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The Global Cosmic Ray Observatory - GCOS

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The Global Cosmic Ray Observatory (GCOS) is an initiative for a new large-scale observatory to measure the properties of ultra-high-energy cosmic rays after 2030. In 2021 more than 200 scientists from around the world came together to discuss possible science cases and detector layouts. We aim to answer several questions: In ten years from now what do we expect to unveil on the origin of cosmic rays, on their nature, energy and arrival directions? If a next generation ground based experiment is built, which are the main characteristics to improve upon the results expected from the Pierre Auger Observatory and the Telescope Array? Based on these expectations and the science case(s), which is the energy range to be addressed by this new Observatory? We will present possible configurations and prototype studies from fluorescence detectors and ground arrays as well as the science results that might be achievable with GCOS in different detector configuration scenarios. Among the layouts discussed is a large ground array (order of $40,000 \text{ km}^2$) with segmented water Cherenkov detectors and radio detectors with the aim to measure arrival direction, energy and particle type with high resolution.

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