1082-83-312 **Erik Schnetter*** (eschnetter@perimeterinstitute.ca), Perimeter Institute for Theoretical Physics, 31 Caroline St. N., Waterloo, ON N2L 2Y5, Canada. *Modern methods in numerical relativity.*

General relativity plays a central role in many astrophysical or cosmological applications, when either densities are high or where the global structure of spacetime is relevant. As applications become more complex, numerical methods become indispensible to study such systems and to make concrete, testable predictions. These days, standard numerical calculations include general relativity, relativistic magneto-hydrodynamics, realistic equations of state, and radiative transfer, and are used to study system such as black holes, neutron stars, binaries of these, or core-collapse supernovae.

As many effects are fundamentally multi-dimensional and time-dependent, numerical methods and algorithms need to be parallel, distributed, and scalable, so that modern computational resources can be applied.

I will present the modelling of core-collapse supernovae as particular astrophysics problem, and use this example to describe a wide range of numerical methods and computational algorithms we employ to study these systems. I will also briefly describe the Einstein Toolkit, a community project where we make open-source implementations of these available to the public. (Received July 10, 2012)