



Contribution ID: 546

Type: **Talk in a parallel session**

## Fully calibrated lanthanide atomic data for 3D kilonova modeling

With the detection of multiple neutron-star merger events in the last few years, the need for a more comprehensive understanding of nuclear and atomic properties has become increasingly important. Despite our current understanding, there are still large discrepancies in the opacities obtained from different codes and methods. These discrepancies lead to variations in the location and strength of absorption and emission features in radiative transfer models and prevent a firm identification of r-process products. To address this issue, we developed an optimisation technique for energy levels and oscillator strengths consistent with available experimental data. With this novel method, we can increase the accuracy of calculations while reducing the computational cost, finally making it possible to apply the method to all lanthanides instead of focusing on single ions.

We will report on converged large-scale atomic structure calculations of all singly and doubly ionised lanthanides with greatly improved transition wavelength accuracy compared to previous works. The impact of our new atomic data set on realistic 3D radiative transfer calculations and prospects of r-process signature identification will be investigated.

This work is supported by the European Research Council (ERC) under the European Union's Horizon2020 research and innovation programme (ERC Advanced Grant KILONOVA No.885281)

**Primary authors:** FLÖRS, Andreas (GSI Helmholtzzentrum für Schwerionenforschung); Mr FERREIRA DA SILVA, Ricardo (LIP, Lisboa, Portugal); Dr SHINGLES, Luke (GSI Helmholtzzentrum für Schwerionenforschung); Dr COLLINS, Christine (GSI Helmholtzzentrum für Schwerionenforschung); Prof. SAMPAIO, Jorge (LIP, Lisboa, Portugal); Prof. PIRES MARQUES, José Manuel (LIP, Lisboa, Portugal); Prof. MARTÍNEZ-PINEDO, Gabriel (GSI Helmholtzzentrum für Schwerionenforschung)

**Presenter:** FLÖRS, Andreas (GSI Helmholtzzentrum für Schwerionenforschung)

**Track Classification:** Multimessenger Astrophysics (MA): New frontier of multi messenger astrophysics: follow up of electromagnetic transient counterpart of gravitational wave sources