

Multi-Messenger, Multi-Band Astrophysics: From Earth, Space and the Moon

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Abstract

Recent gravitational-wave observations have confirmed previously unknown populations of black holes. These black holes challenge our understanding of astrophysical formation mechanisms. In this talk, I will review what we can learn about such black holes this decade with the LIGO-Virgo-KAGRA gravitational-wave network on Earth. In the next decade, with ESA and NASA space mission LISA, I would describe a new method of 'Multi-band Astrophysics' for probing the origins of such black holes. I would conclude by showcasing a new 'Multi-Messenger' lunar observatory as a scientific case for humanity's return to the Moon.

Biography

Dr. Karan Jani is a professor of physics & astronomy at Vanderbilt University. He is the founding director of the Vanderbilt Lunar Labs Initiative and holds the endowed chair position of Cornelius Vanderbilt Dean's Faculty. Karan's research is at the forefront of understanding black holes and testing Albert Einstein's General Theory of Relativity with gravitational-wave detectors on the earth, moon, and space. The Forbes magazine included Karan in their coveted "30 under 30" all-star alumni list and Vice-Motherboard featured him in their list of "105 Interdisciplinary Thinkers in the World". His research has been profiled by the BBC, New York Times, Forbes, and CNN among other international news media. Karan shared the Special Breakthrough Prize in Fundamental Physics for the discovery of gravitational waves.