Contribution ID: **317** Type: **Oral Presentation**

Shaken, not stirred: test particles in binary black hole mergers.

Thursday, 29 July 2021 15:00 (15 minutes)

In 2015 the advanced Laser Interferometer Gravitational-Wave Observatory (aLIGO) detected the first ever gravitational
event, gravitational wave event GW150914, with multiple new gravitational wave events, originating from both
binary neutron stars and binary black hole (BBH) mergers, detected in subsequent years. In light of these detections,
we simulate the dynamics of ambient test particles in the gravitational potential well of a BBH system close to its
inspiral phase with the goal of simulating the associated electromagnetic radiation and resulting spectral energy
density distribution of such a BBH system. This could shed light on possible detection ranges of electromagnetic
counterparts to BBH mergers. The potentials are numerically calculated using finite difference methods, under the
assumption of non-rotating black holes with the post-Newtonian Paczynski-Wiita potential approximation in tandem
with retarded time concepts analogous to electrodynamics. We find that the frequencies of potential electromagnetic
radiation produced by these systems (possibly reaching earth), range between a few kHz to a few 100kHz. The bulk
of radiation is distributed at frequencies below 100kHz.
Keywords: Binary black hole merger, binary black hole, binary black hole merger simulation, particle acceleration,
gravity.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

Primary author: VAN DER MERWE, Pieter (North-west University, Center for Space Research)

Presenter: VAN DER MERWE, Pieter (North-west University, Center for Space Research)

Session Classification: Astrophysics

Track Classification: Track D1 - Astrophysics