

**Project Title:**

Numerical simulations of black-hole binaries

**Supervisor(s):**

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**Project Description:**

Numerical solutions of the Einstein equations for the last orbits and merger of two black holes are essential to detect the gravitational-wave signal from such systems in the Advanced LIGO and Virgo detectors, which are due to come online in late 2015.

Our current numerical codes allow us to simulate systems of moderate mass ratios, and for black holes with moderate spins. Improved numerical techniques, coordinate conditions and initial data will allow us to study systems with far higher mass ratios and spins. These systems are interesting to study for their physical properties alone, as well as being essential for modelling generic-binary waveforms for gravitational-wave applications. A number of research directions are possible, based on the potential improvements mentioned above, as well as the study of the physics of black-hole mergers for specific configurations -- the details of ringdown waveforms, black-hole recoil, and precession effects.

To discuss this project further, please contact:

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