



The UHECR Snowmass White Paper Goals, Organization and General Outline

Fred Sarazin (Colorado School of Mines) on behalf of the white
paper coordinators and lead conveners



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Snowmass UHECR mini-workshop, October 20, 2021

Slightly modified from Peter Denton, NuTau2021 white paper

- **White papers** like this one inform the Frontier Topical reports (CF7 in this case)
- **Frontier topical** reports inform Frontier reports (Cosmic Frontier in this case)
- **Frontier reports** inform the Snowmass report
- **Snowmass report** eventually informs the P5 report
- **P5 report** is the guide for HEP funding in the US for the next decade



- The **UHECR** Snowmass white paper aims at identifying the scientific goals of the community looking out **two decades** in the future.
 - **UHECR**: for the purpose of this document $E > 100$ PeV
 - **Why two decades?** Current experiments are going to operate for another decade, while most planned experiments are about one decade out and will need to operate 5-10 years.
- The white paper also aims at being a **baseline roadmap** for the community and therefore need to be **international** and (reasonably) thorough. We are aiming for a 70 - 100 pages document.



Goals of the mini-workshop

- **Inform** the community
- **Solicit inputs** from the community on the goals / organizational structure / process / general outline
- **Encourage contributions** from everyone



WP Coordinators: Fred Sarazin, Frank Schroeder, Tonia Venters

Lead Conveners: Alan Coleman, Johannes Eser, Eric Mayotte, Dennis Soldin

TASKS (2-3 conveners per task)

- **Spectrum** A. Coleman / Y. Tsunesada
- **Composition** D. Bergman / E. Mayotte
- **Anisotropy** L. Caccianaga / G. Golup / P. Tinyakov
- **Hadronic interactions** H. Dembinski / T. Pierog / D. Soldin
- **Multimessengers** J. Alvarez-Muniz / J. Eser / L. Lu
- **Astrophysics** F. Oikonomou / T. Venters
- **Magnetic fields*** T. Jaffe / M. Unger
- **BSM (dark matter,...)*** R. Aloiso / O. Deligny
- **Computation*** J. Glombitza / E. Santos

EXPERIMENTS (1 representative per experiment)

- **Auger** A. DiMatteo
- **Ice Cube (incl. Gen 2)** J. Kelley
- **Telescope Array** J. Matthews
- **GCOS** J. Hoerandel
- **GRAND** P. Denton
- **POEMMA (& EUSO)** J. Krizmanic



Questions for each task:

- What is the **current status** of the field? [Guidance: 3-5 pages]
- Where are we going to be **10 years from now** (considering the continued operation of existing experiments)? [Guidance: 1-2 pages]
- What are the questions that **will remain to be answered** by the new generation UHECR observatories the following decade? [Guidance: 1-3 pages]

The inputs from the tasks will then be folded in the WP.

Shorter contributions expected from tasks with a *



How are the existing and next-generation experiments going to **contribute to the science case in the next two decades?**

- **Brief description** of the experiment / known or projected performance [2 pages per experiment]
- Ability to **address the science case** advanced by the science tasks [2-3 pages per experiment]



- **One master Overleaf** document editable only by the WP coordinators and lead conveners
- **Template Overleaf** provided for each task / experiment but maintained by the conveners and representatives
- Snowmass Slack channel **#uhecr-whitepaper** for communication between coordinators, (lead) conveners and contributors
- **To contribute**, please contact directly the relevant coordinators, conveners and/or experiment representatives (emails are provided in each relevant section of the WP)



Timeline

- White paper coordinators and lead conveners named Sept 15 ✓
- Identify & contact the conveners and experiment representatives Oct 10 ✓
- Create an outline of the white paper. Inform the community. What is the best structure to be also used for a community-wide roadmap document? Encourage contributions from the community! → We are here! Oct 20 (mini-workshop)
- Deadline for individual contributions to the various tasks Nov 10
- Report from each science tasks (<10 pages) & experiments (<5 pages) due Dec 1
- Update the suggested requirements on future experiments based on the science task and experiment reports. Request information from the experiment representatives to make (comparative) plots. Dec 15 to Jan 15
- Include new plots, update experiment section and conclusion of paper. Jan 20
- Draft of the white paper is released for general review Jan 31
- Solicit external reviews Mar 1
- Submit to Snowmass CF7 Mar 15



Preliminary Outline

Executive Summary (1 page)

1. The Big Questions
2. The UHECR Paradigm Shift [Alan Coleman / Eric Mayotte]
3. Physics at the Energy Frontier – the synergy between UHECRs and Particle Physics [Dennis Soldin]
4. Pinpointing the Most Extreme Physical Processes in the Universe [Tonia Venters]
5. Stepping Up to the New Challenges [Johannes Eser / Eric Mayotte]
6. The Next Generation Experiments [Fred Sarazin / Frank Schroeder]

