

## “Modelling the most catastrophic astrophysical events”

Prof. Dr. Luciano Rezzolla,  
Theoretische Astrophysik, Universität Frankfurt/ M

The detection of gravitational waves is eagerly expected as one of the most important scientific discoveries of the next decade. A worldwide effort is now working actively to pursue this goal both at an experimental level, by building ever sensitive detectors, and at a theoretical level, by improving the modelling of the numerous sources of gravitational waves. Much of this theoretical work is made through the solution of the Einstein equations in those nonlinear regimes where no analytic solutions are possible or known. I will review how this is done in practice and highlight the considerable progress made recently in the description of the dynamics of binary systems of black holes and neutron stars. I will also discuss how the study of these systems provides information well beyond that contained in the gravitational waveforms and opens very exciting windows on the relativistic astrophysics of GRBs and of the cosmological evolution of massive black holes.