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MeV Gamma-ray Astronomy in the Multi-messenger Era and the Future Mission

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MeV gamma rays are indispensable probes for high-energy astrophysics research, providing unique information to help address frontiers, such as the origin of cosmic rays, dark matter, the radiation mechanisms of compact objects, and etc. In particular, MeV range is the domain of nuclear gamma-ray lines that can provide a direct probe of the nuclear processes (such as supernovae, nucleosynthesis, and galactic chemical evolution) in our Universe to explore the fundamental problem of the origin of heavy elements in the Galaxy and beyond. Despite recent improvements in many areas of multi-wavelength astronomy, the 0.1-100 MeV part of the electromagnetic spectrum is poorly covered by current detections. The current MeV observation sensitivity is about 1-2 orders of magnitude lower than the sensitivity in other energy bands. Studying the still largely unexplored MeV domain of astronomy would provide for a rich observatory science and enable discoveries of a wide range of extreme-process events. In this talk, I will briefly discuss the important science that will be addressed by the proposed MeV Gamma-Ray Observatory (MeVGRO) mission with high sensitivity and full MeV gamma-ray coverage.
I will also briefly summarize the recent progress of the high energy space missions in China, which have been or will be playing an important role in the high energy transient observation in the multi-messenger era.

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