

Jens Mahlmann | Abstract

Carrer de l'Arquitecte Arnau 14, Pta. 7 – 46020 Valencia

☎ +34 684 08 21 70 • 📞 +34 96 35 43100 • ✉ J.Mahlmann@gmx.de

**The scientific committee of
GR22& Amaldi13**

January 22, 2019

SIMULATING POYNTING DOMINATED ENERGY FLOWS AROUND MAGNETARS AND BLACK HOLES

Presenting recent results from simulations of twisted magnetar magnetospheres as well as different approaches to extracting energy from rotating black holes via the Blandford/Znajek process we address the subtleties of the numerical implementation of general relativistic force-free electrodynamics. We show our recent progress in formulating a time evolution scheme for general relativistic force-free electrodynamics within the framework of the Einstein Toolkit. The evolution of magnetic field configurations around compact objects on dynamical spacetimes without excisions yields various challenges - especially in guaranteeing constraint conservation and sustaining current sheets over significant timescales. Different techniques used to address these challenges, such as the preservation of the force-free conditions, have notable effects on the observed energy balance in the simulated magnetospheres, thus, on the quality of physically interpretable results. We will illustrate and quantify some of these effects alongside the review of numerical results.