PNACP 2025 Agenda

Organization: Pacific Northwest Association for College Physics
Local Organizer: David Syphers, Eastern Washington University
Dates: Friday and Saturday, April 25-26 2025
Last update: 2025-04-24

Friday, April 25th, 2025
Location: Interdisciplinary Science Center (ISC) 009 (unless otherwise stated below)

Time	Title	Speaker
9:30 – 12:30	Board Meeting: ISC 301 **Zoom option: Will be sent to the board**	
12:30 - 1:30	Lunch (on your own for non–Board members) / Registration Please click here for a list of nearby recommended restaurants.	
1:30– 1:45	Welcome	David Syphers, Eastern Washington University
1:45 – 2:45	Invited Speaker: Ascent to Europa: A Journey to Jupiter's Ocean Moon	Carol Paty, University of Oregon (remote talk)
2:45 – 3:00	Contributed Speaker: Tips From A Retiring Prof - Some Notes to the Beginning Physics Teacher	Brian Houser, Eastern Washington University
3:00 – 3:20	Break	
3:20 – 4:20	Invited Speaker: Exploring Earth and Titan's Atmospheres with Balloons and Spacecraft	Darci Snowden, Central Washington University
4:20 - 5:05	Roundtable Discussion: Supporting students in uncertain and changing times (barriers, advising, resources, ideas, best practices)	Facilitators: Andie Vanture, Robert Hobbs, Tamar More

Banquet

Time	Title	Speaker
5:15 - 6:00	Social Hour Location: Northstar Taps (green marker on map)	
6:15 – 9:00	Banquet: The First 30 Years of PNACP Location: ISC 301	Bob Gibbs, Eastern Washington State (emeritus)

Saturday, April 26th, 2024
Location: ISC 009

Time	Title	Speaker
9:00 - 9:10	Welcome	
9:10 - 10:10	Invited Speaker: Everything that you wanted to know plate tectonics (& Earth's interior), but were too afraid to ask	Catherine Cooper, Washington State University
10:10 - 10:30	Break	
10:30 – 11:30	Invited Speaker: Aerial Exploration of Mars	Brian Jackson, Boise State University
11:30 - 12:40	Lunch	
12:40 - 1:40	Invited Speaker: Dragonfly: NASA's Rotorcraft Lander Mission to Saturn's Moon Titan	Jason Barnes, University of Idaho
1:40 – 2:00	Contributed Speaker: Teaching experimental limits with particle tracks	Matt Geske, Gonzaga University
2:00 - 2:20	Break	
2:20-2:40	Contributed Speaker: Improving The Primordial Helium Abundance Measurement	Erik Aver, Gonzaga University
2:40-3:00	Contributed Speaker: The Physics of Sailing	Christine Berven, University of Idaho
3:00-4:00	James Gerhart Lecture: Panel on Teaching Resources in Preparation- textbooks and lab resources	Bob Gibbs, Christine Berven, Frederic Liebrand, Tamar More

Abstracts

Invited Talks:

Ascent to Europa: A Journey to Jupiter's Ocean Moon
Carol Paty, University of Oregon

Beginning with Galileo Galilei in 1610, the Jovian system of worlds has inspired us and provided a rich environment for paradigm change and discovery. Nearly 415 years from Galileo's discovery of the Jovian moons, we are poised to explore mysteries of Europa.

NASA's Europa Clipper spacecraft launched in October 2024, with the goal of exploring Jupiter's moon Europa to understand its habitability. This robotic explorer will enter Jupiter orbit in April

2030, and, beginning March 2031, it will collect science data while flying past Europa 49 times. The mission will investigate Europa's habitability by studying its interior, composition, and geology, and will search for and characterize any current geologic activity including possible plumes. In this lecture, I'll discuss the mission's science objectives and how they will be addressed using an advanced suite of complementary remote sensing and in-situ instruments onboard Europa Clipper. From the short wavelengths of the ultraviolet to long wavelengths of radio, to a variety of compositional analysis techniques, to magnetic sounding of the interior, the diverse set of observations these instruments and investigations provide will paint a comprehensive picture of Europa's habitability and what lies beneath its frozen exterior.

Exploring Earth and Titan's Atmospheres with Balloons and Spacecraft
Darci Snowden, Central Washington University

A comparative look at two of the solar system's most intriguing atmospheres studied through two very different approaches.

Everything that you wanted to know plate tectonics (& Earth's interior), but were too afraid to ask
Catherine Cooper, Washington State University

Plate tectonics is the unifying theory of Earth Science. While the theory truly has revolutionized the discipline and our collective understanding of terrestrial planetary behavior, there are still so many unanswered (and perhaps unanswerable) questions such as "When did plate tectonics start on Earth?"; "Do/did other planetary bodies experience plate tectonics?"; "Will plate tectonics end eventually?"; "Is plate tectonics required for life?"; "What is up with continents?"; "What is up with plumes and hotspot volcanism?"; and "Does plate tectonics really matter?". In this presentation, I will give an overview of what we think we know, what we don't know yet, and what may continue to elude us (and why). I will also introduce the audience to the additional complexities of the Earth's system that are often neglected in the plate tectonics framework yet are likely still key to the planet's evolution. Finally, I hope to leave the audience with the same sense of wonder and awe for the consequences of how our planet loses its interior heat that continues to keep me asking questions.

Aerial Exploration of Mars
Brian Jackson, Boise State University

Drones have revolutionized geological and atmospheric science on the Earth. Their ability to explore high and low, far and wide allows drones to deploy instrumentation and collect remote-sensing data in regions and from perspectives otherwise difficult or impossible to access. The success of the Ingenuity helicopter opens prospects for transforming the study of Mars in the same way. Drones on Mars can facilitate geological investigations, enable atmospheric measurements, and assist human exploration. Future missions to Mars could involve drones as complements to ground-bound assets, such as rovers or fixed stations, or as stand-alone vehicles. In this presentation, I'll talk about the promise of drone-based exploration

of Mars. I'll also discuss my own group's recent work, using engineering telemetry from the Ingenuity drone to profile near-surface winds on Mars – the first time winds have ever been measured on another planet this way.

Dragonfly: NASA's Rotorcraft Lander Mission to Saturn's Moon Titan
Jason Barnes, University of Idaho

The Dragonfly mission will land a robotic octocopter on Saturn's moon Titan in 2034 to study its prebiotic chemistry, constrain its habitability, and search for potential chemical biosignatures. Taking advantage of Titan's low gravity and thick air, Dragonfly will aerially traverse to over twenty distinct landing sites on dune, interdune, and icy crater terrains. On the ground at those sites we will employ our four scientific instruments: a mass spectrometer, a gamma-ray/neutron spectrometer, seven cameras, and a geophysical and meteorological suite. We seek to determine how far organic chemistry has progressed, to ground-truth the global methane meteorological cycle, to measure the modes and rates of surface geologic processes, to constrain when and where water and organics might have mixed, and to look for evidence that either water-or hydrocarbon-based life may have existed on Titan. I will discuss the planetary science of the mission as well as the physics of flying on another world.

James Gerhart Lecture: Panel on Teaching Resources in Preparation- textbooks and lab resources

Bob Gibbs, Eastern Washington University: The Importance of Qualitative Problems for Understanding Physics
Christine Berven, University of Idaho: Physics Problem-Solving Techniques for Understanding and Success in First Year Mechanics: A Structured Approach for Scientists and Engineers
Fred Liebrand, Seattle University
Tamar More, University of Portland: Crowdsourcing an open source version of NextGen Physics of Everyday Thinking (NGPET), plus a survey of a few more physics texts and curricula from the region.

Contributed talks

Improving The Primordial Helium Abundance Measurement
Erik Aver, Gonzaga University

The Physics of Sailing
Berven, University of Idaho

Humans have been using the power of wind to propel themselves over the seas for millennia. A challenge for all sailors from all parts of the world, from the ancient Polynesians, the Minoans of the eastern Mediterranean, and the Vikings of northern Europe to sailors of today is how to harness the wind and design sails and boats to go where they want. However, it was not until the 18th century that scientists created the first theories that could be used to explain how boats sail, with related more general research on this continuing to this day. In this presentation I'll be describing the physics of how modern recreational

sailboats sail. Some of the questions I'll be addressing include "How does a sailboat sail upwind?", "Can a sailboat go faster than the wind?" "What is lift?"

Tips From A Retiring Prof - Some Notes to the Beginning Physics Teacher

Brian Houser, Eastern Washington University

Over the decades I have come to present some standard topics in nonstandard contexts to enhance student interest. This talk will feature a few examples, such as Cool Carl / Fiery Fiona for blackbody radiation, blood-pressure-depth relation, and PV Sudoku.

Teaching experimental limits with particle tracks

Matt Geske, Gonzaga University

We utilize measurements of particle tracks in a cloud chamber to teach students about detector acceptance and experimental limits. Students are tasked with measuring the scattering cross section of electrons in atmosphere via measurements of the mean free path observed in the cloud chamber. The results of such a measurement yield results that are several orders of magnitude too large. This is used as a launching point for students to estimate the actual detector acceptance, and determine what the measurement they made actually tells us.