The Department of Physics and Astronomy
Announces a Spring 2024 Artist in Residence program in Creative Arts

Opportunity:
The Department of Physics and Astronomy invites proposals for Artist-in-Residence projects that respond to Physics and Astronomy research from creative visual arts, literary, film, performance, music composition, and design perspectives. Creative artist residents are expected to embed themselves in the research lab/group to envision and produce a response that connects to the scientific research (participating research group descriptions included below.) Collaborative applications are welcome. Preference will be given to those who have not previously participated. Selected artists will receive $500 at the end of the program. Funding for reasonable material, presentation, and display expenses will also be provided.

Open to: Undergraduate and graduate Studio Arts, Music, Theatre Arts, Film Studies, Architecture, and English majors and minors.

Expectations:
Selected creative artists are expected to spend time each week with the research group, and create a unique work, body of work, composition, or set of compositions in response that is presented at an exhibition/performance at the end of the spring term.

About the participating Physics and Astronomy research groups:
There are a number of different Physics and Astronomy groups that are interested in participating in this program. Please see the attached descriptions provided by the Physics and Astronomy faculty.

Information sessions:
Potential applicants interested in learning more about participating Physics and Astronomy research groups should plan to attend an information session to meet sponsoring researchers for a brief tour of the labs.
Dates – Wednesday, October 18, 4:00-5:00 pm; 219 Allen Hall and
Thursday, October 19, 3:00-4:00 pm; 100H Allen Hall

Proposal requirements:
- Students should be in good academic standing and have declared a disciplinary major or minor in English, Music, Studio Arts, Film Studies, Theatre Arts, and Architecture.
- Application file including contact info, GPA, artistic department faculty letter, current resume, unofficial transcript
- The artistic department faculty letter must confirm that the faculty advisor has reviewed and supports the merit and feasibility of the artist's proposed work. The creative artist and their advisor should specify how the advisor will support the creative artist. Examples include a mutual commitment to regular meetings or registering for independent study with the faculty member.
- A two-page proposal for the creative plan that connects the creative work to the research groups
- A one-page budget estimating material and presentation expenses (wood, etching plates, paper, framing, pedestals, performers, recording equipment, equipment rental, etc.).
- Work samples, including 2-3 written works, 3-5 JPEG images of visual work (with brief image description of title, media, dimensions, year of completion), 2-3 video samples, or two 5-10 minute MP3 composition/performance samples. Total file size should not exceed 20 MB. Alternatively large files may be posted on a third party site with a link provided.

Deadline to apply: Monday, November 13. Application materials or questions should be emailed to Michele Slogan (slogan@pitt.edu). For more information on the program and descriptions of the artists go to http://www.physicsandastronomy.pitt.edu/artist-residence-program.

Carles Badenes, Astro/Cosmo
Most stars are not alone. They live and die in close proximity to other stars - in astronomy, we refer to these ’stellar marriages’ as ‘multiple star systems'. The iconic image of Luke Skywalker against the twin setting suns of Tatooine from the Star Wars movie is a depiction of one such system. Professor Badenes and his group search through large amounts of data gathered by modern astronomical surveys like the Sloan Digital Sky Survey (SDSS) to identify multiple stellar systems, study the frequency of stellar companions as a function of the properties of the stars, and find rare and interesting systems with exotic companions like neutron stars and black holes.

Rachel Bezanson, Astro/Cosmo
Rachel Bezanson, Astro/Cosmo I am an observational astronomer studying the formation and evolution of galaxies through cosmic time. My work uses some of the largest telescopes in the world (the Keck telescopes in Hawaii, the Gemini telescopes in Hawaii and Chile, the ALMA telescope array and the Very Large Telescopes/VLT in Chile) and in space (the Hubble Space Telescope and the James Webb Space Telescope) to study the detailed properties of galaxies in the distant - and therefore early - Universe. I am actively involved with a variety of studies using JWST, including leading the large “UNCOVER” program that aims to detect light and study the properties of the earliest, and most distant, galaxies in the Universe, thus expanding our cosmic horizon. My work aims at characterizing how galaxies form, how they shut off their star-formation and transform, how the stellar motions trace the galaxies’ evolving gravitational potential wells, and the importance of interactions with neighboring galaxies. I am also leading a new outreach initiative at the historic Allegheny Observatory (https://www.observatory.pitt.edu/), which is also an available resource to participants in the Artists in Residence program.

Arthur Kosowsky, Astro/Cosmo
Over the past 20 years, we have made increasingly detailed and precise maps of the sky at microwave frequencies. The pattern of slight temperature differences in these maps is, quite literally, an image of what the universe looked like when it was 370,000 years old, a tiny fraction of its current age. It is the baby picture of the universe. And what do we discern in this picture? Sound waves.

We see clearly the imprint of sound waves moving about in the early universe, driven by small differences in gravity pulling on the primordial plasma. Cosmic rumbling as all of the structures in the universe begin to grow due to the inexorable pull of gravity. Making this image of the early universe requires the combined efforts of dozens of scientists and engineers, using a custom-designed telescope perched atop a 17,000 foot mountain in Chile’s Atacama Desert. Radiation which has propagated largely unimpeded for 13 billion years is reflected from two mirrors, passes through several silicon lenses, and onto an array of detectors cooled to a tenth of a degree above absolute zero. Months of data are converted to maps of the sky through thousands of hours of supercomputer time. The effort is worth it: the maps show the seeds of our own origins.

Andrew Mugler, Biophysics
Cells are living machines. They process information, make decisions, and take action. Cells sense their environment with a precision that no engineered device could beat. Groups of cells perform collective tasks that no cell can perform alone. The Mugler Group uses theoretical physics to investigate cell sensing, signaling, and communication. This helps further our our understanding of biological mechanisms and combat disease.

Vittorio Paolone, Particle
Particle physics is the study of the fundamental constituents of matter and how they interact. One of these constituents are a set of particles called neutrinos. Presently there are three known types of neutrinos: electron neutrino, muon neutrino, and tau neutrino. A majority of the neutrinos around us were born around 15 billion years ago, soon after the birth of the universe. Neutrinos have incredibly small masses and in general don't like to interact with matter. The neutrino density in the universe is estimated to be about 330 million neutrinos per cubic meter and a neutrino could pass through a light years’ worth of lead and still not interact. Therefore at any second several trillion neutrinos passed through a finger in your hand. My research focuses on the study of neutrino properties through their flavor (type) mixing (oscillations) and interactions with matter.

Hrvoje Petek, Condensed Matter

Light propagates at a velocity of 3x10^8 m/s, which takes it only 1.3 seconds to reach the Moon, but in our research, we have femtosecond (10^-15 s) temporal resolution, which enables us to image light on 10 nm (10^-8 m) spatial scales. In our ultrafast microscopy experiments, we can take movies of light propagating and interacting with itself or other materials. In particular, we are interested in creating plasmonic vortices, where light is structured so that it appears to rotate in place. At the moment, we are considering how to make arrays of light vortices undergoing pirouetting motion, in concert, on silver surfaces.