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Gamma-ray astronomy results from LHAASO

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Very-high-energy (VHE, 100 GeV–100 TeV) and ultra-high-energy (UHE, >100 TeV) gamma-ray observations play a special role in the era of multi-messenger astronomy. Large High Altitude Air Shower Observatory (LHAASO), located high on the edge of Tibetan Plateau at an average altitude of 4410 meters, is a dedicated gamma-ray hunter at energy range from sub-TeV to PeV. This hybrid array consists of Kilometer Square Array (KM2A), Water Cherenkov Detector Array (WCDA), and Wide Field of view Cherenkov Telescope Array (WFCTA). LHAASO has shown its powerful ability to detect VHE and UHE gamma radiation for dozen Galactic sources and even the PeV gamma-ray emission from the Crab Nebula by using only partially running data. Besides the significant progress on extending continuous energy spectra of plentiful gamma-ray sources and diffuse gamma-ray emission of the Galactic plane, newly released the 1st catalog by LHAASO has reported interesting discovery of 32 TeV sources, and additionally, 43 UHE sources at $> 4\sigma$ significance level. Thanks to the wide field of view, time resolution, sensitive response for gamma rays, the afterglow from a narrow jet in the extremely bright GRB 221009A was unprecedentedly detected by LHAASO covering the energy range of 0.2–7 TeV. Remarkable studies on new physics, such as LIV and dark matter, by LHAASO will be also reported in this talk.

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