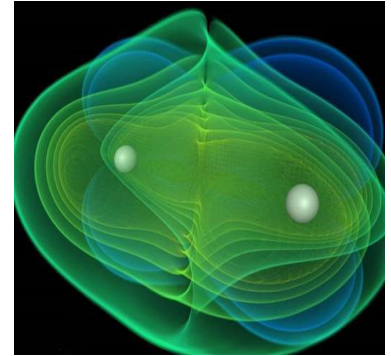


# Computational Challenges in Multi-Messenger Astrophysics

**October 4 - 8, 2021**



## Scientific Overview

Computational relativistic astrophysics and numerical relativity face a number of challenges following the first detection of binary black holes and binary neutron stars: high Lorentz factors, strong and dynamical gravitational fields, uncertain equations of state, magnetic fields, radiative and dissipative effects, large dynamical ranges, solutions of constrained hyperbolic systems. The likely gravitational signals produced after the collapse of massive stellar cores offer unique probes of the dynamics of newly-born compact stellar remnants. Predicting source dynamics of future detections of gravitational wave signals is important to understand the physics of these events in the current and next-generation earth-based gravitational-wave detectors and essential to achieve design sensitivity in future space-based detectors. The goal of this workshop is to bring together mathematical modelers in general relativity, astrophysicists, and experts in numerical relativity to discuss open issues to improve current approaches to build increasingly more accurate gravitational wave templates that allow to identify future detections.

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

- 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

## Organizers

Miguel Ángel Aloy (University of Valencia), Manuela Campanelli (RIT), Marco Cavaglia (MST), Philippe G. LeFloch (Sorbonne University, Paris), Luciano Rezzolla (Goethe University Frankfurt), and Susana Serna (UAB).

## Participation

This long program will involve senior and junior researchers from several communities relevant to this program. You may apply for financial support to participate in the entire fourteen-week program, or a portion of it. We prefer participants who stay for the entire program. Applications will be accepted through **August 9, 2021**, but offers may be made up to one year before the start date. We urge you to apply early. Mathematicians and scientists at all levels who are interested in this area of research are encouraged to apply for funding. Supporting the careers of women and minority researchers is an important component of IPAM's mission and we welcome their applications. More information and an application is available online.

