

Pinpointing the Most Extreme Physical Processes in the Universe

Snowmass UHECR Workshop

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Synopsis

The evolving observational picture motivates new theoretical frameworks for understanding the origins of UHECRs and their journey through the cosmos. Answering the outstanding questions of the UHECR picture will require the enhanced capabilities of a new generation of UHECR experiments, as well as leveraging insights brought about by continued progress in supporting areas of astrophysics and the emerging multimessenger landscape.

Outline

- **Outstanding and New Questions in UHECRs** – How have measurements from the current generation of experiments shifted theoretical/interpretive frameworks for understanding UHECRs?
- **Near-term Outlook for the Emerging UHECR Picture** – How will advancements and progress made in the next decade mold our understanding of UHECRs?
 - Advancements in UHECR experiments – planned upgrades and addition of new facilities and capabilities within the next decade
 - Progress from supporting areas of astrophysics – the nature of candidate astrophysical sources (e.g., acceleration mechanisms, evolution of particle populations, etc.); cosmological matter distribution; mapping the GMF and constraining EGMFs (see the beginning of charged particle astronomy?); leveraging multimessenger observations
- **Building a New UHECR Paradigm** – What further advancements will we need in the next two decades in order to answer the outstanding questions of UHECRs?

Contributing Science Tasks

- **Astrophysics Theory** – T. Venters, F. Oikonomou, K. Murase, R. Aloisio, R. Alves-Batista
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- **Magnetic Fields** – T. Jaffe, M. Unger
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- **Multimessenger** – J. Eser, J. Alvarez-Muniz, L. Lu
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More volunteers welcome!