Contribution ID: **72** Type: **Talk**

Applicability of LTE to Kilonova Ejecta, and Impact on Opacities

Thursday, 9 June 2022 11:00 (20 minutes)

A binary neutron star merger (BNS) is expected to produce supernova-like radioactively powered transient known as a kilonova (KN), which enters the nebular phase several days after the merger. Modelling of the ejecta in this phase has often been approached under the assumption that local thermodynamic equilibrium (LTE) is applicable. In order to test the validity of this assumption, we compare the excitation structure of elements in the ejecta when assuming LTE, and when using full non-local thermodynamic equilibrium (NLTE) calculations from the spectral synthesis code `SUMO`. We also consider NLTE calculations omitting the radiation field in order to test the importance of radiative transfer in NLTE modelling. From these solutions, we calculate expansion opacities for the ejecta in a time-span of 3 –20 days after merger. I will present the results of this study, focussing on the accuracy of LTE at early times, as well as the importance of including radiative transfer in NLTE modelling.

Primary author: POGNAN, Quentin (Stockholm University, Department of Astronomy)

Co-author: Dr JERKSTRAND, Anders (Stockholm University, Department of Astronomy)

Presenter: POGNAN, Quentin (Stockholm University, Department of Astronomy)

Session Classification: Accretion Disks

Track Classification: TIdal Disruption Events