Contribution ID: **332** Type: **Plenary**

Dark photon superradiance: Electrodynamics and multimessenger signals

Monday 9 January 2023 17:20 (35 minutes)

Black hole superradiance is a unique mechanism that allows a large cloud of ultralight bosons to grow around spinning black holes, requiring only gravitational interactions. I will focus on superradiance of vector fields around stellar mass black holes and consider a dark photon that kinetically mixes with the Standard Model photon. The dark photon superradiance cloud sources a rotating electromagnetic field around the black hole and initiates a transient phase of electron-positron pair production that populates a plasma inside the cloud. I will discuss the electrodynamics of the system, which shares qualitative features with a neutron star pulsar magnetosphere, and identify the main sources of dissipation and electromagnetic emissions. The result is a new type of very luminous source, comparable to the brightest X-ray sources on the sky, with several unique features that can be looked for with existing and future telescopes. Observational strategies will be presented and include targeted electromagnetic follow-ups of solar-mass black hole mergers and targeted continuous gravitational wave searches of anomalous pulsars.

Author: Dr MONDINO, Cristina (Perimeter Institute)

Presenter: Dr MONDINO, Cristina (Perimeter Institute)

Session Classification: Plenary session Monday Afternoon 2