Dansk Fysisk Selskab

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High-energy Neutrinos from Off-axis Emission of GRBs

Gamma-ray bursts (GRBs) are transient sources at cosmological distances which for a short period of seconds can outshine all visible gamma-ray sources in the Universe. The primary origin of GRBs are cataclysmic events like the core collapse of massive stars or mergers of neutron stars. The latter have recently been observed by coincident emission in gravitational waves and photons, establishing GRBs as multi-messenger sources. Neutrinos from such events are predicted to be produced in beamed outflow jets but have not been observed yet. We present model predictions of neutrino emission from internal GRB parameters and the relative orientation of the jet axis to the observer. These predictions are used by the IceCube experiments to probe neutrino emission in coincidence with high-energy gamma-ray emission and gravitational waves.

Primary author: HALSER, Lea (Niels Bohr Institute)

Co-author: AHLERS, Markus (NBI)

Presenter: HALSER, Lea (Niels Bohr Institute)