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A Multi-purpose Cosmic Ray Experiment: The LHAASO Project

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As one of encouraging approaches to search for cosmic ray origins, the VHE gamma ray astronomy has achieved such a success that more than 140 VHE gamma ray sources has been discovered, mainly by using the pointing Cherenkov telescopes such as HESS, MAGIC and VERITAS. Some sources have been deeply investigated for their morphology. The origin of the cosmic rays is still unknown. It might become crucial that the spectrometric investigation of the sources over a wide energy range from 0.1 TeV to 1 PeV in the hunting for smoking guns. A wide field of view and full duty cycle instrument is proposed by the group who has successfully carried out two experiments, ARGO-YBJ and ASy at 4300m a.s.l. in last 20 years. With the proposed LHAASO project, one can survey all sources brighter than 0.01Crab unit for their photon spectra up to 1 PeV. This project also keeps the momentum of discovery of new sources, particularly extended sources or high energy cosmos accelerators. Not only for photons, the LHAASO detector will be able to measure spectra of diffusive particles, i.e. photons, protons, helium nuclei and all heavy species. This will significantly boost the performance of cosmic ray measurements in the energy region of “knees”. The scientific prospects, detector performance and important observational results in the experiments with prototype detectors will be summarized in this presentation.

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