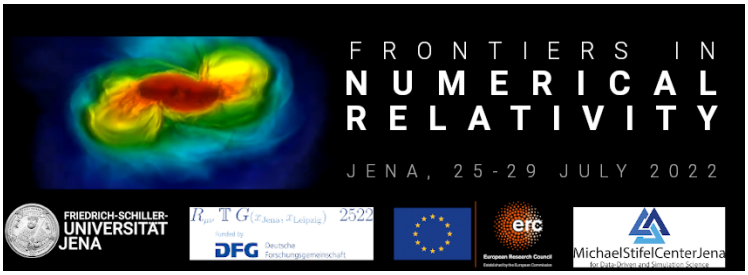

Contribution ID: **42** Type: **not specified**

Universality of curvature invariants in critical collapse of axisymmetric gravitational waves

Using the standard methods of numerical relativity we study axisymmetric gravitational waves undergoing gravitational collapse. Because it is known that the 1+log lapse choice breaks down in this situation, we propose a computationally effective alternative to maximal slicing and show that it allows the simulation to proceed until either the gravitational waves disperse or an apparent horizon is formed. We then consider several families of asymptotically flat initial data for which a strength parameter, similarly to the well-known Choptuik's discovery, can be fine-tuned between dispersal into empty space and collapse into a black hole. We find that such near-critical spacetimes exhibit behavior similar to scalar-field collapse: For different families of initial data, we observe universal "echoes" in the form of approximate scaled copies of the same piece of spacetime. In contrast to very regular behavior of spherically symmetric massless scalar field collapse, in critical collapse of gravitational waves the quantities such as extremes of curvature invariants or geodesic time intervals between echoes seem irregular.

Presenter: Dr LEDVINKA, Tomáš (Charles Univesrity, Prague)

Session Classification: Short talks