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AGILE results and interpretation of the exceptional long gamma-ray burst GRB 221009A

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High-energy gamma rays are extremely important for the interpretation of explosive cosmic events related to the formation of neutron stars and black holes. The long-duration gamma-ray burst GRB 221009A was a recent powerful event that - with its remarkable intensity, spectral features, and duration - was clearly detected also by the AGILE satellite in the MeV-GeV energy range. Through its gamma-ray detection, estimated flux and spectral energy distribution, AGILE provides crucial information regarding the early phases of GRB 221009A, during which also TeV gamma-ray emission was detected.

In this contribution, we report on the experimental measurements of GRB 221009A by the AGILE detectors. AGILE had good exposure during the GRB initial crucial phases, detecting hard X-ray/MeV emission in the prompt phase of the event, and very intense GeV gamma-ray emission in the prompt and early afterglow phase, up to 10⁷000 s. These data suggest that GRB 221009A belongs to a class of GRBs showing the dramatic transition between prompt and afterglow emission with a phase of coexistence of MeV and GeV emissions of very different spectral properties.

AGILE results, together with the all available multiwavelength information, lead us to discuss a theoretical interpretation of this event in terms of a relativistic fireball model.

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