Contribution ID: **163** Type: **Invited**

# Kilonova: A signature of r-process nucleosynthesis

*Wednesday, 7 September 2022 11:00 (30 minutes)*

A kilonova is an electromagnetic transient powered by the radioactive decay of nuclei freshly synthesized by the rapid neutron capture process (r-process). Its observation following the gravitational wave event GW170817 provided the first evidence that the r-process operates in neutron star mergers. Kilonova observations provide unique opportunities to learn about the in-situ operation of the r-process, the distribution of elements produced in individual events, and the dynamics of the event. Addressing these important questions requires to improve our understanding of two fundamental ingredients of kilonova modelling. The first is related to radioactive energy input that depends on the exact distribution of nuclei produced. The talk will discuss the important role of beta-decays and fission and their possible fingerprints in kilonova light curves. The second is related to the photon opacity of the material as it determines the spectral evolution of the emission. The opacity is determined by bound-bound atomic transitions and dominated by the contribution of Lanthanides and Actinides. First kilonova models based on a complete set of atomic opacities will be presented and the main spectral features discussed.

## Field of work

**Presenter:** MARTÍNEZ PINEDO, Gabriel (GSI Darmstadt)

**Session Classification:** Wednesday - Session 2