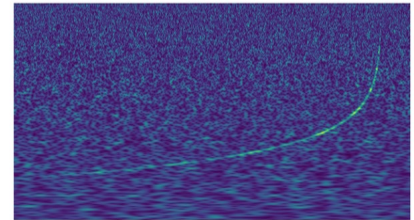# Big Data In Multi-Messenger Astrophysics

November 29 - December 3, 2021

Scientific Overview

Detection of gravitational waves requires the operation of very sophisticated detectors producing large amounts of data. The sensitivity of the gravitational-wave detectors to astrophysical signals is limited by the noise associated with the instruments themselves and their environment. Invaluable astrophysical information is buried in data sets that may be too large or complex to be analyzed with traditional data-processing techniques. Methods for the analysis of gravitational-wave detector data range from standard signal processing algorithms to novel machine learning algorithms. This workshop will focus on the development of these techniques for a more efficient handling of gravitational-wave data sets, reduction of detector noise, identification of astrophysical signals and increase in detection confidence. It will bring together astrophysicists, mathematicians and statisticians working on the state-of-the-art data analysis.

This workshop will include a poster session; a request for posters will be sent to registered participants in advance of the workshop.

Long Program Schedule

This workshop is part of the long program on "Mathematical and Computational Challenges in the Era of Gravitational Wave Astronomy."

- Opening Day : September 13, 2021.
- Mathematical and Computational Challenges in the Era of Gravitational Wave Astronomy Tutorial : September 14 - 21, 2021
- Workshop I: Computational Challenges in Multi-Messenger Astrophysics : October 4 -8, 2021.
- Workshop II: Mathematical and Numerical Aspects of Gravitation : October 25 - 29, 2021.
- Workshop III: Source Inference and Parameter Estimation in Gravitational Wave Astronomy : November 15 - 19, 2021.
- **Workshop IV: Big Data in Multi-Messenger Astrophysics : November 29 - December 3, 2021.**
- Mathematical and Computational Challenges in the Era of Gravitational Wave Astronomy Culminating Retreat at Lake Arrowhead : December 12 - 17, 2021.

Participation

Additional information about this workshop including links to register and to apply for funding, can be found on the webpage listed below. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission, and we welcome their applications.

Organizers

Marco Cavaglia (MST), Peter Couvares (Caltech), Gabriela González (LSU), Ik Siong Heng (University of Glasgow), and Antonio Marquina (University of Valencia).

Speakers

Marica Branchesi (Gran Sasso Science Institute), Sarah Caudill (National Institute for Nuclear and High Energy Physics), Marco Cavaglia (Missouri University of Science and Technology), Michael Coughlin (University of Minnesota), Irene Di Palma (Sapienza University of Rome), Jenne Driggers (California Institute of Technology), Jonathan Gair (Max Planck Institute für Gravitationsphysik, Albert-Einstein-Institut), Gabriela González (Louisiana State University), Leïla Haegel (University of Paris 8), Ik Siong Heng (University of Glasgow), Kelly Holley-Bockelmann (Vanderbilt University), Mario Juric (University of Washington), Arunava Mukherjee (Saha Institute of Nuclear Physics), Laura Nuttall (University of Portsmouth), Agata Trovato (Langevin Institute - Paris Diderot University), Gabriele Vajente (California Institute of Technology), Guillermo Valdes (Louisiana State University), John Veitch (University of Glasgow), Josh Willis (California Institute of Technology), Frank Wuerthwein (University of California, San Diego).