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Advancements in Gamma-Ray Burst science with High Energy Particle Detectors on CSES Satellites: current status and prospects

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The CSES-Limadou collaboration, responsible for the development and operation of High Energy Particle Detectors (HEPD) aboard the China Seismo-Electromagnetic Satellites (CSES), has significantly propelled the study of Gamma-Ray Bursts (GRBs). Initially, utilizing the HEPD-01 detector onboard CSES-01, our collaboration published findings on five GRB events, revealing the instrument's unexpected sensitivity to these phenomena. More recently, a novel analysis framework has expanded our detection rate and further unveiled the potential of HEPD's LYSO crystals in the MeV-tens of MeV energy range. Looking ahead, the imminent launch of HEPD-02 on CSES-02 marks a pivotal advancement. Unlike its predecessor, HEPD-02 features a dedicated trigger system tailored explicitly for GRB detection, promising heightened sensitivity and precision. This technological leap positions the CSES-Limadou collaboration as a significant contributor to the global network of GRB observatories. Our contribution will comprehensively present HEPD-01 findings and its sensitivity to different classes of GRBs. Additionally, we will briefly outline the HEPD-02's Data Acquisition (DAQ) design solutions, facilitating precise measurement of photon fluxes in the MeV-tens of MeV energy range with a time resolution of 5 milliseconds. Finally, we will discuss the anticipated scientific contributions from this enhanced detection capability, extending into the future to 2030 and beyond.

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