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Variability studies of GRB light curves and neutrino flux prediction for multi-collision zone model

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Gamma-Ray Bursts are the most powerful explosions in the Universe. They constitute highly beamed sources of gamma rays and possibly also of high-energy neutrinos and protons. In the fireball model, blobs of plasma, emitted from a central engine, collide within a relativistic jet forming shocks, where particle acceleration is expected to act. However, an open issue is represented by the way in which the central engine operates.
In order to shed light on this topic, the information on the temporal behaviour of individual GRBs is very precious. For the analysis here presented, the most luminous GRB detected by Konus/WIND until now was selected, namely GRB 110918A. Through the NeuCosmA code, simulating multi-zone collisions during the GRB prompt emission, a synthetic light curve consistent with the observed one has been obtained, in order to study how characteristic parameters of the inner engine activity influence the light curve. This is achieved varying the input parameters values in the simulation. In agreement with other previous studies, it was obtained that the inner engine is more variable than the observed light curve and dependence relations between parameters have been found. Furthermore, the empirical mode decomposition method is applied and its stability is analysed.

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