

Project 5/2014: "Gamma-ray burst afterglow blast waves in a stellar wind environment and simulation-based data analysis"

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Abstract:

We request computational resources to perform two tasks: (1) relativistic hydrodynamics (RHD) simulations in two dimensions (2D) using adaptive mesh refinement (AMR) techniques in order to calculate the evolution of directed relativistic blast waves launched during gamma-ray bursts (GRBs), (2) light curve calculations by applying a linear radiative transfer module on the data dumps generated in step (1). Parallel AMR computations are required by the numerical resolution needed to resolve the blast wave shell (made extremely thin by the relativistic nature of the explosion) and the large number of rays needed to properly capture the emergent flux. The results will be used for the continued development of data analysis software that is made publicly available for download by the astrophysics community.