



PHYSICS COLLOQUIUM: The Co-Evolution of Black Holes and their Host Galaxies

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Date:
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Time:
10:30 AM – 11:50 AM

Location:
GRAN 135



About The Speaker:

Dr. Vardha N. Bennert earned her PhD in astrophysics in 2005 from the Ruhr University Bochum in Germany. She then moved to the United States for postdoctoral research at the University of California, first at Riverside and later at Santa Barbara. In 2011, Dr. Bennert joined the faculty at California Polytechnic State University (Cal Poly). Her research focuses on active galaxies—galaxies that host a supermassive black hole at their center. Together with her research team, which includes Cal Poly undergraduate students, she measures the masses of these black holes and investigates the properties of their host galaxies. Outside of research and teaching, Dr. Bennert enjoys exploring California's outdoors and is on an inward journey, integrating meditation into her daily life.

Abstract:

Supermassive black holes, with masses millions to billions of times that of the Sun, reside at the centers of nearly all massive galaxies. When gas falls toward these objects, gravitational energy is efficiently converted into radiation, producing active galactic nuclei (AGNs) that can rival or exceed the luminosity of their entire host galaxy. Over the past two decades, astronomers have discovered surprisingly tight correlations between black hole mass and large-scale properties of galaxies, such as stellar mass and the motions of stars. These relations suggest that black holes and galaxies evolve together, despite the enormous difference in scales. In this talk, I will introduce the physical picture behind AGNs, explain how their black hole masses can be measured, and discuss why the observed black hole–galaxy correlations are both puzzling and important from a theoretical standpoint. I will highlight recent observational progress that allows us to probe the dynamics of gas and stars in galactic centers with unprecedented precision, providing new insight into black hole growth and its connection to galaxy evolution. Finally, I will discuss how observations of distant galaxies, including new results from the James Webb Space Telescope, are beginning to test whether these correlations were already in place in the early universe.

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