Abstract Submitted
for the SES10 Meeting of
The American Physical Society

Non-axisymmetric Instabilities in Thick Self-Gravitating Tori Around Black Holes in Dynamical General Relativistic Framework[1]
OLEG KOROBKIN, ERIK SCHNETTER, Department of Physics and Astronomy, Louisiana State University, NIKOLAOS STERGIOULAS, Aristotle University of Thessaloniki, Greece, BURKHARD ZINK, University of Tuebingen, Germany, ERNAZAR ABDIKAMALOV, Center for Computation and Technology, Louisiana State University — Thick self-gravitating accretion disks around black holes play a major role in several astrophysical scenarios of gamma-ray bursts. These objects can form as a result of massive star core collapse, merger of two neutron stars or a neutron star and a black hole, they have very high densities and relativistic rotation speeds. In this study, we address stability of thick constant angular momentum accretion tori using a fully dynamical general relativistic framework. We have performed evolutions of several accretion tori models and identified two distinct types of non-axisymmetric instabilities. The first type corresponds to the Papaloizou-Pringle instability, enhanced by a motion of the central black hole. The second type corresponds to the I-mode, previously found in Newtonian studies. We discuss the types, growth rates and pattern speeds of the unstable modes, as well as the detectability of the gravitational waves from such objects.

[1]Supported by NSF #0721915, TeraGrid allocation TGMCA02N014.

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Date submitted: 16 Aug 2010 Electronic form version 1.4