HEALTH PHYSICS SOCIETY

67th Annual Meeting
Spokane Convention Center
Spokane, WA • 17-21 July 2022

CONFERENCE PROGRAM
Counts.Pro upgrades your existing meter inventory to digital wireless GPS enabled ALARMING dataloggers with one or two channels to capture, record, and easily share every count measured by your team. Counts are collected and easily exported wirelessly from the FREE iOS APP in .csv files for ease of use and future compatibility. For a fraction of the price you can digitally record all your measurements today.

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Registration
Hours and Location
Exhibit Hall A, Spokane Convention Center

Sunday, 17 July
1:30 PM – 4:00 PM

Monday, 18 July
7:30 AM – 4:00 PM

Tuesday, 19 July
8:00 AM – 4:00 PM

Wednesday, 20 July
8:00 AM – 4:00 PM

Thursday, 21 July
8:00 AM – 11:00 AM

Exhibit
Hours and Location
Exhibit Hall A, Spokane Convention Center

Monday, 18 July
12:00 PM – 7:00 PM

Tuesday, 19 July
9:30 AM – 5:00 PM

Wednesday, 20 July
9:30 AM – 12:00 PM

Spokane Convention Center
334 West Spokane Falls Blvd.
Spokane, WA 99201
509.279.7000
www.spokanecenter.com

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## SCHEDULE AT-A-GLANCE

All events at the Spokane Convention Center unless otherwise noted.

### Saturday, 16 July

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:00 PM – 6:00 PM</td>
<td>Student Orientation</td>
<td>Davenport, Meeting Room 3</td>
</tr>
</tbody>
</table>

### Sunday, 17 July

All PEP Courses take place at the Spokane Convention Center

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00am – 10:00am PDT</td>
<td>PEP 1-A thru 1-C</td>
<td>Room 201 AB</td>
</tr>
<tr>
<td>10:30am – 12:30pm PDT</td>
<td>PEP 2-A thru 2-C</td>
<td>Room 201 C</td>
</tr>
<tr>
<td>1:30pm – 3:30pm PDT</td>
<td>PEP 3-A thru 3-C</td>
<td>Room 202 AB</td>
</tr>
<tr>
<td>3:30pm – 5:30pm PDT</td>
<td>PEP 4-A thru 4-C</td>
<td>Room 202 AB</td>
</tr>
</tbody>
</table>

### Quiz Bowl

- 5:00 PM – 6:30 PM | Room 206 C

### Student Speed Networking

- 3:30 PM – 5:00 PM | Room 206 B

### Sunday PEP Locations

- PEP A = Room 201 AB
- PEP B = Room 201 C
- PEP C = Room 202 AB

### Monday, 18 July

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:45 AM – 7:45 AM</td>
<td>CEL-1 How to Remove and Replace your Cesium irradiator</td>
<td>Centennial Ballroom B</td>
</tr>
<tr>
<td>9:30 AM – 11:15 AM</td>
<td>MAM-A HPS Government Relations Program</td>
<td>Centennial Ballroom 300A</td>
</tr>
<tr>
<td>9:30 AM – 11:30 AM</td>
<td>MAM-B Special Session: Data Quality</td>
<td>Centennial Ballroom 300B</td>
</tr>
<tr>
<td>9:30 AM – 11:30 AM</td>
<td>MAM-C External Dosimetry</td>
<td>Centennial Ballroom 300C</td>
</tr>
<tr>
<td>9:30 AM – 11:15 AM</td>
<td>MAM-D Power Reactor</td>
<td>Centennial Ballroom 300D</td>
</tr>
<tr>
<td>12:15 PM – 2:15 PM</td>
<td>M-1 ICRU 95: Operational Quantities for External Radiation Exposure</td>
<td>Centennial Ballroom A</td>
</tr>
<tr>
<td>12:30 PM – 2:30 PM</td>
<td>M-2 Laser Safety the Next Level</td>
<td>Centennial Ballroom B</td>
</tr>
<tr>
<td>2:30 PM – 5:00 PM</td>
<td>M-3 Integration of Health Physics into Emergency Response</td>
<td>Centennial Ballroom C</td>
</tr>
<tr>
<td>2:30 PM – 5:00 PM</td>
<td>M-4 Internal Dose Calculations for Nuclear Medicine Applications</td>
<td>Centennial Ballroom D</td>
</tr>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td>Exhibitor Sponsored Lunch</td>
<td>Exhibit Hall A</td>
</tr>
</tbody>
</table>

### Tuesday, 19 July

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:45 AM – 7:45 AM</td>
<td>CEL-2 Radiation Protection of the Public and the Environment</td>
<td>Centennial Ballroom B</td>
</tr>
<tr>
<td>9:30 AM – 10:30 AM</td>
<td>TAM-A1 Dose Reconstruction</td>
<td>Centennial Ballroom 300A</td>
</tr>
<tr>
<td>10:45 AM – 11:45 AM</td>
<td>TAM-A2 Radiobiology and Biological Response</td>
<td>Centennial Ballroom 300A</td>
</tr>
<tr>
<td>9:30 AM – 11:45 AM</td>
<td>TAM-B Emergency Response</td>
<td>Centennial Ballroom 300B</td>
</tr>
<tr>
<td>9:30 AM – 11:00 AM</td>
<td>TAM-C Topics in Health Physics</td>
<td>Centennial Ballroom 300C</td>
</tr>
<tr>
<td>9:30 AM – 11:00 AM</td>
<td>TAM-D Special Session: Use of Drones to Enhance Surveys</td>
<td>Centennial Ballroom 300D</td>
</tr>
<tr>
<td>9:30 AM – 11:00 AM</td>
<td>TAM-E Special Session: Rad Air NESHAPs</td>
<td>Room 302AB</td>
</tr>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td>Exhibitor Sponsored Lunch</td>
<td>Exhibit Hall A</td>
</tr>
</tbody>
</table>

### KEY

MAM = Monday AM Session
MPM = Monday PM Session
TAM = Tuesday AM Session
TPM = Tuesday PM Session
WAM = Wed. AM Session
WPM = Wed. PM Session
THAM = Thurs. AM Session
THPM = Thurs. PM Session
# SCHEDULE AT-A-GLANCE

All events at the Spokane Convention Center unless otherwise noted.

<table>
<thead>
<tr>
<th>Wednesday, 20 July</th>
<th>Thursday, 21 July</th>
<th>Registration Hours</th>
</tr>
</thead>
</table>
| **CEL-3** Establishing a Program to Produce Ac-225 with a Superconducting Linear Accelerator: Lessons Learned | **CEL-4** Managing Generally Licensed Devices | **Spokane Convention Center**
| 6:45 AM – 7:45 AM Centennial Ballroom B | 6:45 AM – 7:45 AM Centennial Ballroom B | **Exhibit Hall A**
| **WAM-A** Medical Health Physics | **THAM-A** Special Session: Workings of the Health Physics Society - A "How to" Training Session | **Sunday**
| 9:30 AM – 11:15 AM Centennial Ballroom 300A | 8:00 AM – 12:00 PM Centennial Ballroom 300A | 1:30 PM – 4:00 PM
| **WAM-B** Special Session: DOE Health Studies Part 1 | **THAM-B** Special Session: AIRRS Roundtable | **Monday**
| 9:30 AM – 12:00 PM Centennial Ballroom 300B | 8:00 AM – 12:00 PM Centennial Ballroom 300B | 7:30 AM – 4:00 PM
| **WAM-C** Special Session: The HPS Standards Organization | **THAM-C** International Collaboration Committee Special Session: How to Influence the Future of Radiological Protection | **Tuesday**
| 9:30 AM – 11:50 AM Centennial Ballroom 300C | 8:00 AM – 11:30 AM Centennial Ballroom 300C | 8:00 AM – 4:00 PM
| **WAM-D** Decontamination and Decommissioning | **PEP Program** | **Wednesday**
| 9:30 AM – 11:45 AM Centennial Ballroom 300D | 12:15 PM – 2:15 PM Room 302 A | 8:00 AM – 4:00 PM
| **HPS Awards Lunch** | **TH-1** Radiation in Flight | **Thursday, 21 July**
| 12:00 PM – 2:30 PM Exhibit Hall B | Room 302 B | **AIRRS Business Meeting**
| **WPM-A** AAHP Special Session: The System of Radiological Protection, Part 2 | **TH-2** Radon physics | 1 PM – 5:00 PM Centennial Ballroom 300B
| 2:30 PM – 5:30 PM Centennial Ballroom 300A | Room 402 C | **Women in Radiation Protection Section Business Meeting**
| **WPM-B** Special Session: DOE Health Studies Part 2 | **TH-3** Technical Basis and Operational Experience for Clearance of Personal Property from SLAC Accelerator Facilities | 5:00 PM – 5:30 PM Centennial Ballroom 300C
| 2:30 PM – 5:45 PM Centennial Ballroom 300B | **THPM-A** Special Session: Non-ionizing Radiation | **AAHP Business Meeting**
| **WPM-C** Environmental Monitoring | 1:30 PM – 5:50 PM Centennial Ballroom 300A | 5:30 PM – 6:30 PM Centennial Ballroom 300A
| 2:30 PM – 5:00 PM Centennial Ballroom 300C | **THPM-B** Special Session: Radiation Safety Issues in Radiation Oncology | **Wednesday, 20 July**
| **WPM-D** Special Session: Health Physics Evolution in Medical Physics Enterprise | 1:30 PM – 5:40 PM Centennial Ballroom 300B | 10:45 AM – 11:45 AM Centennial Ballroom 300D
| 2:30 PM – 3:30 PM Centennial Ballroom 300D | **THPM-C** Special Session: Early-Career Professionals | **HPS Business Meeting**
| | 1:30 PM – 5:30 PM Centennial Ballroom 300C | 5:45 PM – 6:45 PM Centennial Ballroom 300A

**NOTE FOR CHPs**

The American Academy of Health Physics has approved the following meeting-related activities for continuing education credits for CHPs:

- Meeting attendance is granted 1 CEC per contact hour, excluding meals and business meetings;
- AAHP 8-hour courses are granted 16 CECs each;
- HPS 2-hour PEP courses are granted 4 CECs each;
- HPS 1-hour CELs are granted 2 CECs each.
THANK YOU TO OUR 2022 HPS SPONSORS

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<th>LEVEL</th>
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<td>Mirion Technologies</td>
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<td>GOLD</td>
<td>Bionomics, Oak Ridge, TN</td>
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<td>Eckert &amp; Ziegler Isotope Products</td>
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<td>Versant Medical Physics and Radiation Safety</td>
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<td>SILVER</td>
<td>C&amp;C Irradiator Service LLC</td>
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<td>HI-Q Environmental Products Company, Inc.</td>
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<td>Air Sampling &amp; Radiation Monitoring Equipment, Systems &amp; Accessories</td>
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<td>BRONZE</td>
<td>Berkeley Nuclear Corp</td>
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<td>Nuclear News, Radwaste Solutions</td>
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BOARD OF DIRECTORS/OFFICERS

Officers
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Treasurer (2022) - Ali Simpkins
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George Tabatatze

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Task Force Chair: Deirdre Elder
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sales@ludlums.com
https://ludlums.com
(800) 622-0828
(325) 235-5494
Welcome
The Columbia Chapter of the Health Physics Society welcomes you to Spokane and the 67th Annual Meeting of the HPS. Spokane is a gem of the Inland Northwest with something for everyone close by to our conference activities. Riverfront Park provides beautiful walks, breathtaking waterfalls (including the largest urban waterfall in the country), sculptures, and activities for children of all ages. There are over 100 eating and drinking establishments within easy walking distance, and shopping abounds in the heart of downtown Spokane. A short ride can take you to museums and the gardens of Manitou Park. Check out the link www.visitspokane.com to find more to do. Take time to enjoy the beautiful and relaxing surroundings of this meeting.

PEP/CEL Ready Room
The PEP/CEL Ready Room will be combined with the Speaker Ready Room in Room 303 AB in the Spokane Convention Center from Sunday-Thursday.

Speaker Information
Technical Sessions Speaker Instructions
You are allotted a total of 12 minutes of speaking time unless you have been notified otherwise.

The Speaker Ready Room (Room 303 AB) will be open Sunday from 2:00 PM – 5:00 PM, Monday through Wednesday from 7:30 AM – 5:00 PM, and Thursday 7:30 AM – 10:00 AM. You must check in at the Speaker Ready Room (even if you have already submitted your presentation) no later than the following times:

<table>
<thead>
<tr>
<th>Presentation Time</th>
<th>Check-In Deadline</th>
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</thead>
<tbody>
<tr>
<td>Monday AM-PM</td>
<td>5:00 PM Sunday</td>
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<tr>
<td>Tuesday AM-PM</td>
<td>5:00 PM Monday</td>
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<tr>
<td>Wednesday AM-PM</td>
<td>5:00 PM Tuesday</td>
</tr>
<tr>
<td>Thursday AM</td>
<td>5:00 PM Wednesday</td>
</tr>
</tbody>
</table>

Please report to your session room 10 minutes prior to the session start to let your session chair(s) know that you are there.

Posters in Exhibit Hall A must be put up for display between 10:00 AM and 12:00 PM on Monday and removed on Wednesday by 11:00 AM.
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VISIT US IN BOOTH 105!
Information for Registered Companions

Companion Registration cost is $130 and includes the Welcome Reception, Monday-Thursday breakfast buffet at The Davenport Grand, and lunch and breaks in the Exhibition Hall. There will not be a separate Hospitality Room, however the Local Arrangements Committee staff will be happy to answer your questions or assist in finding the answer.

Monday, 18 July

Welcome Reception
5:30 PM – 7:00 PM,
Exhibit Hall A, Spokane Convention Center
Come see old friends and make new ones! Enjoy hors d’oeuvres with a cash bar, 5:30 PM – 7:00 PM.

Monday, 18 July

Welcome to Spokane Companion Orientation
Spokane Representative – 9:00 AM - 10:00 AM,
The Davenport Grand, Meeting Room 5
The city orientation takes place Monday, 18 July from 9:00 AM to 10:00 AM. A representative from Spokane will be on hand to describe some of the many opportunities, provide maps, and answer questions.

Monday, 18 - Thursday, 21 July

Companion Breakfast
6:30 AM - 10:30 AM, The Davenport Grand
Companion Registration includes Monday – Thursday breakfast buffet at The Davenport Grand, 6:30 AM – 10:30 AM. A delicious buffet awaits you including made-to-order omelets, scrambled eggs, breakfast meats (sausage and bacon), French toast, pancakes, hot oatmeal, assorted pastries, fresh fruits, juice, coffee, and tea.
Registered companions are welcome to come to the lunch and breaks in Exhibit Hall A.
Does your radiation safety program need an upgrade?

Upgrade to Odyssey, a cloud-based, mobile software solution for the modern RSO.

Odyssey modernizes the administration of radiation safety programs. It reduces program management costs, increases productivity, and streamlines workflow processes for more efficient management. The software is made up of 12 modules:

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- Machine Management
- Inventory Tracking
- Training
- Forms
- Reports
- Permits
- Document Library
- Canvas
- Incident Management
- Equipment Catalog
- Waste Management

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We'd love to chat about how our software, regulatory, diagnostic physics, and personnel dosimetry management services can assist your radiation safety program.

www.versantphysics.com
sales@versantphysics.com
Committee/Business Meetings
Meetings take place at the Spokane Convention Center unless otherwise noted.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, 16 July 2022</td>
<td>Finance &amp; Executive Committee Meeting</td>
<td>7:30 AM – 4:00 PM</td>
<td>Davenport, Meeting Room 11</td>
</tr>
<tr>
<td></td>
<td>NRRPT Meeting</td>
<td>8:00 AM – 4:00 PM</td>
<td>Davenport, Terrace Room West</td>
</tr>
<tr>
<td></td>
<td>Student Orientation</td>
<td>5:00 PM – 6:00 PM</td>
<td>Davenport, Meeting Room 3</td>
</tr>
<tr>
<td>Sunday, 17 July 2022</td>
<td>NRRPT</td>
<td>8:00 AM – 4:00 PM</td>
<td>Davenport, Terrace Room West</td>
</tr>
<tr>
<td></td>
<td>HPS Board of Directors</td>
<td>8:30 AM – 5:00 PM</td>
<td>Room 207</td>
</tr>
<tr>
<td></td>
<td>HPS Science Support Committee</td>
<td>12:30 PM – 5:00 PM</td>
<td>Room 202 C</td>
</tr>
<tr>
<td></td>
<td>Science Teachers Workshop</td>
<td>12:30 PM – 5:00 PM</td>
<td>Room 206 A</td>
</tr>
<tr>
<td></td>
<td>Student Speed Networking</td>
<td>3:30 PM – 5:00 PM</td>
<td>Room 206 B</td>
</tr>
<tr>
<td></td>
<td>Quiz Bowl</td>
<td>5:00 PM – 6:30 PM</td>
<td>Room 206 C</td>
</tr>
<tr>
<td>Monday, 18 July 2022</td>
<td>Elda Anderson Breakfast</td>
<td>6:45 AM – 8:00 AM</td>
<td>Davenport, Meeting Room 4</td>
</tr>
<tr>
<td></td>
<td>NRRPT Meeting</td>
<td>8:00 AM – 4:00 PM</td>
<td>Davenport, Terrace Room West</td>
</tr>
<tr>
<td></td>
<td>Intersociety Relations Committee</td>
<td>9:00 AM – 10:00 AM</td>
<td>Room 401 A</td>
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<td></td>
<td>Academic Education Committee</td>
<td>12:00 PM – 1:00 PM</td>
<td>Room 401 A</td>
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<tr>
<td>Tuesday, 19 July 2022</td>
<td>NRRPT Meeting</td>
<td>8:00 AM – 4:00 PM</td>
<td>Davenport, Terrace Room West</td>
</tr>
<tr>
<td></td>
<td>Health Physics Publications Team Meeting</td>
<td>8:30 AM – 10:00 AM</td>
<td>Room 401 A</td>
</tr>
<tr>
<td></td>
<td>ANSI/HPS N13.45 Working Group</td>
<td>9:00 AM – 12:30 PM</td>
<td>Room 401 C</td>
</tr>
<tr>
<td>Wednesday, 20 July 2022</td>
<td>Membership Committee</td>
<td>10:00 AM – 12:00 PM</td>
<td>Room 401 A</td>
</tr>
<tr>
<td></td>
<td>President Meeting with BOD Designates</td>
<td>10:00 AM – 5:00 PM</td>
<td>Room 301</td>
</tr>
<tr>
<td></td>
<td>Awards Lunch</td>
<td>12:00 PM – 2:30 PM</td>
<td>Exhibit Hall B</td>
</tr>
<tr>
<td></td>
<td>Health Physics Society Standards Committee</td>
<td>12:30 PM – 2:30 PM</td>
<td>Room 401 B</td>
</tr>
<tr>
<td></td>
<td>Student Support Committee</td>
<td>2:30 PM – 3:30 PM</td>
<td>Room 401 A</td>
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<tr>
<td></td>
<td>HPS Business Meeting</td>
<td>5:45 PM – 6:45 PM</td>
<td>Centennial Ballroom 300 A</td>
</tr>
<tr>
<td>Thursday, 21 July 2022</td>
<td>HPS Executive/Finance Committee Meeting</td>
<td>10:00 AM – 11:30 AM</td>
<td>Room 301</td>
</tr>
<tr>
<td></td>
<td>HPS Board of Directors Meeting</td>
<td>11:30 AM – 2:30 PM</td>
<td>Room 301</td>
</tr>
<tr>
<td></td>
<td>AIRRS Business Meeting</td>
<td>12:00 PM – 1:00 PM</td>
<td>Centennial Ballroom B</td>
</tr>
<tr>
<td></td>
<td>Program Committee Meeting</td>
<td>12:00 PM – 1:30 PM</td>
<td>Room 401 A</td>
</tr>
<tr>
<td></td>
<td>Homeland Security Section Business Meeting</td>
<td>12:15 PM – 1:15 PM</td>
<td>Centennial Ballroom C</td>
</tr>
<tr>
<td></td>
<td>Military Section Business Meeting</td>
<td>12:15 PM – 1:15 PM</td>
<td>Centennial Ballroom A</td>
</tr>
</tbody>
</table>
HPS Awards Luncheon
Wednesday, 20 July • 12:00 PM – 2:30 PM
Spokane Convention Center, Exhibit Hall B

Join us Wednesday, 20 July, for the HPS Awards Program. We look forward to seeing you by 12:30 PM for the presentation at the Spokane Convention Center. There will be a buffet lunch provided that begins at 12:00 PM.

Sunday-Thursday
PEPs, CELs, Committee Meetings, Exhibits, and Sessions (all events) take place at the Spokane Convention Center.

Speaker Ready Room
Spokane Convention Center • Room 303 AB
Sunday: 2:00 PM – 5:00 PM
Monday-Wednesday: 7:30 AM – 5:00 PM
Thursday: 7:30 AM – 10:00 AM

You must check in at the Ready Room (even if you have already submitted your presentation).

Note For CHPs
The American Academy of Health Physics has approved the following meeting-related activities for continuing education credits for CHPs:
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- HPS 2-hour PEP courses are granted 4 CECs each;
- HPS 1-hour CELs are granted 2 CECs each.

The HPS program committee has applied to CAMPEP for MPCEC credits for appropriate sessions. Please contact Sandy Konerth, SKonerth@versantphysics.com for more information.

Student Events

Student Orientation
Saturday, 16 July, 5:00 PM – 6:00 PM
Davenport, Meeting Room 3

Quiz Bowl
Sunday, 17 July, 5:00 PM– 6:30 PM
Room 206 C

Speed Networking Event/
Mentor Reception
Sunday, 17 July, 3:30 PM – 5:00 PM
Room 206 B

Exhibitor Luncheons
Monday, 18 July, 12:00 PM
Tuesday, 19 July, 12:00 PM
Exhibit Hall A

Welcome Reception
Monday, 5:30 PM – 7:00 PM
Exhibit Hall A

HPS Awards Lunch
Wednesday, 20 July, 12:00 PM – 2:30 PM
Exhibit Hall B
IMPORTANT EVENTS

Quiz Bowl
You and your friends can test your knowledge against other HPS members (members are encouraged to group with students and young professionals). Join in on the fun Sunday, 17 July, 5:00 PM– 6:30 PM, at the Spokane Convention Center, Room 206 C.

Student Mentor Speed Networking
This event will serve as a way for students and early career health physicists to meet potential mentors within the society who can help guide their growing career with industry/academia recommendations and suggestions. Join in on Sunday, 17 July, 3:30 PM – 5:00 PM, at the Spokane Convention Center, Room 206 B.

Welcome Reception
The Welcome Reception this year will be held on Monday, 18 July from 5:30 PM – 7:00 PM in Exhibit Hall A. Join fellow attendees for a time to socialize and renew old acquaintances. A cash bar will be available with appetizers.

HPS’s ‘Ask-the-Expert’ Social
Calling all Ask-The-Experts topic editors, experts, and contributors! Join the team for a social night out on Wednesday, July 20 at 5:30pm at Brick West Brewing, 1318 W 1st Ave, Spokane, WA 99201

Exhibits
Free Lunch! Free Lunch! – 12:00 PM, Monday, 18 July and Tuesday, 19 July. All registered attendees are invited to attend a complimentary lunch in Exhibit Hall A.

Breaks Monday Afternoon-Wednesday Morning – Featuring morning continental breakfasts and afternoon refreshments such as fruit, ice cream, and cookies. Be sure to stop by and visit with the exhibitors while enjoying your refreshments!

Sessions and Course Locations
Sunday PEPs are in the Spokane Convention Center; PEPs, CELs, and all sessions Monday through Thursday will take place at the Spokane Convention Center.

AAHP and ABHP Awards Luncheon
Spokane Convention Center, Ballroom 111 C
Tuesday, 19 July • 12:00 PM – 2:00 PM

HPS Awards Lunch
Join us Wednesday, 20 July, for the HPS Awards Program. We look forward to seeing you by 12:30 PM for the presentation at the Spokane Convention Center. There will be a buffet lunch provided that begins at 12:00 PM.

Again this YEAR!
PEP Courses will have presentations posted online for those who have signed up for them prior to the meeting. There will be no hard copy handouts. See page 52 for course information.

Things to Remember!
All speakers are required to check in at the Speaker Ready Room (Room 303 AB) in the Spokane Convention Center, at least one day prior to their assigned presentation.
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HPS AWARDS LUNCHEON

Wednesday, 20 July • Spokane Convention Center, Exhibit Hall B
12:00 PM – 2:30 PM – Awards Luncheon

Awards
Introduction by John Cardarelli II, President
Presented by Eric Goldin, Awards Committee Chair

Recognition of 50 Year Members

Recognition of Student Fellowship & Scholarship Recipients

Recognition of Student Travel Grant Recipients

Announcement of Health Physics-Related Awards

Student Science Award

Fellow of the Health Physics Society Awards and Certificate Presentations

Geoffrey G. Eichholz Outstanding Science Teacher Award

Distinguished Scientific Achievement Award

Elda E. Anderson Award

Adjournment

2022 HPS 50 Year Members

John F. Agnew
Jerry D. Allison
Caridad Borras
Howard W. Dickson
Richard L. Doty
Michael P. Grissom
John Handloser, Jr.
Paul W. Harvey
Elizabeth P. Katsikis
Sheila I. Kronenberger
Linda L. Morris
Francis M. Roddy
Mike Singh
Henry B. Spitz
Orhan Suleiman
John E. Till

Student Fellowships
We appreciate the sponsors and recognize the merits of the students in the following fellowships that provide important financial support to students in our health physics teaching programs:

Health Physics Society Fellowships
Robert Dawson, University of Florida
Sean Domal, University of Florida

Robert Gardner Memorial Fellowship
Ryan Tan, University of Tennessee

Robert S. Landauer, Sr., Memorial Fellowship
Andrew Rosenstrom, Georgia Institute of Technology

Richard J. Burk, Jr., Fellowship
Sarah Donaher, Clemson University

J. Newell Stannard Memorial Fellowship
Julian Newmyer, University of Tennessee

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Yuiko Chino, Colorado State University
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HPS AWARDS LUNCHEON

Student Travel Grant Recipients
These grants enable health physics students to attend and participate in our annual meeting. Additional support was received from the Medical Health Physics Section.

Vanessa Adriatico
Oregon State University

Johnson Aina
Idaho State University

Mashael Almowallad
Illinois Institute of Technology

Eric Ofosu Asare
University of Ghana-School of Nuclear and Allied Sciences

Ignacio Bartol
Georgia Institute of Technology

Yuiko Chino
ERHS, Colorado State University

Long Kiu Chung
Stanford University

Christopher Davis
University of Michigan

Jeremiah Edwards
University of Alabama at Birmingham

Philip Gyan
KEPCO International Nuclear Graduate School

Jordan Hillis
Texas A&M University

Jarriah Hooker
Alcorn State University

De’Marcus Jackson
Alcorn state University

Matthew Jalbert
Worcester Polytechnic Institute

Chukwuka James
Alcorn State University

Elif Kara
Ludwig Maximilian University of Munich / Helmholtz Zentrum Münch

Andrew Kent
University of Michigan

Ryan Kim
University of Michigan

Philippe Laporte
Université de Montréal

Heechan Lee
Georgia Institute of Technology

Matthew Louis
Georgia Institute of Technology

Anna Manfredo
Illinois Institute of Technology

Dmitri Margot
Georgia Institute of Technology

Emmanuel Mate-Kole
Georgia Institute of Technology

Jordan Noey
University of Michigan

April Parks
University of Massachusetts Lowell

Paul Pierson
Columbia Basin College

Michael Robinson
University of Michigan

Abdullahi Shittu
King Abdulaziz University

Felicia Shoulders
Alcorn State University

Jonas Smith
Clemson University

Colin Stewart
University of Michigan

Colett Treas
Bloomsburg University of Pennsylvania

Bryanna Wattier
Clemson University

Raquema Williams
University of Alabama at Birmingham
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HPS AWARDS LUNCHEON

Related Awards

American Academy of Health Physics

William A. McAdams Outstanding Service Award
Presented annually to individuals who have made long-term and significant contributions to the certification process and have elevated professionalism in health physics.
Wei-Hsung Wang, Ph.D., CHP, CSP, CLSO, FHPS

Joyce P. Davis Memorial Award
Presented in recognition of exemplary service as a role model in upholding the ethical and professional standards of the Academy.
Dr. Samuel Baker, CHP

Nancy K. Johnson National Service Award
Presented to individuals who have provided exceptional service to the Academy during the immediate Past President’s term of office.
James P. Nunn, MS, CHP, DABR

Accelerator Section Awards

H. Wade Patterson Memorial Award
Established in 2003, the H. Wade Patterson Memorial Award recognizes outstanding student presentations on accelerator health physics at the annual meeting. The winner receives a check and plaque.

Lutz Moritz Memorial Award
Established in 2009, the Lutz Moritz Memorial Award recognizes outstanding student presentations on accelerator health physics at the Annual Meeting. The winner receives a check and plaque.

Homeland Security Section Award
The Health Physics Society Homeland Security Section honors those who exemplify outstanding service and dedication to the HSS.
Daniel J. Blumenthal

Military Health Physics Section Awards

Superior Civilian Service Award
Established in 2014, the Superior Civilian Service Award recognizes a person who has distinguished himself or herself in service to our Country over a long career as a civilian military health physicist and is presented at the Annual Meeting. The winner receives a plaque.
Michael “Mike” R. Call
Brian B. Hearty

Young Military Health Physicist of the Year Award
Established in 2014, the Young Military Health Physicist of the Year Award recognizes a young military health physicist for excellence in (1) research or development, (2) discovery or invention, (3) devotion to military health physics, and/or (4) significant contributions to the profession of military health physics and is presented at the annual meeting. The winner receives a plaque and a one-year membership in the Health Physics Society.
Kristina D. Yepez

Academic, Industrial, and Research Radiation Safety (AIRRS) Section Award

Outstanding Radiation Safety Program Award
Established in 2022, this brand new award acknowledges an exceptional Radiation Safety Program in an academic, industrial or research institution that uses radioactive materials or radiation producing devices. The winning organization receives a Plaque and the representative from the organization receives a complimentary registration at the annual meeting. This award will be presented at the AIRRS section business meeting.

University of Massachusetts Lowell (UML) Radiation Safety Office

Non-Ionizing Radiation Section Service Award
Established in 2018, this award is designed to acknowledge outstanding contributions to the science and technology of non-ionizing radiation safety. The recipient of the award is recognized for accomplishments of fundamental importance to the practice, acceptance, and advancement of Non-Ionizing Radiation Protection.
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Student Science Award
This award recognizes outstanding contributions by students in grades 6–12 to the understanding of the applications of radiation and its impact on the environment and health. Nominations for this award can be made by any full member of the Society or by a chapter. This award is presented at a meeting of the nominating chapter or a chapter near the awardee’s residence.

Devarshi Dalal
Use of Artificial Intelligence for Obtaining Optimal Wrist X-Rays

Fellows
To honor senior members of the Society who have made significant administrative, educational, or scientific contributions to the profession of health physics.

2022 Fellows
Keith Eckerman
Philip C. Fulmer
John Keklak
David Medich

Geoffrey G. Eichholz Outstanding Science Teacher Award
To honor teachers who have made significant contributions to educating students in topics related to the field of radiation safety. Award consists of an Associate Membership.

Huitzilin Ortiz

Distinguished Scientific Achievement Award
This award is designed to acknowledge outstanding contributions to the science and technology of radiation safety. The recipient of the award is recognized for accomplishments of fundamental importance to the practice, acceptance, and advancement of the profession of health physics. It is awarded in memory of those scientists who contributed in an outstanding way to the development of scientific knowledge for the protection of man and his environment. (Prior to 1984 this was called the Distinguished Achievement Award.)

Harold L. Beck
Award consists of a plaque and life membership in the Society

Elda E. Anderson Award
This award is presented to a young member of the Health Physics Society to recognize excellence in:
1. Research or development
2. Discovery or invention
3. Devotion to health physics, and
4. Significant contributions to the profession of health physics

Sara Dumit
Award consists of a certificate and a $1,000 check
HPS Speed Networking

Join the HPS Student Support Committee for the third annual Speed Networking Event and Mentor Reception! After the resounding success of the first Speed Networking Event in 2019, the HPS Student Support Committee is excited to once again host the dynamic and engaging event aimed at allowing students and early career professionals to connect with more experienced individuals within the Health Physics Society in a fun and relaxed atmosphere (with snacks, of course). Everyone is welcome, we need all of you to make this event a success!

HPS Quiz Bowl

This year, the Speed Networking event will be directly followed by the HPS Annual Quiz Bowl. The Quiz Bowl is a great chance to exercise your Health Physics muscles! Students and young professionals, meaning those yet to become a CHP, are encouraged to participate and everyone is welcome to come cheer on the participants! The questions will range from “you should know this” to advanced, with some fun trivia mixed in. You can sign up as a team of 3 or 4 or sign up individually to be teamed up during the event!

For more information contact:
Dawn Montgomery
(Speed Networking)
damontg@clemson.edu

-or-
Norbert Hugger
(Quiz Bowl)
HPSQuizBowl@gmail.com

Events sponsored by the HPS Student Support Committee
Breaks
Tuesday AM – Wednesday AM
Featuring morning continental breakfasts and afternoon refreshments. Be sure to stop by and visit with the exhibitors while enjoying your refreshments.

Lunches
Monday – Tuesday, 12:00 PM
All registered attendees are invited to attend a complimentary lunch in Exhibit Hall A.

Welcome Reception
Monday, 5:30 PM – 7:00 PM
Join fellow attendees in the Exhibit Hall A for a time to socialize and renew old acquaintances.
The AAHP advances the profession of Health Physics and encourages the highest standards of ethics and integrity in its members. The AAHP offers membership to all individuals who have been certified by the American Board of Health Physics (ABHP), known as Certified Health Physicists (CHPs).

The American Nuclear Society is a nonprofit, international professional organization representing the fields of nuclear science and technology. ANS promotes the awareness and understanding of the applications of nuclear science and technology to the general public and policymakers, while providing networking and professional development opportunities. Visit ans.org for more information.

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HPS 2023 Annual Meeting – National Harbor, MD

Join us for the HPS 2023 Annual Meeting, 23–27 July 2023, at the Gaylord National Harbor!

HPS Publications

The Health Physics Society (HPS) issues several types of official publications: the HPS website, Health Physics News, the Health Physics Journal, Operational Radiation Safety, special publications (proceedings and educational materials), and American National Standards. Meet HPS editors and share your thoughts on what we are doing and what you would like to see us do. While you are here, enter our book drawing. It’s as easy as filling out a survey to let us know your thoughts on the HPS website and publications. We are giving away over $3,000 worth of health physics-related books!

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IRPA 16

The Health Physics Society (HPS) is proud to welcome IRPA delegates and radiation safety professionals from around the world to the 16th International Congress in Orlando, Florida. Joining us in welcoming IRPA to North America are the Canadian Radiation Protection Association and Sociedad Mexicana de Seguridad Radiológica. This will be the first time in 51 years that the International Congress has been held in the United States and the first time since 1992 that it has been held in North America.

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radiuminc.com

Radium has developed a next generation of gamma radiation shielding technology. Our patented (#10262763) ClearView Radiation Shielding liquid solution is developed to be a lightweight, non-hazardous alternative to the industry's existing heavy and toxic lead shielding. Our shields are being used by hospitals in nuclear medicine departments, theranostics such as Lu-177 and I-131 therapies, nuclear medicine along with DOE labs, radwaste sites, etc.

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Booth: 215
Silver Sponsor
4137 Commerce Circle  
Idaho Falls, ID 83401  
208-524-5300  
www.radqual.com

RadQual is the exclusive distributor for LEA throughout the United States and Canada. LEA's calibration and reference sources are measured according to ISO 17025:2017 under COFRAC accreditation, which provides the same traceability to SI as the National Institute of Standards and Technology (NIST).

Sandia National Labs Program  
Booth 216
Radiation Protection
1515 Eubank Blvd. SE  
Albuquerque, NM 87123  
www.sandia.gov
For more than 70 years, Sandia has delivered essential science and technology to resolve the nation's most challenging security issues. Sandia National Laboratories as a contractor for the U.S. Department of Energy's National Nuclear Security Administration. We provide radiation protection support services to Sandia and are the steward of the corporate Radiation Protection Program. Personnel support the development and implementation of critical operational elements of the SNL RP Program, which is established to meet the requirements of 10 CFR 835. We routinely interface directly with radiological workers of various disciplines and backgrounds throughout SNL and provide guidance on regulatory requirements and best radiation protection practices.

SE International  
Booth: 219
PO BOX 39, 436 Farm Road  
Summertown, TN 38483  
931-964-3561  
www.seintl.com
Manufacturer of the Radiation Alert® product line, offering affordable handheld ionizing radiation detection instruments including Geiger counters, dosimeters, multi-channel analyzers, Area Monitors, for surface and air contamination. Proven reliable in Emergency Response, environmental, industrial, laboratory, research, Health physics, and educational fields. We provide excellence in instrumentation, reliability and customer service.

Spectral Labs Incorporated  
Booth: 405
Silver Sponsor
15920 Bernardo Center Drive  
San Diego, CA 92127  
858-207-3727  
spectrallabs.com
The Spectral Labs mission is to leverage our broad technical skill set and the product development passion of our Employee Owners to innovate practical, high-quality solutions developed through keen focus on customer requirements. Our experience lies in product development and manufacturing of instrumentation and software for military and first responders.
**Spectrum Techniques**  
Booth: 214  
106 Union Valley Road  
Oakridge, TN 37830  
865-482-9937  
www.spectrumtechniques.com  

Spectrum Techniques is your primary source for exempt quantity radionuclides, radiation detection and measurements instrumentation. Applications include teaching in nuclear medicine, health physics, chemistry, biology and nuclear engineering. See our web site at Spectrumtechniques.com for MCAs, nuclear counters and ratemeters. Source types include disk, rod, laminated and needle sources.

**Thermo Fisher Scientific**  
Booth: 415  
1 Thermo Fisher Way  
Oakwood, OH 44146  
800-766-7000  

The radiation detection and measurement portfolio of products from Thermo Fisher Scientific have been used in a wide range of applications throughout the world. From TLD crystal growth to spectroscopic handheld instruments, we have a solution for your radiation detection and identification needs.

**Thomas Gray & Associates, Inc.**  
Booth: 409  
1205 West Barkley Avenue  
Orange, CA 92868  
714-997-8090  
TGAINC.com  

Thomas Gray and Associates, Inc. (TGA) is a licensed radioactive services company that offers a full suite of health physics consulting that includes facility decommissioning, on-site services, training, radioactive materials processing, disposal brokerage, nuclide identification, transportation, packaging, and decay-in-storage services.

**Ultra Energy**  
Booth: 124  
7 Lancaster Road  
Ferndown Industrial Estate  
Wimborne Dorset, BH21 7SQ UK  
44 1202 850450  
www.ultra-electronics.com  

Ultra Electronics Nuclear Control Systems specialise in the supply of radiation detection systems to the nuclear industry. Product supplied include measurement instruments for dose-rate, contamination and the measurement of radioactive concentration in air and liquids. Ultra Electronics - NCS support operating NPP’s, fuel cycle facilities and decommissioning projects around the World.

**U.S. Nuclear Regulatory Commission (NRC)**  
Booth: 225  
11555 Rockville Pike, MS TWFN 2A77  
Rockville, MD 20852  
301-415-7000  
www.nrc.gov  

The mission of the U.S. Nuclear Regulatory Commission is to license and regulate the Nation’s civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety and to promote the common defense and security and to protect the environment.

**USTUR Washington State University**  
Booth: 112  
1845 Terminal Drive, Suite 201  
Richland, WA 99354  
509-946-6870  
ustur.wsu.edu  

The United States Transuranium & Uranium Registries (USTUR) is a research program that studies actinide elements deposited within the human body – in persons with measurable, documented exposures to those elements.

**Versant Medical Physics and Radiation Safety**  
Booth: 107  

**GOLD SPONSOR**  
119 N. Church St, Suite 201  
Kalamazoo, MI 49007  
888-316-3644  
www.versantphysics.com  

Versant Physics is the creator of Odyssey, a Radiation Safety Software suite used by Hospitals, Pharmaceutical companies, Businesses, and Universities. Versant Physics also provides exceptional quality consulting and support services including RSO support, Radiation Safety Audits, Surveys, Physics Calculations, Online Continuing Education Courses, and Personnel Dosimetry Badge Management services.

**Zievert**  
Booth: 224  

**Silver Sponsor**  
6 Huron Dr, Suite 1B  
Natick, MA 01760  
508-653-7100  
www.zievert.com  

Zievert is offering more than 100 types of radiation detection instruments, including radiation survey meters, activity counters, radioisotope identification devices (RIDs), backpack radiation detectors (BRDs), pedestrian and vehicle portal monitors (RPMs), etc. Additional information is available on www.zievert.com
Colorado State University
CSU/ERHS 1618 Campus Delivery
Fort Collins, CO 80523
970-491-0563
vetmedbiosci.colostate.edu/degree-programs/graduate/ms-radiological-health/health-physics/

Colorado State University offers an MS in health physics (ABET accredited), with concentrations in radioecology and radiochemistry, as well as a PhD program. CSU has established relationships with Fukushima, Los Alamos National Laboratory, Idaho National Laboratory and others as key partners in the education of students.

Oregon State University, School of Nuclear Science and Engineering
151 Batcheller Hall
Corvallis, OR 97331
541-737-2343
ne.oregonstate.edu

Founded in 1959, OSU School of Nuclear Science and Engineering boasts a global influence and are one of the top programs in the United States. We are known for our progressive research, large-scale test facilities, and industry and governmental partnerships. With students from around the globe; world-class faculty hailing from China, Iran, Poland, Slovakia, and the United States; and more than 1,300 alumni living and working in the United States and abroad, we are driving the future of nuclear science through engineering and health physics.

University of Alabama at Birmingham
1716 9th Ave S
Birmingham, AL 35233
541-250-1975
www.uab.edu/shp/cds/health-physics

The UAB MS in Health Physics program strives to provide a quality educational experience that prepares students to be skilled professionals who will equitably serve in a diverse workforce, who will contribute to the profession throughout their careers, and who will uphold the highest standards of ethics and integrity both personally and professionally.
# Sunday Professional Enrichment Program (PEP)

All sessions take place in the Spokane Convention Center

## SUNDAY

### 8:00 AM – 10:00 AM

**PEP 1-A**
- **Room 201 AB**
- Control of Hazards from Ultraviolet Lamps and Arcs
  - *Sliney D*

**PEP 1-B**
- **Room 201 C**
- Alpha Spectroscopy for the Health Physicist
  - *Clemmer M*

**PEP 1-C**
- **Room 202 AB**
- Using the Updated CAP88-PC and STARGET Codes for Estimating Dose and Risk from Chronic Atmospheric Releases
  - *Littleton B*

### 10:30 AM – 12:30 PM

**PEP 2-A**
- **Room 201 AB**
- Nonionizing Radiation: An Overview of Biological Effects and Exposure Limits
  - *Edwards B*

**PEP 2-B**
- **Room 201 C**
- Gamma Spectroscopy for the Health Physicist
  - *Clemmer M*

**PEP 2-C**
- **Room 202 AB**
- Contemporary Topics in Radiation Protection: Ethics and Insider Threat Security Risks
  - *Emery R*

### 1:30 PM – 3:30 PM

**PEP 3-A**
- **Room 201 AB**
- Laser Safety for Health Physicists
  - *Edwards B*

**PEP 3-B**
- **Room 201 C**
- New Pixelated CZT 3D Detection System for Applications in Nuclear Power, Nuclear Research & Medical Imaging
  - *Miller DW*

**PEP 3-C**
- **Room 202 AB**
- Introductory R programming with the ‘Radsafer’ package
  - *Hogue M*

### 3:30 PM – 5:30 PM

**PEP 4-A**
- **Room 201 AB**
- Retrospective dosimetry in nuclear forensics
  - *Hayes R*

**PEP 4-B**
- **Room 201 C**
- Calculating Effective Dose and Risk of Cancer from Internal Intake and External Exposure to Radioactive Material
  - *Stuenkel D*

**PEP 4-C**
- **Room 202 AB**
- Federal Radiological Response Teams
  - *Groves K*
MONDAY

6:45 AM – 7:45 AM

**CEL-1**

Centennial Ballroom B

How to Remove and Replace your Cesium Irradiator

MacKenzie CJ

10:00 am

**MAM-A.3**

DOE Domestic and International Health Studies

Al-Nabulsi I

DOE

10:15 am

**MAM-A.4**

NRC’s University Nuclear Leadership Program

Coffin S, Hebron-Israel N

US NRC

8:00 AM – 9:10 AM

**MAM-PLEN**

Plenary Session

Centennial Ballroom 300AB

8:00 am

**MAM-PLEN.1**

Welcoming Comments

Cardarelli J

HPS

8:10 am

**MAM-PLEN.2**

Radiological Protection for the Next Generation

Clement C

8:40 am

**MAM-PLEN.3**

Landauer Lectureship

Calabrese E

9:30 AM – 11:15 AM

**MAM-A**

HPS Government Relations Program

Chair: Craig Little

Centennial Ballroom 300A

9:30 am

**MAM-A.1**

Interacting with Federal Agencies and Congress: The HPS Government Relations Program

Little CA

HPS

9:45 am

**MAM-A.2**

HPS Government Relations Committee Activities

Ring JP

Beth Israel Deaconess Medical Center

10:00 am

**MAM-A.3**

DOE Domestic and International Health Studies

Al-Nabulsi I

DOE

10:15 am

**MAM-A.4**

NRC’s University Nuclear Leadership Program

Coffin S, Hebron-Israel N

US NRC

10:30 am

**MAM-A.5**

Health Physicist: The Next Generation, Building Capacity for our Radiation Protection Future at the Nuclear Regulatory Commission

Clark T

US NRC

10:45 am

**MAM-A.6**

An Overview of the 2022 OSTP Recommendations for Coordinating Radiation Biology Research

Boyd MA

U.S. Environmental Protection Agency

11:00 am

**MAM-A.7**

HPS and DC: The HPS Government Relations Program

Connolly DA

HPS

9:30 AM – 11:30 AM

**MAM-B**

Special Session: Data Quality

Chair: Jeff Chapman

Centennial Ballroom 300B

9:30 am

**MAM-B.1**

Adapting the Data Quality Process to the Needs of Radiological Emergency Response

Becker EM, Mosser J

Pacific Northwest National Laboratory, Environmental Protection Agency

9:45 am

**MAM-B.2**

Upper Tolerance Limits for Radiological Decision Making

Obiri M, Newburn LN, Fagan DK

Pacific Northwest National Laboratory
MONDAY

10:00 am MAM-B.3
Statistical methods for subsurface decommissioning
Huckett JC, Weller ZD*, Fagan DK, Johnson CD
Pacific Northwest National Laboratory

10:15 am MAM-B.4
Statistical methods to analyze continuously collected data
Fagan DK, Obiri MO, Newburn LN, Bunn AL, Huckett J
Pacific Northwest National Laboratory

10:30 am MAM-B.5
Data quality assessment of continuously collected survey data
Bunn AL, Ikenberry TA*, Fagan DK, Newburn LL
Pacific Northwest National Laboratory

10:45 am MAM-B.6
In an Age of Misinformation and Disinformation: Yes, Data Quality Still Matters
Chapman JA, Mieskoski R
NNSA

11:00 am MAM-B.7
Panel

9:30 AM – 11:15 AM

MAM-C External Dosimetry
Chair: Nolan Hertel
Centennial Ballroom 300C

9:30 am MAM-C.1
“Hostages to Compliance”: Optimizing Reasonableness and Implementing Critical Thinking in External Dosimetry
Passmore CN
Passmore Dosimetry Consulting Services

9:45 am MAM-C.2
Radiation exposure during boating activities: towards more realistic modelling and less conservatism
Griffin KT, Hertel NE*
Georgia Institute of Technology

10:00 am MAM-C.3
Charged Particle Contributions to Local Skin Dose from Neutron Irradiations
Veinat KG, Hertel NE*, Hiller MM, Eckerman KF
Y-12 National Security Complex, Georgia Institute of Technology, Independent Consultant

10:15 am MAM-C.4
Thermo Fisher Scientific NetDose Dosimetry Service NVLAP Accreditation
LaFrate PJ
Thermo Fisher Scientific

10:30 am MAM-C.5
Revision of the ANSI/HPS N13.11-2009
Ushino T, Benevides LA, Harris, Jr. WS, Isbell KM, Jones DF, Lantz MW, Perle SC, Piper RK, Soares CG

10:45 am MAM-C.6
Thermo Fisher Scientific NetDose Dosimeter Performance
Ramlo MJ
Thermo Fisher Scientific

11:00 am MAM-C.7
Occupational Dose Trends in Cardiology
Kirr M
Landauer

9:30 AM – 11:15 AM

MAM-D Power Reactor
Chair: Rick Adams
Centennial Ballroom 300D

9:30 am MAM-D.1
Thirty Years of International NPP Worker Outage Dose Reduction Operating Experience Sharing under OECD NEA / IAEA ISOE Program
Miller DW, Boyer BR
University of Illinois, Tennessee Valley Authority

9:45 am MAM-D.2
Radiological Characterization in Bare Leu U-10mo Before And After Heat Treatment
Calderin Morales D, Huber ZF, Soderquist CZ, Arendt CL, Joshi W, Brooks KP, Rossiter MA, Lavender C
Pacific Northwest National Laboratory

10:00 am MAM-D.3
Advantages Of Real-Time Positioning for Nuclear Power Health Physics Operations
Rashidifard NB, Jarrow D, Kost J, Berrien W, Moerel F
Mirion Technologies
MONDAY

10:15 am
The Effect of Radiation and Dose on Diffusion Pump Oil
Smith JP, Wright CS, Larson G, Guin T, Bliznyuk VN, DeVol TA
Clemson University, Savannah River National Laboratory

10:30 am
Research Reactor Waste Challenges/Achievements
Doenges DD
University of Missouri Research Reactor

11:00 am
Current Status of Radiation Controlled Areas in Korean Nuclear Power Plants
Kim SJ, Chai WS, Son JH, Kim HP, Song CJ
Chosun University

12:15 PM – 2:15 PM

PEP M-1 Centennial Ballroom A
ICRU 95: Operational Quantities for External Radiation Exposure
Hertel NE

PEP M-2 Centennial Ballroom B
Laser Safety the Next Level
Barat K

PEP M-3 Centennial Ballroom C
Integration of Health Physics into Emergency Response and Information Communication
Sugarman S

PEP M-4 Centennial Ballroom D
Internal Dose Calculations for Nuclear Medicine Applications
Sabin M

2:30 PM – 5:50 PM

MPM-A
Special Session: Magnetic Field Effects & Safety for Health Physicists
Chair: Peter Sprenger, John Metyko

Centennial Ballroom 300A

2:30 pm
NMR/MRI Physics Primer
Jafari ME
Morristown Medical Center

MPM-A.1

2:50 pm
Static Magnetic Field Sources recognized and not so much
Barat KL
Laser Safety Solutions

MPM-A.2

3:10 pm
Magnetic Resonance Safety
Kanal E
University of Pittsburgh Medical Center

MPM-A.3

3:30 pm
MR Suite Design & Shielding
Kellogg T
ETS-Lindgren

MPM-A.5

4:10 pm
BREAKE

MPM-A.4

4:30 pm
Preclinical 7T MRI, micro-PET, and micro-CT in a BSL3
Amurao MR, Szatkowski DJ, Cook SH, Quirk J, Boschert K
Washington University in St. Louis

MPM-A.8

5:10 pm
Effects of Magnetic Fields on Pacemakers/Defibrillators
Jafari ME
Morristown Medical Center

MPM-A.7

5:30 pm
Static Magnetic Field Measurements: Overview of Instruments and Techniques
McWilliams FF, Haes DL*
MIT, Consultant

MPM-A.6

5:55 pm
BREAKE

MPM-B

Accelerator
Chair: Robert May

Centennial Ballroom 300B

2:30 pm
Removal of highly activated Isotope Production Facility window assembly from the window-collimator cask
Duran MD, Vigil JV*
LANL

MPM-B.1

2:50 pm
Utility and assessment of the code TALYS-1.96 in accelerator-based production of radioisotopes.
Akabani G
Asociación Mexicana de RadioProtección

MPM-B.2
3:10 pm  MPM-B.3
Characterization of DD and DT Neutron Generators at Georgia Tech
Hertel NE, Mukhopadhyay S
Georgia Institute of Technology

3:30 pm  MPM-B.4
BREAK

3:45 pm  MPM-B.5
High dynamic range neutron dosimetry: applications of the novel NDX dose rate meters at accelerators
Degtiarenko PV
Jefferson Lab

4:10 pm  MPM-B.6
An LSTM Deep Learning Network for Background Radiation Prediction
Stavola A, Zhang H, Ferguson H, Degtiarenko P, Li J, Kwan C
Thomas Jefferson National Accelerator Facility, Old Dominion University, Applied Research LLC

4:25 pm  MPM-B.7
Analysis of Relative Hazards and Detection Capabilities for Radionuclides at the Spallation Neutron Source
Hillis JA
Oak Ridge National Laboratory

4:40 pm  MPM-B.8
High Power Beam Dump Shielding Design for the LCLS-II-HE Low Emittance Injector
Rosenstrom A, Santana M, Dewji S
Georgia Institute of Technology, SLAC National Accelerator Laboratory

4:55 pm  MPM-B.9
Accelerator Section Business Meeting

2:45 pm  MPM-C.2
Radiation Safety for Animal Research Study - Columbia University’s Experience
Meng RA, Caracappa PF
Columbia University

3:00 pm  MPM-C.3
Mysteries at the Radiation Safety Office
Grimm SL
Georgia Institute of Technology

3:15 pm  MPM-C.4
Experiencing Ionizing Radiation: A Virtual Reality Radiation Protection Game
Robinson MB, Noey JD, Lieng EY, Mumick HS, Nunu GA, Wade MN, Kearfott KJ
University of Michigan

3:30 pm  MPM-C.6
Break

4:15 pm  MPM-C.7
A Training Program For General Laboratory Workers At Academic Institutions
Pickering JJ
Emeritus

4:30 pm  MPM-C.8
Radiation Detection Design Challenges for a First Year Undergraduate Introductory Engineering Course
Kearfott KJ, Kent AJ, Trager ME, Noey JD
University of Michigan

2:30 PM – 4:15 PM

MPM-D
Risk Assessment
Chair: Darrell Fisher
Centennial Ballroom 300D

2:30 pm  MPM-D.1
Machine Learning Methods and Multivariate Epidemiology in Radiation Risk Assessment Models
Lee H, Agasthya GA, Hanson HA, Logan JS, Houri JM, Kapadia AJ, Dewji SA
Georgia Institute of Technology, Oak Ridge National Laboratory

2:45 pm  MPM-D.2
How the Science of Radiation Biology has Helped Remove the Crippling Fear of Low-Level Radiation
Brooks AL, Conca JL, Glines WM, Waltar AE
Washington State University, UFA Ventures, Inc., Texas A&M University, American Nuclear Society

2:30 PM – 4:45 PM

MPM-C
Academic Health Physics
Chairs: Steve Grimm, Angela Meng
Centennial Ballroom 300C

2:30 pm  MPM-C.1
Development of the Research Facilities to Support a Next Generation University Research Reactor
Hugger NA, Medich DC
Worcester Polytechnic Institute
MONDAY

3:00 pm MPM-D.3
Dose Mapping Comparison Study of Gamma Rays And X-Rays in Preclinical Models
Gunther CS, Steri V, Camara Serrano JA, Caravaca Rodriguez J, Nostrand CV, Seo Y
C&C Irradiator Service LLC, University of California San Francisco, University of California Berkeley, Lawrence Berkeley National Laboratory

3:15 pm MPM-D.5
Clonal Hematopoiesis of Indeterminate Potential and the Risk of Exposure Induced Death for Mars Mission Scenarios
Werneth CM, Patel ZS, Blattning SR, Thompson MS, Pattarini JM, Huff JL
NASA Langley Research Center, KBR, NASA Johnson Space Center

3:30 pm MPM-D.6
Break

4:00 pm MPM-D.7
Radiological Assessment of Commonly Consumed Food Crops Grown in Rustenburg, South Africa
Olagbaju PO, Wojula OB, Tshivhase VM
North West University

4:15 pm MPM-D.8
Should the Limit on Radiation Dose to the Public be Revised?
Fisher DR
Versant Medical Physics and Radiation Safety

4:30 pm MPM-D.9
Panel Discussion

6:00 PM – 7:00 PM

P: Poster Session
Exhibit Hall A

P.1
The Enhancement of a Radiation Safety Research Laboratory Inspection Program at a Large Academic University
Ranade RM, Zittle MJ, Campbell PG
University of Washington Seattle

P.2
Free Web-Based Assessment Scientist and Gamma Spectroscopy Training Provided by US DOE and US EPA to Improve Nuclear Incident Response
Sandia National Laboratories, US Environmental Protection Agency, Environmental Management Support, Inc., FEMA Nuclear Incident Response Team

P.3
Review of radium accumulation and effects in algae: a work-in-progress
Gonzales AK, Donaher SE, Wang J, Powell BA, Martinez NE
Clemson University

P.4
Radioactive Potassium-40 in Water Softeners
Billa B, Beitollahi M, Adzanu S, Atkins M
Porters Chapel Academy, University of Utah, Alcorn State University

P.5
How safe are Organic Fertilizers- A Radioactivity Assessment Study
Hooker J, Billa J, Adzanu S, Adjaye J
Alcorn State University

P.6
Radon Levels in Ground Water of Alcorn State University Campus
Jackson D, Billa J, Adzanu S, Adjaye J
Alcorn State University

P.7
Radium Concentrations in Sludge Samples from Water Treatment Facilities
James D, Billa J, Adzanu S, Adjaye J
Alcorn State University

P.8
Radioactivity in Fish Native to Lower Mississippi Watersheds
Shoulders F, Billa J, Adzanu S, Adjaye J
Alcorn State University

P.9
Assessment of personal dosimeter response with energy and geometry of exposure for evaluating the reconstruction of organ dose for Korean radiation workers.
Jeong HY, Chung YS, Kim JS, Yoo JR, Park SH
KIRAMS, Han Yang Univ
P.10  Further characterization of BeO detectors for applications in external and medical dosimetry  
Kara E, Woda C  
Helmholtz Zentrum München

P.11  The Gap in NRC Financial Assurance and Insurance Liability for Blood and Research Gamma Irradiators  
Kamen J, Abraham E, Perricelli D, Price S  
Mount Sinai, Healthcare Risk Advisors, Alliance insurance Services Inc

P.12  Characterization of Airborne Particulates Containing Naturally Occurring Radioactive Materials in Welding Rod Manufacturing Industries  
Park JH, Lee BM, Lee SY, Kim MS, Kim KP  
Kyung Hee University

P.13  Investigation of Unexpected Effluent Peaks on Cyclotron Vault PM-11 Sodium Iodide Detector  
Silvestrini E, North CJ*  
Northwell Health, Hofstra University

P.14  Determination of time-dependent counting efficiency to consider the exposure scenario using the transportable radiation detection instruments  
Park M, Yoo J, Kim HS, Lee S  
Korea Institute of Radiological and Medical Sciences

P.16  A Risk Comparison between Lifestyle, Socioeconomic Status, and Radiation among Japanese Nuclear Workers (J-EPISODE)  
Kudo S, Furuta H, Saigusa S  
Radiation Effects Association

P.17  Review of Computer Programs for Risk Assessment of Radioactive Waste Overland and Maritime Transportation  
Ryu GW, Nam HW, Heo JB, Kwak MW, Kim KP  
Kyung Hee University

P.18  Derivation of Dose Constraints of PWR Type Reactor for General Public  
Jin YH, Seo HS, Kim KH, Kim JW, Kim KP  
Kyung Hee University

P.19  Radiation safety investigation of non-medical planned exposure radiation practices in Taiwan  
Hsu FY, Chen LY*  
National Tsing Hua University, Louisiana State University
TUESDAY

6:45 AM – 7:45 AM

CEL-2 Centennial Ballroom B
Radiation Protection of the Public and the Environment
Stewart M

8:00 AM – 9:10 AM

TAM-PLEN
Plenary Session
Centennial Ballroom 300AB

8:00 am TAM-PLEN.1
Welcoming Update Comments
Cardarelli J
HPS

8:10 am TAM-PLEN.2
Long-Term Strategy for Low-Dose Radiation Research in the United States
Gray J

8:40 am TAM-PLEN.3
New Initiatives in Radiation Protection Sciences
Held K
NCRP

9:30 AM – 10:30 AM

TAM-A1
Dose Reconstruction
Chair: Mauritis Hiller
Centennial Ballroom 300A

9:30 am TAM-A1.1
Revision of the post-Chernobyl Thyroid Dosimetry System in Ukraine
State Institution “National Research Center for Radiation Medicine of the National Academy of Medical Sciences of Ukraine”, Taras Shevchenko National University of Kyiv, Institute for Safety Problems of Nuclear Power Plants, National Cancer Institute, NIH, DHHS

10:45 AM – 11:45 AM

TAM-A2
Radiobiology and Biological Response
Chair: Yuiko Chino
Centennial Ballroom 300A

10:45 am TAM-A2.1
Difference in Long-term WBC Response in Pediatric and Mature Rhesus Macaques
Chino Y, Olson JD, Cline JM, Johnson TE
Colorado State University, Wake Forest University School of Medicine

11:00 am TAM-A2.2
Establishment of the Next Generation Omics-Based Anthropomorphic Phantoms for Radiation Protection - The Impact of The Human Cell Atlas Project.
Akabani G
Asociación Mexicana de Radio Protección

11:15 am TAM-A2.4
The Neutrophil to Lymphocyte Ratio Shows Evidence for Chronic Inflammation in a Radium Dial Painter Cohort
Goans RE, Toohey RE, Iddins CJ, Mumma M, McComish SL, Tolmachyev SY
M JW Corporation, REAC/TS, International Epidemiology Institute, USTUR

10:00 am TAM-A1.3
Dose reconstruction in the village of Metlino, Techa River region, Southern Urals, Russia
Hiller M, Woda C, Degteva M, Bugrov N, Napier B
Helmholtz Zentrum München, Ural’s Research Center for Radiation Medicine, Pacific Northwest National Laboratory

10:15 am TAM-A1.4
Reconstruction of Organ Dose from Emergency Work Dose at Fukushima: J-EPISODE
Furuta H, Kudo S, Soigusa S
Radiation Effects Association

10:45 AM – 11:45 AM

TAM-A2
Radiobiology and Biological Response
Chair: Yuiko Chino
Centennial Ballroom 300A

10:45 am TAM-A2.1
Difference in Long-term WBC Response in Pediatric and Mature Rhesus Macaques
Chino Y, Olson JD, Cline JM, Johnson TE
Colorado State University, Wake Forest University School of Medicine

11:00 am TAM-A2.2
Establishment of the Next Generation Omics-Based Anthropomorphic Phantoms for Radiation Protection - The Impact of The Human Cell Atlas Project.
Akabani G
Asociación Mexicana de Radio Protección

11:15 am TAM-A2.4
The Neutrophil to Lymphocyte Ratio Shows Evidence for Chronic Inflammation in a Radium Dial Painter Cohort
Goans RE, Toohey RE, Iddins CJ, Mumma M, McComish SL, Tolmachyev SY
M JW Corporation, REAC/TS, International Epidemiology Institute, USTUR
11:30 am TAM-A2.5
Radiobiology of Select Radionuclides in Hanford Site Tank Waste
Glines WM, Brooks AL, Hoel DG
Washington State University Tri-Cities, Medical University of South Carolina

9:30 AM – 11:45 AM

TAM-B
Emergency Response
Chair: Steve Sugarman
Centennial Ballroom 300B

9:30 am TAM-B.1
The Importance Of Effective And Understandable Communication Of Radiation-Related Information
Sugarman SL
SummitET

9:45 am TAM-B.2
The Radiation Field Training Simulator (RaFTS): Reducing Dose by Simulating Sources
White GK, Kreek SA, Dunlop WM, Oakgrove JD, Bower DE, Trombino DG, Swanberg EK, Pike SD, King JN
Lawrence Livermore National Laboratory, Argon Electronics (UK) Limited

10:00 am TAM-B.3
Final Results from Nuclear Accident Simulation Study Comparing 2017 vs. 1992 Protective Action Guidelines
McMahon MD
Tulane University

10:15 am TAM-B.4
Electromagnetic Reliability Effects Probability (EMREP) tool strength and stress testing.
Bak MT
DoD Defense Threat Reduction Agency

10:30 am TAM-B.5
Sproull M, Shankavaram U, Camphausen K
NIH/NCI/ROB

10:45 am TAM-B.6
Gamma Radioactivity Detection Limits and Dose Assessment in Artificial Human Urine Using Sodium-Iodide and High-Purity Germanium Detectors
Burn AG, Haines DK, Khan AJ, Torres MA, Faye SA, Costello CA, Hoffman TJ, Semkow TM
Wadsworth Center, NYS Department of Health, Bureau of Environmental Radiation Protection

11:00 am TAM-B.7
Impact Analysis of Age-based demographic data and FGR 15 on Mortality Estimations in HPAC
Dant JT, Castillo IA, Nye CG

11:15 am TAM-B.8
The Advisory Team for Environment, Food and Health
Chen G
U.S. EPA

11:30 am TAM-B.9
RadResponder Network – A Quick Walkthrough with the Newest Updates
Chen G
U.S. EPA

9:30 AM – 11:00 AM

TAM-C
Topics in Health Physics
Chair: Ben Edwards
Centennial Ballroom 300C

9:30 am TAM-C.1
National Academies’ Study on Radioactive Sources, Applications and Alternative Technologies
Kosti O
National Academies

9:45 am TAM-C.2
An Evaluation of Nuclear Regulatory Commission and Agreement States Future Directives
Jue TM, Gulshan Z, Akhavanik H
California Department of Public Health, Nuclear Regulatory Commission

10:00 am TAM-C.3
The current problems in the quantification of radiation exposure
Sabol J
Police Academy of the Czech Republic in Prague

10:15 am TAM-C.4
Regulator requirement of smoke detector
Al Somali OY
Saudi Aramco

10:30 am TAM-C.5
Mahjan V, Gherase MR
California State University Fresno
TUESDAY

9:30 am – 10:45 am

TAM-C.6
X-ray Fluorescence Measurements of Strontium Concentration in a Lamb Bone Sample
Gherase MR, Berrios M*
California State University Fresno

9:30 AM – 11:30 AM

TAM-D
Special Session: Use of Drones to Enhance Surveys
Chair: Shannon Thompson
Centennial Ballroom 300D

9:30 am
TAM-D.1
A Review Of The Applications Of Drones For Radiological Surveys
Thompson SW
PNNL

10:00 am
TAM-D.2
UAV-Based Gamma Surveys for NORM Applications
Alekseyan TJ
Environmental Restoration Group, Inc.

10:30 am
TAM-D.3
UAV-borne spectrometry applications for geological mapping and monitoring of radioactive ecological loads (case studies)
Štěpán V, Thinová L, Klusoň J, Martinčík J, Otáhal P
Czech Technical University in Prague, National Institute for Nuclear, Chemical and Biological Protection

11:00 am
TAM-D.4
A Primer On Drone-Borne Radioelement Mapping
van der Veeke S, Limburg J, Koomans RL
University of Groningen, Medusa Radiometrics

9:30 AM – 10:45 AM

TAM-E
Special Session: Rad Air NESHAPs
Chairs: Sandra Snyder, Michael Stewart
Room 302AB

9:30 am
TAM-E.1
U.S. Environmental Protection Agency Update on the Radionuclide NESHAPs
Walsh JP, Rustick JH
U.S. EPA

9:45 am
TAM-E.2
U.S. Environmental Protection Agency Update on Compliance Codes
Littleton BK, Stuenkel DO*
U.S. Environmental Protection Agency

10:00 am
TAM-E.3
DOE Subpart H Report
Stewart M, Snyder SF*
DOE-HQ, PNNL

10:15 am
TAM-E.4
Regulatory Overview of Compliance with Washington State Radioactive Air Emissions Regulations During Cleanup of a Breached Cs-137 Irradiator Sealed Source
Martell PJ, Schmidt JW
Washington State Department of Health

10:30 am
TAM-E.6
Surrogate Selection and Methods to Account for Omitted Radionuclides in CAP88PC
Harshman AM, Scofield PA
Oak Ridge National Laboratory, Strato-G

12:15 PM – 2:15 PM

PEP T-1
Centennial Ballroom D
The Case Against The LNT
Fellman A

PEP T-2
Room 302 AB
Performing ANSI Z136-Based Laser Hazard Calculations
Edwards B

PEP T-3
Room 402 C
Design, Licensing and Commissioning of a New Nuclear Medicine Accelerator Facility
Kelley S
### TPM-A
#### AAHP Special Session: The System of Radiological Protection, Part 1
*Chairs: Scott Schwahn, Christopher Clement*
*Centennial Ballroom 300A*

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Affiliation</th>
</tr>
</thead>
</table>
| 1:30 pm| TPM-A.1             | Why Revise the System of Radiological Protection? | Rühm W, Clement CH  
ICRP                     |
ICRP                     |
Icelandic Radiation Safety Authority, IRPA |
| 3:15 pm| TPM-A.4             | Break                             |                           |
| 3:45 pm| TPM-A.5             | How the ICRP System of Radiological Protection Influences EPA’s Guidance and Regulations | Nagata JS, DeCair SD, Boyd MA  
U.S. Environmental Protection Agency |
| 4:15 pm| TPM-A.6             | NCRP’s Views on Radiation Protection Guidance | Held KD  
NCRP                     |
| 4:45 pm| TPM-A.7             | Panel                             |                           |
| 5:30 pm| TPM-A.8             | AAHP Business Meeting             |                           |

### TPM-B
#### Special Session: Remediation of Contaminated Sites
*Chair: Jeff Whicker, Lisa Manglass*
*Centennial Ballroom 300B*

<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
<th>Affiliation</th>
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</table>
| 1:30 pm| TPM-B.1             | Adaptive Management of Radioactively Contaminated Sites | Whicker JW  
Independent Consultant |
| 2:00 pm| TPM-B.2             | Implementing As Low As Reasonably Achievable to Performance Assessments using Structured Decision Making and Decision Analysis | Black PK, Stockton TB, Perona RA, Catlett KM  
Neptune and Company, Inc. |
| 2:30 pm| TPM-B.3             | Retrospective Detection Sensitivity for GPS-Based Gamma Radiation Surveys | Alecksen TJ, Whicker RD  
Environmental Restoration Group, Inc. |
| 3:00 pm| TPM-B.4             | Radiological Clearance of Property at DOE-EM Sites | Anderson AL  
US Department of Energy |
| 3:30 pm| TPM-B.5             | Break                             |                           |
| 4:00 pm| TPM-B.6             | NRC Decommissioning Research and Related Guidance Development | Barr CS, Aird T  
US NRC                     |
| 4:30 pm| TPM-B.7             | Update on Revisions to the Multi-Agency Radiation Survey and Site Investigation Manual | Stuenkel DO, Anderson AL  
U.S. Environmental Protection Agency, U.S. Department of Energy |
| 5:00 pm| TPM-B.8             | Environmental/Radon Section Business Meeting |                           |
### TPM-C
**Special Session: Challenges, Barriers, and Successes in an HP Career – From STEM to Retirement**
*Chair: Wendy Kuhne, Rachel Nichols*
Centennial Ballroom 300C

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<tbody>
<tr>
<td>1:30 pm</td>
<td>Challenges, Barriers, and Successes in a HP Career - From STEM to Retirement</td>
<td>Kuhne WW, Savannah River National Laboratory</td>
</tr>
<tr>
<td>1:45 pm</td>
<td>Educational opportunities and challenges for women in health physics: a man's perspective.</td>
<td>Harris JT, Purdue University</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>Challenges Faced in Recruiting Students and Running a New Masters in HP Program</td>
<td>Caffrey EA, UAB</td>
</tr>
<tr>
<td>2:15 pm</td>
<td>Key Decisions that Defined my Career Pathway</td>
<td>Salame-Alfie A, HPS</td>
</tr>
<tr>
<td>2:45 pm</td>
<td>Getting Involved in the Health Physics Society – What are you Waiting for??</td>
<td>Simpkins A, ORAU</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>Dose Assessment following Pu-238 Glovebox Breach at Los Alamos National Laboratory</td>
<td>Klumpp JA, Bertelli L, Dumit S, Poudel D* Los Alamos National Laboratory</td>
</tr>
<tr>
<td>3:15 pm</td>
<td>Modeling of a plutonium-238 inhalation incident treated with DTPA at Los Alamos National Laboratory</td>
<td>Dumit S, Miller G, Poudel D, Bertelli L, Klumpp JA Los Alamos National Laboratory, Retired</td>
</tr>
<tr>
<td>3:45 pm</td>
<td>Considerations in knowledge transfer from a “seasoned” health physicist</td>
<td>Higley KA, Oregon State University</td>
</tr>
</tbody>
</table>

### TPM-D
**Internal Dosimetry**
*Chair: Sara Dumit*
Centennial Ballroom 300D

<table>
<thead>
<tr>
<th>Time</th>
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<th>Speaker(s)</th>
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<tbody>
<tr>
<td>2:30 pm</td>
<td>Revision of the ICRP 141 Pu Systemic Model to Incorporate the HAT Model and the Hepatic Portal Vein</td>
<td>Strom DJ, Avtandilashvili M, Felsot AS, McComish SM, Åeße M, Tabatadze G, Tolmachev SY Washington State University, NV5/Dade Moeller</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>Dose Assessment following Pu-238 Glovebox Breach at Los Alamos National Laboratory</td>
<td>Klumpp JA, Bertelli L, Dumit S, Poudel D* Los Alamos National Laboratory</td>
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</tr>
<tr>
<td>3:45 pm</td>
<td>Tools for effective communication with radiation workers: Improving how to listen, relate, empathize, and communicate internal doses</td>
<td>Dumit S, Matta T, Klumpp JA Los Alamos National Laboratory, Oak Ridge National Laboratory</td>
</tr>
</tbody>
</table>
4:00 pm  TPM-D.7  Improvements In Collecting Performance Statistics For Hanford In Vivo Counting Systems  Lungu A, Stamper LJ, Antonio CL  Hanford Mission Integration Solutions (HMIS)

4:15 pm  TPM-D.8  A Novel Biokinetic Model for Chromium and its Intent for Health Physics Applications  Hiller MM, Leggett RW  CheMin GmbH, Oak Ridge National Laboratory


4:45 pm  TPM-D.9  Uncertainty Propagation in ICRP 66 Human Respiratory Tract Model (HRTM)  Cochran LD, Jelsema CM, Kalinowski AE, Margot DE, Dewji SA  Sandia National Laboratories, Georgia Institute of Technology

5:00 pm  TPM-D.11  It Takes Energy to Calculate Dose  Stabin MG

2:30 PM – 5:30 PM

TPM-E
Health Physics Instrumentation
Chair: Rick Adams
Room 302AB

2:30 pm  TPM-E.1  Development of Metal Halide Perovskite Semiconductors for Radiation Sensing  Tan R, Lukosi ED, Dryzhakov B, Ahmadi M, Hu B, Charest J, Higgins K, Busch C  University of Tennessee

2:45 pm  TPM-E.2  Epithermal Neutron Field for Dosimetry and Instrument Testing  Mozhaev AV, Piper RK, Meza JR, Christ JF, Berg RK, Maine AL, Dutcher EB  Pacific Northwest Natl Lab

3:00 pm  TPM-E.3  Application and Comparison of Multi-Robot Exploration Methods for Radioactive Source Localization  Chung LK, Chan A, Li Y, Wong A, Davis CC, Noey JD, Kearfott KJ  Stanford University, University of Michigan

3:15 pm  TPM-E.4  Design Improvements to a Low Cost Radiation-Detecting Weather Station for Nuclear Science Outreach  Kent AJ, Noey JD, Kearfott KJ  University of Michigan

3:30 pm  TPM-E.5  Interfacing a Radiation Detector to an Intelligent Radiation Awareness Drone  Kim RA, Trager ME, Davis CC, Ho RS, Kent AJ, Noey JD, Kearfott KJ  University of Michigan


4:00 pm  TPM-E.7  Break


4:30 pm  TPM-E.9  Analysis of Minimum Detectable Concentrations for Environmental Samples in a Novel High Sensitivity Large Volume Spectroscopy System  Noey JD, Kearfott KJ  University of Michigan

4:45 pm  TPM-E.10  Quality Control Program for High Precision Radiation Dose Delivery in Operational Health Physics Facilities  Noey JD, Stewart C.J.*, Kearfott KJ  University of Michigan

5:00 pm  TPM-E.11  Building Our Own: Design Challenges for an Intelligent Radiation Awareness Drone  Trager ME, Kim RA, Davis CC, Ho RS, Phatke A, Sumter KH, Kidambi M, Wang P, Noey JD, Kearfott KJ  University of Michigan

5:15 pm  TPM-E.12  Reevaluating Legacy Neutron Survey Meters  Rashidiford NB  Mirion Technologies
### WEDNESDAY

#### 6:45 AM – 7:45 AM

**CEL-3**  
Centennial Ballroom B  
Establishing a Program to Produce Ac-225 with a Superconducting Linear Accelerator: Lessons Learned  
Bakken A

#### 8:00 AM – 9:10 AM

**WAM-PLEN Plenary Session**  
Centennial Ballroom 300AB

<table>
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<tr>
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<th>Session Title</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>WAM-PLEN.1 Welcoming Update Comments</td>
<td>Cardarelli J HPS</td>
<td>Centennial Ballroom 300AB</td>
</tr>
<tr>
<td>8:10 am</td>
<td>WAM-PLEN.2 History and Accomplishments of the Veterans Advisory Board on Dose Reconstruction</td>
<td>Roadman C</td>
<td></td>
</tr>
<tr>
<td>8:40 am</td>
<td>WAM-PLEN.3 DOE Dose Reconstruction</td>
<td>Calhoun G NIOSH</td>
<td></td>
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#### 9:30 AM – 11:15 AM

**WAM-A Medical Health Physics**  
Chair: Glenn Sturchio  
Centennial Ballroom 300A

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<tbody>
<tr>
<td>9:30 am</td>
<td>WAM-A.1 Medical Radioisotope Production from Uranium and Radium</td>
<td>Bakken AC Wahlen RN Johnson NC Peters WA Grimm TL Boulware CH Gelis AV Niowave Inc University of Nevada Las Vegas</td>
<td></td>
</tr>
</tbody>
</table>

#### 10:00 AM

**WAM-A.3**  
A Health Physics Evaluation of Yb169 Brachytherapy Treatment for Cervical Cancers  
Jolbert MR, Medich DC Worcester Polytechnic Institute

#### 10:15 AM

**WAM-A.4**  
Development of Surface Contamination Action Levels for a Multistate Medical Licensee  
Ram V, Sturchio GM Mayo Clinic

#### 10:30 AM

**WAM-A.5**  
Feasibility of safe outpatient radio-targeted treatment in pediatric patients following administration of Iodine-131 Omburtamab for leptomeningeal disease  
Prasad K, Chu BP, Bellamy M, Pandit-Taskar N Memorial Sloan Kettering Cancer Center

#### 10:45 AM

**WAM-A.7**  
Patient Specific Neutron Shielding For Electronic Device Attached To Proton Patient; Case Study  
Rahimi R Taylor M Eblan M Fan J Wang P INOVA Schar Cancer Institute

#### 11:00 AM

**WAM-A.8**  
The UF-MSK Computational Phantom Library of Adult and Pediatric Patients for Medical Dosimetry  
Dowson RJ Baggett JM Wang Y Smither WW Dinwiddie LE Wehmeier SK Domal SJ Kofler CB Bolch WE University of Florida

#### 9:30 AM – 12:00 PM

**WAM-B Special Session: DOE Health Studies Part 1**  
Chair: Isaf Al-Nabulsi, Ashley Golden  
Centennial Ballroom 300B

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<tr>
<td>9:30 am</td>
<td>WAM-B.1 New Developments in the Dosimetry of the Japanese Atomic Bomb Survivors</td>
<td>Cullings HM Bolch WE Funamoto S Sato T Lee C Egbert SD Hertel NE Domal SJ Griffin KT Paulbeck CJ Radiation Effects Research Foundation University of Florida Japan Atomic Energy Agency US National Cancer Institute Georgia Institute of Technology Johns Hopkins University</td>
<td></td>
</tr>
</tbody>
</table>
10:20 am WAM-B.3
Biorepository of A-Bomb Survivors and their Offspring
Tanabe O, Hayashi T, Imaizumi M, Kajimura J, Matsuda Y
Radiation Effects Research Foundation

10:45 am WAM-B.4
Recent Improvements in Dose Reconstructions for the
JCCER Russian Studies
Napier BA, Smith MA, Eslinger PW, Efimov AV, Vostrotin VV,
Wedensky VE, Degteva MO, Shishkina EA, Tolstykh EI
Pacific Northwest National Laboratory, Southern Ural’s Biophysics
Institute, Ural’s Research Center for Radiation Medicine

11:10 am WAM-B.5
Follow-up and Risk Analyses in the Mayak and Expanded
Techa River Cohorts
Preston DL, Krestinina LY, Sokolnikov ME, Stram DO
Hirosoft International, Ural’s Research Center for Radiation
Medicine, Southern Ural’s Biophysics Institute, University of
Southern California

11:35 am WAM-B.6
Radiation Research And The Russian Radiobiological Human
Tissue Repository
Loffredo C, Azizova T
Georgetown University, Southern Ural’s Biophysics Institute

9:30 AM – 11:50 AM WAM-C
Special Session: The HPS Standards Organization
Chair: Antonio Triventi
Centennial Ballroom 300C

9:30 am WAM-C.1
The Health Physics Society Standards Committee (HPSSC)
Triventi A
HPSSC

9:40 am WAM-C.2
Radiation Protection Standards: ANSI/HPS N13 Accredited
Standards Committee
Barnett J, Potter CA
Pacific Northwest National Laboratory, Sandia National
Laboratories

10:00 am WAM-C.3
ANSI N43 Report
Jones C, Whitman R*
US Army Public Health CMD

10:20 am WAM-C.4
Participation In International Radiation Protection
Standardization
Herrold JF
University of Wyoming, US NTAG Chair ISO TC 85

10:40 am WAM-C.5
Break

10:50 am WAM-C.6
Panel

9:30 AM – 11:45 AM WAM-D
Decontamination and Decommissioning
Chair: Phil Rutherford
Centennial Ballroom 300D

9:30 am WAM-D.1
Efficiency Comparison of Hybrid Radiation Transport
Variance Reduction Methods for Wide Area Environmental
Contamination Assay Applications
Asano EA, Dewji SA
Georgia Institute of Technology

9:45 am WAM-D.2
Visual Sample Plan (VSP) geospatial analysis tools for
environmental decision making
Huckett JC, Weller ZD*, Newburn LN, Fagan DK, Johnson CD,
Simpson BC, Bunn AL
Pacific Northwest National Laboratory

10:00 am WAM-D.3
Workplace Monitoring and Energy Analysis Of Low Energy
Beta Contamination
Iwatschenko-Borho MI
Thermo Fisher Scientific Messtechnik GmbH

10:15 am WAM-D.4
Decommissioning in California: 20+ Years of Politics vs.
Science
Rutherford PD
Phil Rutherford Consulting

10:45 am WAM-D.5
Decommissioning Section Business Meeting
2:30 PM – 5:30 PM

WPM-A
AAHP Special Session: The System of Radiological Protection, Part 2
Chairs: Scott Schwahn, Christopher Clement
Centennial Ballroom 300A

2:30 pm
State Perspectives on Changes to the System of Radiological Protection
Leek AE, McBurney R
CRCPD, Iowa DPH

2:45 pm
ICRP Radiation Protection Recommendations Considered and Applied to DOE Order 458.1 and DOE-STD 1196-2021
Corredor CE
Department of Energy

3:15 pm
Medical Uses of Radiation and the System of Radiological Protection
Dauer LT
Memorial Sloan Kettering Cancer Center

3:45 pm
Accounting for Nonlinearity in Radiation Protection
Ulsh Brant
M.H. Chew Associates

4:15 pm
Revisiting the Concepts of Reasonableness and Tolerability of Risk in the System of Radiological Protection: ICRP On-Going Reflections
Schneider TL
ICRP – CEPN

4:45 pm
Panel

2:30 PM – 5:45 PM

WPM-B
Special Session: DOE Health Studies Part 2
Chair: Isaf Al-Nabulsi, Ashley Golden
Centennial Ballroom 300B

2:30 pm
Tolmachev SY
U.S. Transuranium and Uranium Registries, Washington State University

2:55 pm
Uncertainties in Radiation Dose Assessment for Internally Deposited Plutonium in Support of Radiation Epidemiology
U.S. Transuranium and Uranium Registries, Washington State University, U.S. Department of Energy

3:10 pm
Beryllium in Tissues of Former Nuclear Workers
Avtandilashvili M, Larivière D, Momoshima N, Wegge D, Brackman JD, Tolmachev SY
U.S. Transuranium and Uranium Registries, Washington State University, Laval University, Kyushu Environmental Evaluation Association, University of Missouri – Columbia

3:25 pm
Plutonium bioassay models for reconstruction of doses for Los Alamos National Laboratory and Rocky Flats workers
Samuels CE, Leggett RW
ORNL Center for Radiation Protection Knowledge

3:50 pm
Break

4:05 pm
Reconstruction of Lung Doses for the Tennessee Eastman Corporation
Bellamy MB, Dauer L, Eckerman K
MSKCC, ORNL

4:30 pm
Impact of the Department of Energy’s Comprehensive Epidemiologic Data Resource (CEDR) to the Million Worker Study
Howard SC, Golden AP, Ellis ED, Girardi DJ
Oak Ridge Institute for Science and Education
4:55 pm WPM-B.8
Findings from Department of Energy Cohorts in the Million Worker Study: Los Alamos National Laboratory, Rocky Flats Site, and Tennessee Eastman Corporation
Golden AP, Boice, Jr. JD, Howard SC, Cohen SC, Mumma MT, Bellamy MB, Dauer LT, Samuels C, Eckerman EF, Leggett RW
Oak Ridge Institute for Science and Education, Vanderbilt University, National Council on Radiation Protection and Measurements, EpidemiStat, IEI, Memorial Sloan Kettering Cancer Center, Oak Ridge National Laboratory

5:20 pm WPM-B.9
The Million Person Study of Low-Level and Low-Dose-Rate Health Effects: Importance, Information and Innovation
Dauer LT, Boice, Jr. JD
Memorial Sloan Kettering Cancer Center, NCRP, Vanderbilt University Medical Center

2:30 PM – 4:45 PM

WPM-C
Environmental Monitoring
Chair: David Goodman and Jonathan Napier
Centennial Ballroom 300C

2:30 pm WPM-C.1
Quantifying Preferential Tissue Accumulation and Antioxidant Stress Response of a Marine Mussel After Exposure to Radium Paint
Donaher SD, Dunn RP, Powell BA, Van den Hurk P, Martinez NE
Clemson University, University of South Carolina

2:45 pm WPM-C.2
Use of 14C-PFOA to study uptake and effects of PFOA in Brassica juncea
Wattier BD, Gonzalez AK, Donaher S, DeVol TA, Martinez NE
Clemson University

3:00 pm WPM-C.3
Distribution and Radiological Impact Assessment of Natural Radionuclides in Nevada National Security Site
Liu X, Warren RW
MSTIS

3:15 pm WPM-C.4
Lightweight, Low-Power, High-Resolution, Pixelated CdZnTe Detectors For Drone-Based Measurements
Goodman DI, Barron DP, Sowers JT, Thomason AM
Titan Robotics, Skydio

3:30 pm WPM-C.5
Environmental Measurement of Gamma and Cosmic Radiation Using a Sensitive Spectroscopic Radiation Pager
Iwatschenko-Borho MA
Thermo Fisher Scientific Messtechnik GmbH

3:45 pm WPM-C.6
Break

4:15 pm WPM-C.7
Spatial Representation of Determined Transfer Factors
Napier JB
Pacific Northwest National Laboratory

4:30 pm WPM-C.8
Determination of Gross Alpha and Gross Beta Activity in recently imported organic fertilizer samples, Sri Lanka
Weerakkody TL, Dabare PR, Dissanayoke CK
Sri Lanka Atomic Energy Board

WPM-D
Special Session: Health Physics Evolution in Medical Physics Enterprise
Chair: Ronald Leuenberger
Centennial Ballroom 300D

2:30 pm WPM-D.1
Health Physics Evolution in Medical Physics Enterprise
Leuenberger RD
Louis Stokes VA Medical Center

2:45 pm WPM-D.2
Enterprise Applications for Medical Physics: Past, Present & Future
Leuenberger RD, Misseldine RE*
RSO, ARSO

3:00 pm WPM-D.3
Medical Physics Enterprise - VHA Radiation Exposure Monitoring (REM) Registry
Leuenberger RD, Misseldine RE, Dietz AT*, Jordan D
RDO, VA Northeast Ohio Healthcare System (VANEHCS), ARSO, University Hospitals of Cleveland

3:15 pm WPM-D.4
Evolving Role of Radiation Safety Officer
Jordan DW
University Hospitals Cleveland Medical Center, Case Western Reserve University
THURSDAY

6:45 AM – 7:45 AM

CEL-4
Managing Generally Licensed Devices
Lewandowski M

8:00 AM – 12:00 PM

THAM-A
Special Session: Workings of the Health Physics Society - A “How to’’ Training Session
Chair: Timothy Taulbee
Centennial Ballroom 300A

8:00 am
Introduction

8:05 am
Practical strategies to promote inclusiveness
Martinez NE
Clemson University, ORNL

8:25 am
Bylaws, Rules, and Standard Operating Procedures
Braun JS
Mayo Clinic

8:45 am
The Health Physics Society’s ‘Ask-the-Expert’ Feature: A Tool for Risk Communication
Caffrey EA
Radian Scientific LLC

9:05 am
Transitioning from Student to Early Career Professional for the Health Physicist
Wilson CA, Cochran LD, Condon C
University of Missouri, Sandia, PNNL

9:20 am
Tips on how to prepare for the ABHP Exam
Johnson TE
Colorado State University

9:45 am
HPS Membership Renewal and Upgrade Overview
Cochran LD
HPS Membership Committee

10:00 am
Break

10:30 am
Getting the Most From Your Health Physics Journal
Ulsh B
Health Physics Journal

10:45 am
Presenting at HPS Meetings: A Program Committee Perspective
Shaw CG
WCS

11:00 am
Awards and Scientific and Public Issues Committees
Goldin EM
Goldin & Associates

11:15 am
HPS Continuing Education Programs: Past, Present, Future
Mahothy JM
ORAU

11:30 am
Radiation Biology for Health Physicists
Ulsh B
M. H. Chew Associates

11:50 am
Discussion

8:00 AM – 12:00 PM

THAM-B
Special Session: AIRRS Roundtable
Chair: Carl Tarantino
Centennial Ballroom 300B

8:00 am
AIRRS Special Session
Tarantino C, Vasudevan L, Root C
AIRRS

8:00 AM – 11:30 AM

THAM-C
International Collaboration Committee
Special Session: How to Influence the Future of Radiological Protection
Chair: George and Amber Harshman
Centennial Ballroom 300C

Please see the online program for the schedule.
THURSDAY

12:15 PM – 2:15 PM

PEP TH-1
Radiation in Flight
Shonka J

PEP TH-2
Radon physics
Hayes R

PEP TH-3
Technical Basis and Operational Experience for Clearance of Personal Property from SLAC Accelerator Facilities
Rokni S

3:05 pm
Review of case studies for radiofrequency exposures in stadiums, on small cells, towers and rooftops
Thatcher AH, Ludick D, Nell J
Thatcher Consulting LLC, Alphawave Mobile Network Products (Pty) Ltd

3:25 pm
NIR Hazards Mitigation for ISS and Lunar Missions
Gaza R, Hayes B, Castro A
Leidos, Exploration & Mission Support 2NASA Johnson Space Center

1:30 PM – 5:35 PM

THPM-A
Special Session: Non-ionizing Radiation
Chair: Pete Sprenger and Ken Barat
Centennial Ballroom 300A

1:30 pm
A review of the non-ionizing radiation topics and discussions from the first International Radiation Protection Agency’s North American Regional Congress.
Sprenger PJ
Naval Medical Research Unit San Antonio

1:50 pm
Impact of Concomitant Electromagnetic Energy (EME) Hazards on the Radio-Frequency (RF) Safety Program
Haes DL
Consultant

2:10 pm
Revision of Ultraviolet Exposure Limits at Shorter Wavelengths - UV-C
Sliney DH
Johns Hopkins University School of Public Health

2:30 pm
Safety Aspects of Germicidal Ultraviolet Radiation
Sliney DH
Johns Hopkins University School of Public Health

2:50 pm
BREAK

3:05 pm
THPM-A.6
Review of case studies for radiofrequency exposures in stadiums, on small cells, towers and rooftops
Thatcher AH, Ludick D, Nell J
Thatcher Consulting LLC, Alphawave Mobile Network Products (Pty) Ltd

3:25 pm
THPM-A.8
NIR Hazards Mitigation for ISS and Lunar Missions
Gaza R, Hayes B, Castro A
Leidos, Exploration & Mission Support 2NASA Johnson Space Center

3:45 pm
THPM-A.9
Health Physicists’ duty to fight misinformation and disinformation.
Edwards BE

4:05 pm
THPM-A.10
BREAK

4:35 pm
THPM-A.11
Non-ionizing Section Business Meeting

1:30 PM – 5:40 PM

THPM-B
Special Session: Radiation Safety
Issues in Radiation Oncology
Chair: John Metyko
Centennial Ballroom 300B

1:30 pm
THPM-B.1
Alpha DaRT (TM) Institutional Review Board and Clinical Trial Experience
Dauer LT
Memorial Sloan Kettering Cancer Center

1:50 pm
THPM-B.2
Emerging Medical Technology Evaluations at the Nuclear Regulatory Commission
Tapp K, Flannery C*
U.S. Nuclear Regulatory Commission

2:10 pm
THPM-B.3
Radiation Protection Considerations when Implementing a Mobile Linear Accelerator for an Intraoperative Radiotherapy Program
Young R
IntraOp Medical
2:30 pm THPM-B.4
To Report, Or Not To Report, That Is The Question In Radiation Oncology
Nitsch PL
UT MD Anderson Cancer Center

2:50 pm THPM-B.5
BREAK

3:05 pm THPM-B.6
New Modalities/Technologies – Coordination with State Regulatory Agencies
Gavathas L, Leek A
CRCPD

3:25 pm THPM-B.7
Shielding Design for Emerging Technologies in Radiation Oncology
Martin M
Therapy Physics Inc.

3:45 pm THPM-B.8
Installation Personnel: Overlooked in Guidance and Regulations for Linear Accelerator Shielding and Surveys
Nimmo EA

1:30 PM – 5:30 PM
THPM-C
Special Session: Early-Career Professionals
Chair: Rachel Nichols, Charles Wilson
Centennial Ballroom 300C

1:30 pm THPM-C.1
Early-Career Professional Section - An Update
Wilson CA, Nichols RP, Wang C
University of Missouri, Duke University

1:45 pm THPM-C.2
A day in the life of an ECP - Environmental, Internal Dosimetry, and Academia
Caffrey E
Radian Scientific LLC

2:00 pm THPM-C.3
A day in the life of an ECP - Energy
Krage E
Energy Harbor

2:15 pm THPM-C.4
A day in the life of an ECP - Army HP
Swanson J
US Army

2:30 pm THPM-C.5
A day in the life of an ECP - Veterinary, University, and Medical
Nichols RP
University of Missouri

2:45 pm THPM-C.7
Break

3:30 pm THPM-C.8
A day in the life of an ECP - Medical
Hinchcliffe B
Yale New Haven Medical

3:45 pm THPM-C.9
Interview considerations for the Health Physicist
Shaw C
WCS

4:00 pm THPM-C.10
Leadership and Volunteering for ECPs
Brackett E
MJW

4:30 pm THPM-C.11
Roundtable for ECPs
Wong C
Duke

5:00 pm THPM-C.12
Early Career Professional Section Business Meeting
Key Aspects of Radiology and Nuclear Emergency Response and Recovery

Brooke Buddemeier, William Irwin, Angela Leek, Brendan Palmer

This course will provide participants with information and skills that are critical to responding to and recovering from a radiological or nuclear incident. The main topical areas include:

1. Review of the key concepts outlined in the newest Federal guidance documents recently updated for nuclear detonation response.
2. Review and training on key core aspects of the CBRN Responder system for whole community data collection and situational awareness, and introduction of new simulation and data management features.
3. Review of the Radiological Operations Support Specialist program and development of the key aspects of ROSS qualifications, skill development, and integration with state/local jurisdictions.
4. Review and demonstration of the newly developed Virtual Evaluation Scenario Tool (VEST) as a remote opportunity for ROSS to practice skills and apply knowledge in a simulated nuclear detonation response environment.

Introductory Radiation Epidemiology & Biostatistics

Ashley Golden

Epidemiologic studies of radiation cohorts face many unique challenges from cohort selection to statistical risk modeling approaches and uncertainties. Thus, the purpose of this session is to provide an introductory overview on the methodological and statistical approaches commonly used in radiation epidemiology. This course briefly introduces general epidemiological concepts, study designs, and risk measurements. However, the majority of this course will focus on the analytic decision-making process and risk modeling, including the comparison of Poisson and Cox Proportional Hazards regression techniques, primarily used in radiation epidemiology. The session will conclude with an example of how the concepts are applied for the Million Person Study, a study of chronic low dose radiation in 1 million United States Workers and Veterans.

FRMAC AS-50 Assessment Science Overview

Lainy Cochran, Brian Hunt

The Department of Energy’s Federal Radiological Monitoring and Assessment Center (FRMAC) is an asset comprised of representatives of multiple federal agencies that are available on request to support a response to nuclear/radiological accidents and/or emergencies. The FRMAC works with multiple agencies such as the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) to establish consistent radiological dose assessment methods to support public protection guidance provided by the EPA’s and FDA’s Protective Action Guides (PAG). The revised EPA PAG Manual references the FRMAC Assessment Manual (FAM) for radiological dose assessment methods in support of protective action decisions. This presentation provides an overview of the FRMAC Assessment Manual, describes the default methods for radiological dose assessment, and introduces the Turbo FRMAC software tool that automates these assessment methods.

1. Introduces the FRMAC function, organizational structure and support capabilities, the EPA and FDA Protective Action Guides, the FRMAC Assessment Manual format and tables; Presents several mathematical concepts used in the dose assessment methods; Introduces the software tool, Turbo FRMAC.
2. Presents an overview of the dose assessment methods and mathematical calculations used for Public Protection; Demonstrates the use of the software tool Turbo FRMAC to generate Public Protection dose assessments.
3. Presents an overview of the dose assessment methods and mathematical calculations used for the Ingestion Pathway; Demonstrates the use of the software tool Turbo FRMAC to generate ingestion dose assessments.
The Professional Enrichment Program (PEP) provides a continuing education opportunity for those attending the Health Physics Society Annual Meeting. The two hours allotted each course ensure that the subjects can be discussed in greater depth than is possible in the shorter programs offered elsewhere in the meeting.

On Sunday, 17 July, a series of 12 courses will be offered between 8:00 AM – 5:30 PM PDT.

In addition to the above-mentioned sessions for Sunday, 10 PEP lectures are scheduled on Monday-Thursday, 12:15 PM – 2:15 PM PDT. Registration for each two-hour course is $105 and is limited to 60 attendees on a first-come, first-served basis. Those whose registrations are received before the preregistration deadline will be sent confirmation of their PEP course registration.

Students with a current ID card will be admitted free of charge to any sessions which still have space available after the waiting list has been admitted. Student admission will be on a first-come, first-served basis and will only begin 15 minutes after the start of the session to allow for completion of ticket processing.

AAHP is evaluating the number of Continuing Education Credits awarded for each of the PEP (and CEL) courses based on technical content. Course instructors will be able to provide this information at the time of the presentation. This information will also be made available on the AAHP recertification site after data entry is completed.

Please Note!!

In-Person PEPs will be taught in Spokane, WA. All times shown below are Pacific Daylight Time (PDT). Virtual attendees must adjust for their local time. All PEPs will be viewable by either type of paid PEP attendee.

If a PEP is given virtually you will be sent a link to watch the PEP virtually from home or your hotel room. There will NOT be a room on-site at the convention center to watch the PEP.

If a PEP is given in person, you can participate in the course in person or virtually. If you are attending virtually, you will be sent a link to watch it LIVE. If you are attending in person, the course will take place at the Spokane Convention Center.

Please be on time for your sessions. The lecturer will begin promptly at the scheduled time. Please allow time for check-in. The HPS reserves the right to schedule a substitute speaker or cancel a session in case the scheduled speaker is unavailable.

Attendees not present at the starting time of the session cannot be guaranteed a space, as empty spaces will be filled from the wait list at that time. Spaces left after the wait list has been admitted may be filled with students. If your duties at the meeting cause you to be late for your lecture (e.g., chairing a session), contact the PEP registration desk so that your name can be placed on the waiver list and your space held.

Refund Policy

Requests for PEP refunds will be honored if received in writing by 15 June. All refunds will be issued AFTER the meeting. Exceptions will be handled on a case-by-case basis.

ONCE AGAIN

The Professional Enrichment Program (PEP) handouts for the Annual Meeting will not be available in hard copy. For those who preregister, you will be provided with an access code for downloading the handouts approximately two weeks prior to the meeting. For those who register for courses on-site, you will be provided the code when you register.

Please note, not all instructors provide downloadable information.
PEP 1-A  Control of Hazards from Ultraviolet Lamps and Arcs

David Sliney
Room 201 AB

Everyone is familiar with the risks posed by exposure to ultraviolet radiation from outdoor sunlight, but the health physicist is sometimes called on to assess the safety of ultraviolet lamps used in forgery detection, insect light-traps, photocuring - and since COVID-19 - germicidal applications. Open-arc sources, such as welding arcs emit both intense ultraviolet and visible light. This PEP course is designed to review UV hazards and aid in clarifying the risks, control measures, exposure limits and measurement techniques for indoor UV sources. The common questions raised with regard to indoor, artificial sources of UV will be addressed. Are different lamps equally hazardous? What are the differences between UV-A, UV-B and UV-C? What are the safety standards and the recognized human exposure limits to UV? What are the acute and chronic effects from UV exposure? What is an “action spectrum,” and why is the wavelength spectral power distribution of the UV source so important? What are the pitfalls in UV source measurement? Do germicidal lamps really pose a serious photocarcinogenic risk when used in an open setting? What is far-UV-C and is it really safer to disinfect occupied rooms? What are the most common UV lamp types? What safety standards exist for indoor sun tanning lamps? Attendees are encouraged to bring their own questions as well.

PEP 1-B  Alpha Spectroscopy for the Health Physicist

Mike Clemmer
Room 201 C

This course offers a fast-paced review of the basic principles of alpha spectroscopic analysis for the health physicist. The course includes a review of the nature and origins of alpha-particle emitting radioactivity, basic physics of alpha-particle interaction with matter, considerations and consequences of sample preparation for alpha spectroscopy, alpha spectroscopy system components and calibrations, and a primer on interpretation of alpha spectroscopy data.

PEP 1-C  Using the Updated CAP88-PC and STARGET Codes for Estimating Dose and Risk from Chronic Atmospheric Releases

Brian Littleton
Room 202 AB

The U.S. Environmental Protection Agency (EPA) is finalizing a new release of the CAP88-PC model for the National Emission Standards for Hazardous Air Pollutants (NESHAPs) Subpart H compliance demonstration. This new release, Version 4.1.1, fixes a minor error in the recently released Version 4.1, and is accompanied by the STARGET utility which allows for updated meteorology data to be incorporated into the compliance demonstration. CAP88-PC Version 4.1.1 fixes a glitch in the calculation for those radionuclides where previously no data existed for particulate size resulting in an error when running CAP88-PC for these radionuclides in the code. This 2-hour course will help users of CAP88-PC to understand the changes to the model; and demonstrate how meteorological data can be used to update the “.wnd” files needed to run CAP88-PC. The course will also include a brief description of the model and information about the code’s architecture, along with demonstrations on the using the code and the STARGET utility. Additional information on future update paths and regulatory approaches will also be presented.

PEP 2-A  Nonionizing Radiation: An Overview of Biological Effects and Exposure Limits

Ben Edwards
Room 201 AB

This course provides a fundamental overview of nonionizing radiation (NIR) hazards and biological effects. Course attendees will learn the basic terminology and nomenclature, spectral region designations, regulatory framework, and consensus guidance associated with NIR. The course material will begin at the edge of the ionizing part of the electromagnetic (EM) spectrum and walk participants through a tour of the optical, radiofrequency (including microwave), and extremely low frequency (ELF) portions of the EM range, finally ending with static electric and magnetic fields. The existence of a series of exposure limits covering the entire NIR spectrum forms one of the course’s basic themes. This continuous line of “safe” exposure levels helps establish the concept that NIR dose-response curves are at least well enough understood at all parts of the spectrum to provide a reasonably safe exposure envelope within which we can operate. After completing this course, attendees will be conversant in the major sources and
associated hazards in each part of the NIR spectrum, along with the recognized exposure limits and control measures for those sources. Armed with this information, safety professionals can better recognize, evaluate, and communicate the hazards associated with the spectrum of significant NIR sources and address workers’ concerns in a credible, fact-based, knowledgeable, and professional manner. While some knowledge of optical, radiofrequency, ELF, and static electromagnetic field characteristics may be helpful, both experienced and novice health physicists with NIR interests or responsibilities will benefit from this course.

PEP 2-B    Gamma Spectroscopy for the Health Physicist  
Mike Clemmer  
Room 201 C  
This course offers a fast-paced review of the basic principles of gamma spectroscopic analysis for the health physicist. The course includes a review of the nature and origins of gamma-emitting radioactivity, basic physics of gamma interaction with matter, consequences of gamma interactions on gamma spectra, gamma spectroscopy system components and calibrations, gamma spectroscopy analysis methods, and interpretation of gamma spectroscopy data.

PEP 2-C    Contemporary Topics in Radiation Protection: Ethics and Insider Threat Security Risks  
Robert Emery  
Room 202 AB  
Ethical Decision-Making Tools for Enhancing Organizational Radiation Safety Culture Recent investigations of several tragic events have repeatedly identified the absence of a culture of safety as a common contributing factor. An organization’s safety culture is a collective reflection of individual decisions made by its workforce, each carrying with them ethical implications. Safety culture, good or bad, is the sum product of many individual ethical decisions, yet the notion of ethical safety decision-making is not often discussed. This presentation will describe ethical dilemmas radiation safety professionals can encounter, and how the decisions that are made can impact an organization’s overall safety culture. A set of ethical decision-making tools will be presented, along with a suggested path forward for actually improving safety culture within an organization. Radiation Safety’s Role in Mitigating the “Insider Threat” Security Risk While organizations maintain many layers of controls to prevent outsiders from gaining unauthorized access to cause loss or harm, persons who have been granted legitimate access can become an “insider threat” risk, and because they are very difficult to detect, cause over $100 billion is losses annually. Although the typical insider targets assets or data, in some cases their actions can also have significant impacts on workplace and environmental health and safety. Because much of an organization’s radiation safety program activities are carried out with the workers in their places of work, this represents a unique opportunity to assist in the possible detection of insider threats. This presentation will discuss the threats represented by insiders and will detail their recognized traits so that radiation safety professionals can enhance their situational awareness and report suspicions to the appropriate authorities.

PEP 3-A    Laser Safety for Health Physicists  
Ben Edwards  
Room 201 AB  
This course provides an overview of laser physics, biological effects, hazards, and control measures, as well as a concise distillation of the requirements in the ANSI Z136.1-2014 Standard for the Safe Use of Lasers. Non beam hazards, emerging issues, and accident histories with lessons learned will also be covered. Course attendees will learn practical laser safety principles to assist in developing and conducting laser safety training, performing safety evaluations, and effectively managing an institutional laser safety program. While some knowledge of laser hazards will be helpful, both experienced and novice health physicists with laser safety responsibilities will benefit from this course. Attendees may find it helpful to bring their own copy of ANSI Z136.1-2014.

PEP 3-B    New Pixelated CZT 3D Detection System for Applications in Nuclear Power, Nuclear Research & Medical Imaging  
David W Miller  
Room 201 C  
The state-of-art advancement of CdZxTe gamma cameras launched by the University of Michigan over the past 20 years under the US Department of Defense sponsored research is now in use at over 80% of the US and Canadian nuclear power plants. The H3D CdZnTe gamma cameras verify the adequacy of temporary shielding, contamination control, PWR Crud Burst isotopic mapping and radwaste shipment surveys. The wide adoption of the CdZnTc detector have led to new applications in homeland security, safeguard on nuclear materials as part of the missions of the IAEA and nuclear emergency response. IAEA organized a gamma-ray imaging workshop
and conducted blind test on gamma-ray systems developed by eight different organizations in the world. H3D's pixelated, 3-D, CdZnTe gamma cameras were selected for deployment at IAEA for international nuclear safeguards applications. The position-sensitive, 3-dimensional CdZnTe room temperature semiconductor gamma-ray spectrometers and imagers are being evaluated for medical applications including proton beam therapy dose measurements, PET and radionuclide isotopic imaging. New funding from US DOE for sustainable nuclear technologies to develop spectra software will be discussed.

PEP 3-C  Introductory R programming with the ‘Radsafer’ package
Mark Hogue
Room 202 AB
Health physicists routinely perform computations, but many of us lack tools that help keep these computations accurate and transparent. Some even resort to – gasp – spreadsheets. In this PEP session, you learn how to quickly get started with R programming, using the radsafer package. The radsafer package provides easy-to-use functions in the following categories: radiation measurements, decay corrections, accessing radionuclide data, and tools for MCNP. (The MCNP tools will be reserved to the end of the class since they are of interest only to MCNP analysts.) R can be challenging to learn if starting from scratch. But starting with a package — a documented set of shared code and data designed for your work — makes the transition easier. All software in this course is free and open-source. The class will start with a brief overview of R and Rstudio. Attendees will perform simple computations in the Rstudio console, then run the same computations from the Rstudio source panel. This will transition to writing and saving work as scripts. A brief look at function writing will provide the user insight into the best way to use the functions provided in radsafer. Next, we will explore the radsafer package and try out functions on realistic examples. Many radsafer functions access the RadData package. RadData contains the International Commission on Radiological Protection (ICRP) Publication 107, Nuclear Decay Data for Dosimetric Calculations – one of the data sets used by ORNL’s Radiological Toolbox. More details on the packages are provided at github.com/markhogue/radsafer and github.com/markhogue/RadData. Attendees are encouraged to bring laptops, with any common operating system, loaded with the latest versions of R and Rstudio. Installing radsafer (through the Package menu in Rstudio) automatically installs all needed packages such as RadData. Loading R and RStudio is very straightforward. If desired, a set of instructions to load the programs is located at: www.sthda.com/english/wiki/installing-r-and-rstudio-easy-r-programming.

PEP 4-A  Retrospective dosimetry in nuclear forensics
Robert Hayes
Room 201 AB
The physics of thermoluminescence (TL), optically stimulated luminescence (OSL) and electron paramagnetic resonance (EPR) will be reviewed and then shown how these technologies can be used in nuclear forensics, radiological emergency response and epidemiology.

PEP 4-B  Calculating Effective Dose and Risk of Cancer from Internal Intake and External Exposure to Radioactive Material
David Stuenkel
Room 201 C
With updated dose coefficients from the International Commission on Radiation Protection (ICRP) for workers and members of the public, and updated cancer risk coefficients to be published in Federal Guidance Report No. 16, there will be updated tools to calculate effective dose and cancer risks from internal intake and external exposure to radioactive material. This Professional Enrichment Program (PEP) provides an overview of the methods used to calculate dose and risk coefficients, highlighting similarities and differences in the two types of coefficients. This PEP provides a discussion of where to find and how to use these coefficients, including examples of how to estimate effective dose and risk from inhalation or ingestion of radioactive material or exposure to radioactive material in the air or on the ground for both acute and chronic intakes and exposures. The PEP also includes a discussion of the different ways to estimate dose and risks for radon-222 and its decay products. This PEP is intended for anyone interested in the calculation of dose and risk coefficients or their application.

PEP 4-C  Federal Radiological Response Teams
Kenneth Groves
Room 202 AB
This PEP will offer a review of both Federal and State (Federally Funded) Radiological/Nuclear Emergency Response Teams/Assets. FIRST AND FOREMOST, ALL EMERGENCIES ARE LOCAL (AND AT BEST REGIONAL)! The response times for both Federal and State resources are not fixed; so it is critical that local jurisdictions have planned for the first 24+ hours without outside support. It is critical that ‘regional’ plans be in place, documented, trained and exercised if your response is to be effective!
PEP M-1  ICRU 95: Operational Quantities for External Radiation Exposure
Nolan Hertel
Centennial Ballroom A

In 2020 the International Commission on Radiation Units and Measurements published ICRU Report 95. The report recommends a new set of operational quantities which are more closely tied to the ICRP protection quantities. The ICRU sphere has been eliminated. In the session the objectives of the report will be presented. The phantoms used in computing the dose conversion coefficients will be discussed. Resulting coefficients for skin dose, eye lens dose, effective dose, and ambient dose will be shown and discussed. Some analysis of the impact of implementing the newly recommended quantities as opposed to using the current set of operational quantities will be discussed. Some time will be carved out for practitioners to discuss the changes.

PEP M-2  Laser Safety the Next Level
Ken Barat
Centennial Ballroom B

The goal of this PEP is to discuss a number of topics not commonly addressed in the traditional/introductory laser safety PEP or laser safety officer training. These topics will be of considerable interest to an LSO whether at a university or research facility (excluding medical facilities). The typical laser safety training course for users or Laser Safety Officers is based on the existing laser safety standards. Because of this several topics are either not touched upon or are represented in a limited format due to restrictions on how standard can address items. This even extends to items covered in the non-normative appendices of standards. This PEP will include material on the items or elements required to be prepared to respond to a laser accident. Laser safety products that are on the market, both traditional and nontraditional which support laser safety efforts. The class will also include a performance exercise to help engage attendees in demonstrating how laser safety can be obtained and the importance of laser safety officer input. As well as the evaluation of a number of over looked audit items and laser use scenarios. I am quite sure all who attended will leave with useful information and ideas to apply to their place of employment.

PEP M-3  Integration of Health Physics into Emergency Response and Information Communication
Steve Sugarman
Centennial Ballroom C

Response and communication go hand-in-hand. In the event of a radiation incident, it is essential that the radiological situation is properly, yet rapidly, assessed so that a proper response can be planned. Various techniques can be employed to help gather the necessary information needed. It is not always necessary to incorporate wholesale changes to the way things may usually be done in the absence of radioactive materials. For instance, stand-off distances, universal precautions, and response PPE that are normally used can also serve to protect personnel when responding to a radiological event. Coupled with a good event history and other data, health physicists can help to develop a strategy for safely and effectively responding to a radiological event. HP support duties can also include assessment of dose to patients/victims. In addition to performing the “normal” health physics duties, assisting with messaging and communication should be looked at as an area where health physicists can be of help. As time goes on and more information, such as specific source term and chemical/physical form of the involved material, bioassay data, plume data, and other additional data, is received, the health physicist will be called upon to interpret that data and communicate the technical information in an understandable manner to people who need it. It is, therefore, essential that health physicists are able to seamlessly integrate themselves into the response environment and effectively communicate their findings to a wide variety of people that may include on-scene command staff, involved victims, medical care providers, public information officers, decision makers, and others.

PEP M-4  Internal Dose Calculations for Nuclear Medicine Applications
Michael Stabin
Centennial Ballroom D

Internal dose calculations for nuclear medicine applications are based on the well-established concepts and units, as defined by the RADiation Dose Assessment Resource (RADAR) Committee of the Society of Nuclear Medicine and Molecular Imaging. The RADAR method harmonized the defining equations and units employed to provide quantitative analysis for both nuclear medicine and occupational internal dose calculations. This program will show, from a practical standpoint, how data are gathered and dose calculations are performed in nuclear medicine applications, showing practical examples.
to solve different problems. An overview will be given of the current state of the art in the use of internal dose calculations in nuclear medicine therapy, and the promise for future improvements to provide more patient specificity in calculations (in therapeutic applications) and better ability to predict biological effects from calculated doses. Current developments in radiation biology, particularly bystander effects, that are challenging our interpretation of internal dose calculations in nuclear medicine will also be presented.

**Tuesday, 12:15pm – 2:15pm PDT**

**PEP T-1  The Case Against The LNT**  
*Alan Fellman*

*Centennial Ballroom D*

Radiation safety regulations are based on the linear no-threshold (LNT) hypothesis despite overwhelming peer-reviewed science demonstrating a carcinogenic threshold or hormesis at low doses. LNT insists that lowering a worker dose by as little as one µSv results in a safer workplace. Regulators and radiation safety professionals have convinced most of the public that evacuating 150,000 persons following Fukushima ‘saving’ them from tens of mSv improves public health when in fact it caused more than 2,000 fatalities among evacuees. Despite compelling evidence revealing LNT to be fraudulent, the consistent response taken by regulatory agencies and scientific bodies whose recommendations are cited as the basis of regulatory actions is to deflect or rationalize away the science or simply pretend it doesn’t exist so as to maintain allegiance to a worldview of radiation safety built on ALARA and LNT. A sample of relevant findings supporting this allegation will be presented.

**PEP T-2  Performing ANSI Z136-Based Laser Hazard Calculations**  
*Ben Edwards*

*Room 302 AB*

This course provides a step-by-step guide to performing laser hazard calculations based on the principles and methodology in the ANSI Z136.1-2014 Standard for the Safe Use of Lasers. Attendees will gain an understanding of how to complete these calculations for continuous wave, pulsed, and repetitively pulsed laser systems. While some knowledge of laser hazards will be helpful, both experienced and novice health physicists with laser-safety responsibilities will benefit from this course. However, anyone not already familiar with the fundamentals of radiometry and the arcane conventions of the Z136 series of standards for the safe use of lasers would benefit from attending the Laser Safety for Health Physicists PEP so they’ll have some familiarity with the concepts under discussion. Attendees will also find bringing their own copy of ANSI Z136.1-2014 a useful reference.

**PEP T-3  Design, Licensing and Commissioning of a New Nuclear Medicine Accelerator Facility**  
*Shaun Kelley*

*Room 402 C*

Nuclear medicine manufacturing is a quickly growing industry with many new facilities being designed, built and commissioned around the US and the world. Many of these facilities are utilizing new types of technology in the quest to deliver new radionuclides, increased yields, and improved efficiencies which can present new and different challenges in facility design, licensing and commissioning, particularly in agreement states with less experience with operations of this scope. Some examples of these new technologies include accelerator, ion source, target designs and more. These challenges dictate that the Health Physicist should get involved in the process as early as possible for proper design and planning in many areas including but not limited to siting, shielding, ventilation, waste storage and more. This lecture will inform attendees of the areas requiring greatest Health Physics attention and effort, pitfalls to be avoided and suggestions for best practices, all based on a successful recent facility commissioning.

**Thursday, 12:15pm – 2:15pm PDT**

**PEP TH-1  Radiation in Flight**  
*Joseph Shonka*

*Room 302 A*

In 2012, measurements of a extreme solar flare that missed earth by 7 days, along with analysis that showed such an event had a 12% probability of occurrence per decade led the US and UK science and technology advisors to recommend a course of action should such an event occur. Unlike the US, carriers in the EU and UK are regulated, and the doses that would have been received exceeded allowable limits. There are no radiation dose limits for US aircrew and passengers. This PEP will summarize the conclusions of those meetings and address both routine and extreme events from radiation that occur in flight. The PEP will also address methods that are being considered to control that radiation routinely and during space weather events. Recent efforts by the ISO to develop standards for measurement of radiation in flight will also be summarized.
PEP TH-2  Radon physics
Robert Hayes
Room 302 B

The basics of radon and thoron physics as they apply to operational health physics as either an interferent to nuclear operations or as an actual health concern as found in uranium mines. The physics of transport and evolution for radon as it effects airborne air contamination measurements including diurnal variation, wind and transuranic activity deconvolution.

PEP TH-3  Technical Basis and Operational Experience for Clearance of Personal Property from SLAC Accelerator Facilities
Manuel Mejias
Room 402 C

At high energy particle accelerators, induced radioactivity in accelerator components or materials can occur as a direct or indirect consequence to exposure to the particle beam and/or the secondary radiation particles due to beam losses. Management of the potentially activated materials is an important part of the radiation protection program. This presentation addresses the release of the materials from radiological control (i.e., clearance of personal property) in accelerator facilities to meet the DOE Order 458.1 requirements. SLAC, a high-energy electron accelerator facility, has successfully released metals for recycle in the past few years. The SLAC material clearance program with its technical bases are consistent with the DOE Technical Standard DOE-STD-6004-2016 on “Clearance and Release of Personal Property from Accelerator Facilities.” The technical bases that support the clearance of metals (e.g., aluminum, iron, steel, copper, and lead) associated operational experience at SLAC are presented. The emphasis of the technical basis is placed on the volumetric radioactivity aspects due to potential activation at high-energy accelerator facilities and the more challenging measurement methods for volumetric radioactivity. The technical basis includes process knowledge (e.g., characteristics of induced radioactivity, proxy radionuclides versus the hard-to-measure radionuclides, and surface maximum activity), measurement protocols (including quantification of detection capability), and a release criterion based on that the release measurements are indistinguishable from background. SLAC has developed and implemented a material management and release program for the material clearance and metal recycling. The program includes the establishment of radiation detection instrumentation and measurement methods to meet the ANSI N13.12 screening level requirements for clearance of accelerator materials. These instruments include portable instruments with sufficient detection capability for survey on material surfaces, field gamma spectrometer for confirmatory measurements, and a portal gate monitor. The discussion will also include best practices for instrument set-up, field measurements, documentation and record management, and communication with stakeholders. A summary of recycling progress, as well as lessons learned will be provided.
CONTINUING EDUCATION LECTURES (CELs)
Monday, 18 July through Thursday, 21 July

CELs will be taught in Spokane, WA. All times shown below are Pacific Daylight Time (PDT). Virtual attendees must adjust for their local time. All CELs will be viewable by either type of paid CEL attendee.

You can participate in the course in person or virtually. If you are attending virtually, you will be sent a link to watch it LIVE. If you are attending in person, the course will take place at the Spokane Convention Center.

AAHP is evaluating the number of Continuing Education Credits awarded for each of the PEP (and CEL) courses based on technical content. Course instructors will be able to provide this information at the time of the presentation. This information will also be made available on the AAHP recertification site after data entry is completed.

Monday, 6:45am – 7:45am PDT

CEL-1 How to Remove and Replace your Cesium Irradiator
Carolyn McKenzie
Centennial Ballroom B

Cesium irradiators represent a liability to the owner due to their potential use as a dirty bomb, the need for enhanced security for their safe housing and the expense of licensing these large sources. There is a policy initiative within the United States to voluntarily eliminate blood irradiation devices that rely on cesium-137 by December 31, 2027. Both blood and research irradiators can now be replaced with x-ray irradiators for both blood and research use in most applications with equivalent results. We will explore the pros and cons of replacement x-ray irradiators for different applications and their primary features will be highlighted. Steps to take to replace your cesium irradiator will be outlined using the Cesium Irradiator Replacement Program (CIRP) to cover part of the cost of the replacement x-ray irradiator. Recommendations for how to work with your research community to gain their buy-in to the use of alternative technologies will be discussed. The use of comparison studies of the old and new irradiator in side-by-side comparison is needed to successfully transition to an x-ray irradiator. Once the comparison studies are completed, removal of the cesium irradiator is available for free under CIRP. What to expect when your Cesium irradiator is planned for removal will be covered.

Tuesday, 6:45am – 7:45am PDT

CEL-2 Radiation Protection of the Public and the Environment
Mike Stewart
Centennial Ballroom B

Regulatory agencies have established requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under specified policies. This session will discuss different programmatic aspects to consider when meeting the requirements. Discussion will focus on Department of Energy (DOE) Order 458.1, Radiation Protection of the Public and Environment with comparisons to other Federal Agencies’ protection requirements. Covered will be DOE objectives for the protection of the public and the environment which include; conducting radiological activities so that exposure to members of the public is maintained within the established dose limits, controlling the radiological clearance of real and personal property, ensuring that potential radiation exposures to members of the public are as low as reasonably achievable (ALARA), and providing protection of the environment from the effects of radiation and radioactive material. Topics discussed will be public dose limit, ALARA, demonstrating compliance with the public dose limit, airborne radioactive effluents, liquid discharges, radioactive waste, protection of drinking water and ground water, protection of biota, release and clearance of property, and independent verification.
Wednesday, 6:45am – 7:45am PDT

**CEL-3** Establishing a Program to Produce Ac-225 with a Superconducting Linear Accelerator: Lessons Learned  
*Alexander Bakken*  
*Centennial Ballroom B*

Niowave is at the forefront of producing and supplying high-purity Ac-225 in the private sector. Many technical and regulatory hurdles have been overcome to obtain a first-of-a-kind license from the Nuclear Regulatory Commission to process dispersible Ra-226 for the production of Ac-225 using a superconducting linear accelerator. Cancer research in areas such as targeted alpha therapy (TAT) show immense promise with Ac-225 based drugs, however, the existing supply simply cannot match demand. In order to help fill that void, Niowave has spent several years building out radiochemical processing facilities, superconducting linear accelerators, and the surrounding infrastructure to operate a fully functional, closed-loop production system. In this talk, a review of the Ra-226 and Ra-225 (Ac-225) decay chains will be presented. These decay chains possess a complex mixture of radiological hazards. There are alpha, beta, and gamma emissions spanning the range from high to low energy across all particle types, with half-lives varying from microseconds to thousands of years. Even more interesting, is that many of the predominant radiological hazards are dictated by managing a single noble gas, Rn-222, with a half-life of just 3.8 days. With this in mind, the following topics will be presented and discussed: approaches to facility planning and engineering controls, practical methods for detection and identification of contamination, containment and control of Rn-222 gas, real-time spectroscopy techniques for short-lived isotopes, and methods to accurately quantify all isotopes in the respective decay chains.

Thursday, 6:45am – 7:45am PDT

**CEL-4** Managing Generally Licensed Devices  
*Mike Lewandowski*  
*Centennial Ballroom B*

Many commercial devices that contain radioactive material for analytical or process control have been determined to present a low hazard and are approved by a regulatory agency for distribution as a generally licensed device. This presentation will review the requirements for end users to use generally licensed devices and provide some suggestions for managing generally licensed devices under a specific license. This presentation builds on a CEL provided at the 2022 IRPA North American Regional Congress and contains additional information. Please note that this presentation is limited to generally licensed devices regulated under 10 CFR Part 31.5 or similar Agreement State regulations.
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