Contribution ID: **297** Type: **Talk in a parallel session**

A covariant approach to relativistic large-eddy simulations

Tuesday, 9 July 2024 18:15 (15 minutes)

The first detection of a binary neutron star merger has made sharp reality the long-standing paradigm that these cosmic fireworks are exciting laboratories for extreme physics. To get the most out of observations, however, we need accurate modelling of the merger dynamics via numerical relativity simulations. In this respect, the large amount of numerical work carried out over the last decade has allowed us to obtain a robust, but broad-brush, picture of the merger dynamics. Current simulations are in fact far from resolving the full range of scales involved, particularly because of the development of turbulence in the merger remnant. This has motivated recent efforts towards adapting the large-eddy simulation strategy to the relativistic setting relevant for binary mergers. Despite the impressive results that such efforts have already delivered, however, all the practical implementations so far are problematic in that they break covariance. In this talk, I will discuss a theoretical framework that allows us to overcome said limitations, and go on to present a practical implementation of the first fully-covariant filtering strategy in relativity.

Primary authors: CELORA, Thomas (Institute of Space Sciences (ICE-CSIC)); Prof. COMER, Greg (Saint Louis University); Prof. ANDERSSON, Nils (University of Southampton); Prof. HAWKE, Ian (University of Southampton); Mr HATTON, Marcus (University of Southampton)

Presenter: CELORA, Thomas (Institute of Space Sciences (ICE-CSIC))

Session Classification: Modeling of binary neutron star and black hole-neutron star mergers, and of their electromagnetic counterparts

Track Classification: Gamma-Ray Bursts (GB): Modeling of binary neutron star and black hole-neutron star mergers, and of their electromagnetic counterparts