Contribution ID: **5** Type: **not specified**

Millisecond waveforms for eccentric extreme mass ratio inspirals into spinning black holes

The Laser Interferometer Space Antenna is expected to observe numerous gravitational-wave sources in the mHz band. One promising source class are extreme mass ratio inspirals (EMRIs) of a stellar-mass compact object into a massive black hole (MBH). Accurate EMRI waveforms are essential for data analysis, but this is challenging to achieve due to the need to accurately track the phasing of many harmonic modes over tens of thousands of orbital cycles. Rapid EMRI template generation is the ongoing aim of the FastEMRIWaveforms (FEW) project, which demonstrated millisecond waveform generation for eccentric inspirals into spin-zero black holes. However, MBHs are expected to be rapidly spinning, which greatly impacts EMRI waveforms for these systems. In this talk, I will present a significant extension to FEW that incorporates MBH spins of up to 0.999. I will first describe the modifications to the framework required to achieve this, followed by a discussion of EMRI science prospects for eccentric and spinning systems with a fully relativistic waveform model for the first time. I will conclude with an overview of the next steps for FEW development, including early results for the generation of EMRIs directly in the time-frequency domain, which has the potential to further accelerate FEW by more than an order of magnitude.

Author: CHAPMAN-BIRD, Christian (University of Birmingham)

Presenter: CHAPMAN-BIRD, Christian (University of Birmingham)

Session Classification: Waveform tools