# 2018 Physics Education Research Conference

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Preface

The theme of the 2018 Physics Education Research (PER) Conference was Having Wonderful Ideas: Connecting the Content, Outcomes, and Pedagogies of Physics. The plenary talks dipped into this theme in several ways. Rosemary Russ, in the Wednesday bridging session, focused on preservice teachers. Benedikt Harrer discussed the multiple modes of communication (speech, gestures, whiteboards, etc.) that teachers and students used to construct and respond to wonderful ideas. Déana Scipio, in the Thursday lunch plenary, explored theory and examples of epistemic agency for students from non-dominant communities in a chemical oceanography laboratory.

A recurring theme through all three plenaries was who is allowed to have wonderful ideas: who is given space to speak in our classrooms and research, what different types of "wonderfulness" say about the values of the listeners, and how making those choices consciously can empower rather than oppress. This resonates with a larger conversation that is gaining volume in physics education research, about how equity and inclusivity can be part of physics education even when springs and ramps are the material on the page. Education has always been political, and more researchers are critically engaging with this reality as our field continues to grow.

Every PERC does some things differently than the year before. In 2018, the no-banquet format continued on Wednesday night, but many people joined breakout "Dine and Discuss" groups. These groups of 6-14 people were organized around themes ranging from labs to being a religions person in physics, and were very popular. Another format shifts was to keep longer juried talks, but return those papers to the main peer-reviewed section of the Proceedings. Finally, PERC has often ended with a plenary session or panel. This year, closure was more of a "choose your own adventure," where a panel of plenary speakers ran in parallel with a discussion about teaching implications, a forum for emergent questions from the conference, and an art/music room.

None of this could happen without a team of people every year who bring their vision, energy, and sweat. The 2018 PERC organizers were Amy Robertson, Leslie Atkins Elliott, Andy Elby, and Jen Richards. They were joined by the formidable organizational powers of the American Association of Physics Teachers (AAPT) and the Physics Education Research Leadership and Organizing Council (PERLOC).

The PERC Proceedings online submission and review process was supported by Lyle Barbato and Bruce Mason who work closely with the editors to ensure smooth functioning of the online system. We owe Lyle and Bruce a great deal of thanks. The editors also thank the AAPT for their sponsorship of the Proceedings, allowing it to be published open-access through the comPADRE website.

As in every year, the editors wish to thank the referees for volunteering their time and expertise to give feedback to papers submitted to the Proceedings. This year we had 251 reviewers who reviewed the 153 papers submitted to the Peer Reviewed Section. The PERC Proceedings is both an important archive of findings and also a place where many new members of the field publish their first physics education research, and we are deeply appreciative of the reviewers who make this possible.
Laura Wood, Nicholas Young, Cabot Zabriskie, Daqing Zhang, Raymond Zich, Dina Zohrabi Alaee.

Finally, the Editors wish to express our special thanks to the PERC Coordination Committee chaired by Joel Corbo, who facilitated communications and coordinated logistics among multiple parties to streamline the process for future years.

See you Summer 2019 in Provo, Utah!

Adrienne Traxler
Editor-in-Chief
Many physics instructors have educational goals for their students that go beyond understanding physics concepts and problem-solving approaches. These goals can include understanding how physics knowledge is generated, understanding how to learn difficult concepts, learning more general problem-solving skills, developing confidence in physics/science, and developing a physics identity. Our conference theme is inspired by an educational goal articulated by Eleanor Duckworth, a goal connected to the ones just mentioned but different in flavor: "The having of wonderful ideas is what I consider the essence of intellectual development. And I consider it the essence of pedagogy to give [students] the occasion to have [their] wonderful ideas and to let [them] feel good about [themselves] for having them." What does "having wonderful ideas" mean in physics courses and other physics learning environments? Sessions at PERC 2018 will explore this question by focusing on both learners (including students and teacher-learners) and classrooms. At the student level: What are the various ways in which student ideas in physics are wonderful? In what ways can students' ideas challenge our sense of what "counts" as physics? How do our assessments capture wonderful aspects of student thinking? At the classroom level: How do the learning outcomes we identify help us articulate what is wonderful about physics? What are the different ways in which our classrooms are wonderful places to be? Discussing these questions can help us better refine and articulate our goals as physics educators and physics education researchers.

Organizers:
Amy Robertson, Seattle Pacific University
Leslie Atkins Elliott, Boise State University
Andy Elby, University of Maryland College Park
Jen Richards, University of Washington

The organizing committee of the PERC 2018 would like to express gratitude to the following individuals for their invaluable assistance in creating this conference:

The plenary speakers, Benedikt W. Harrer, Rosemary S. Russ, and Déana Scipio; the PERC liaison, Joel Corbo; 2017 PERC organizers who served as advisors through the whole process; Lyle Barbato and Bruce Mason with ComPADRE; Tiffany Hayes, Cerena Cantrell, Janet Lane, and Pearl Watson from AAPT; PERLOC for supporting award plaques; reviewers of juried talk proposals; and the PERC Proceedings Editors: Adrienne Traxler, Ying Cao, and Steven Wolf.
## PROGRAM

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<td>Time</td>
<td>Event</td>
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<tr>
<td>3:15 PM</td>
<td>Plenary Panel</td>
<td>Renaissance Ballroom</td>
</tr>
<tr>
<td>Closing</td>
<td>Small Group Discussions of Emergent Questions</td>
<td>Meeting Room 2</td>
</tr>
<tr>
<td>Activities</td>
<td>Discussion: Implications for Teaching</td>
<td>Meeting Room 3</td>
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<td>Art/Music Room</td>
<td>Meeting Room 4</td>
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- Researcher and the Researched
- Probing Understanding of Sophisticated Use of “Simple” Mathematics in Physics
- Juried Talks II

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Papers published in the 2018 Physics Education Research Conference Proceedings consist of two categories, one plenary paper and peer-reviewed papers.

The plenary paper was contributed by one plenary speaker, Dr. Benedikt W. Harrer.

The peer-reviewed papers are written products of any presentation including the juried talks, parallel sessions, and poster sessions. Each paper undergoes a rigorous peer review process in order to be published in the Proceedings. This year saw 153 submitted manuscripts, of which 113 were accepted for final publication.

The readership of the Physics Education Research Conference Proceedings includes faculty, post-doctoral associates, and graduate and undergraduate students in physics education; scholars in other discipline-based science education or closely related fields, such as cognitive science; practitioners in physics or other sciences, such as teaching faculty at undergraduate and graduate levels, and high school physics teachers.