UCD School of Mathematics and Statistics

Colloquium Seminar

**Title:** Eavesdropping on the cosmological cocktail party: data analysis challenges for the Laser Interferometer Space Antenna

**Speaker:** Prof. Jonathan Gair (Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Germany)

**Date:** Wed 11th February 2026 at 12:00PM

**Location:** (See abstract)

**Abstract:** LOCATION: Lynch Theatre F (room H1.37), Science Hub, O'Brien Centre, UCD

Lunch to follow on the 4th floor of the O'Brien Centre atrium. If you plan to attend, please complete this brief form.

ABSTRACT: In 2035 the European Space Agency will launch LISA, the Laser Interferometer Space Antenna. This will be the first ever instrument capable of detecting gravitational waves at millihertz frequencies. The millihertz band is expected to be source rich, containing signals from the mergers of supermassive black holes at the centres of galaxies, from the inspiral and merger of compact objects formed as the end-state of stellar evolution with supermassive black holes, from millions of ultracompact binary star systems in the Milky Way and other nearby galaxies, and possibly also

stochastic signals generated in the early Universe or by populations of unresolved astrophysical objects. The LISA data stream will be a complex cocktail of all of these signals, which will overlap in time and frequency. Picking individual astrophysical voices out of the crowd requires careful data analysis algorithms that simultaneously constrain the properties of the populations and the instrumental noise in a single global fit. In this talk I will describe the challenges of LISA data analysis, the current state of the art of attempts to address these challenges and the potential for new approaches, including machine learning, to make contributions to these efforts.