Contribution ID: **55** Type: **Talk/Seminar**

Modeling short gamma ray bursts from binary neutron star mergers with general relativistic magnetohydrodynamics

Tuesday, 24 September 2019 12:30 (30 minutes)

I will present the recent development of numerical tools for GR MHD modeling of the black hole accretion flows.
The black hole appears as the result of a binary neutron star merger, and is surrounded by a remnant debris torus.
The code named HARM_COOL is our implementation of the existing algorithm
for a conservative GR MHD scheme.
The newly added modules cover the neutino cooling and the nuclear equation of state for dense matter, as relevant for the physics
of accretion flows in a gamma-ray burst (GRB) central engine environment. We also implement
further post-processing with a nuclear reaction network, and reproduce the nucleosynthesis of heavy, neutron-rich isotopes.
These elements are synthesized within the magnetically driven outflow from the remnant torus.
These fast wind outflows (v/c~0.11–0.23) appear with a broad range of electron fraction Ye~0.1–0.4.
The total mass loss from the post-merger disk via unbound outflows is between 2\% and 17\% of the initial disk mass.
The results are in agreement with the scenarios that explain the blue and red kilonova components, detected in optical lightcurves
after the gravitational wave event GW 170817.

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Session Classification: Selected Talks

Track Classification: Selected Talks