Project 2/2014: "**Numerical simulations of Fermi gamma-ray burst afterglows and gamma-ray burst prompt emission**"
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Abstract:
We request computational resources to run a series of relativistic hydrodynamics (RHD) sim- ulations of relativistic Gamma-ray burst (GRB) jets, which are created during certain black hole formation scenario's. The simulations will be executed using the ram code and the recently developed effectively multi-dimensionally Lagrangian code jet, augmented with algorithms to trace the local microphysics of non-thermal particle distributions and to perform radiative trans- fer. These simulations will provide insight into the physics of the prompt and early afterglow emission physics of GRBs (i.e. the initial flash of gamma-rays and at early stages of jet - sur- rounding medium interaction), of direct relevance to e.g. recent observational data gathered by the Fermi gamma-ray satellite. Using ram with a specialized moving frame and using the La- grangian jet code allows for an unprecedented high numerical resolution in multi-dimensional simulations of ultra-relativistic GRB flows, which is needed to correctly identify the different contributors to the complex interplay of (relativistic) shock dynamics and non-thermal emission mechanisms at early times.