SnowMass 2021

Conveners: Clarence Chang & Scott Dodelson
Outline

• Introduction to the Snowmass process
• Snowmass2021 organization
• Snowmass schedule
• Session overview
Snowmass and P5

Major Initiative prioritization in the HEP community proceeds in 2 steps:

**Snowmass**: A series of workshops culminating in a written proceeding, collecting broad community input (2013 Proceeding)
- Organized by the APS Division of Particles & Fields (DPF)
- 2021 Snowmass web site: see esp. Cosmic Frontier WGs

**P5** (Particle Physics Project Prioritization Panel)
- Subpanel of High Energy Physics Advisory Panel (HEPAP)
- HEPAP: Advisory panel to DOE Office of HEP and NSF Math. & Physical Science Directorate
- P5 issues a report with priorities in different budget scenarios, along with a timeline of construction & operation (Building for Discovery: P5 2014 report, exec summary)

The 2014 P5 report has been highly successful in that the advice has been followed (reasonably) closely, and the major new initiatives included are either immanent or under way.

Slides from Katrin in DESC presentation
Distilled from the Snowmass 2013 inputs, five Science Drivers for the field:

- Use the Higgs boson as a new tool for discovery
- Pursue the physics associated with neutrino mass
- Identify the new physics of dark matter
- Understand cosmic acceleration: dark energy and inflation
- Explore the unknown: new particles, interactions, and physical principles.

- 29 recommendations
- Projects prioritized according to funding scenarios

As a result, highly impactful on the
- Directions/achievements in HEP
- Federal funding profile for the current and near-future projects in the decade.
2014 P5 Report: Construction & Physics Timeline

- Projects listed here are all >50M$ (medium & large).
- A small projects portfolio was also recommended.
- Cosmic surveys
  - CMB-S4 was strongly recommended: HEP science case & community enthusiasm were present
  - Rubin Obs included with operations to 2032
- Note: no cosmology projects under construction after ~2030
- Developing a plan for the next decade
- Role of Snowmass21 is to organize the physics content.
- CMB-S4 is relevant for next decade of science
- How will CMB-S4 results influence science in the next decade?
- How will CMB-S4 data connect with future projects?

Slides from Katrin in DESC presentation
Overall Snowmass Structure

- Snowmass Frontiers
  - Energy Frontier
  - Neutrino Physics Frontier
  - Rare Processes and Precision
  - Cosmic Frontier
  - Theory Frontier
  - Accelerator Frontier
  - Instrumentation Frontier
  - Computational Frontier
  - Underground Facilities
  - Community Engagement Frontier

- Each Frontier has subgroups (7 on average)

- CF1. Dark Matter: Particle-like
- CF2. Dark Matter: Wave-like
- **CF3. Dark Matter: Cosmic Probes**
- CF5. Dark Energy and Cosmic Acceleration: Cosmic Dawn and Before
- CF7. Cosmic Probes of Fundamental Physics
Snowmass21 organization: connecting science to reports

- Science ideas
- Frontier 1
- Frontier 2
- Frontier N
- TG1
- TG1
- ... (repeated for Frontier 1 and Frontier 2)
- TGN

Snowmass Steering Group

Frontier reports

Topical Group reports

Contributed papers

Snowmass summary & book

Summaries

Chapter

References

Contributed papers
Snowmass21 Timeline

- **Fall 2021**
  - 01/22
  - 02/22
  - 03/22
  - 04/22
  - 05/22
  - 06/22
  - 07/22 **CSS**
  - 08/22
  - 09/22
  - 10/22 **Snowmass Book & arXiv**

**Contributed paper submission**

**Preliminary TG reports**

**Preliminary Frontier reports**

**Frontier Executive summaries**

**Final TG/Frontier reports**

**Snowmass Book (SG) & on-line arXiv docs**

**July 17-27, 2022**
Community Summer Study
UW - Seattle

Note staggering
Report content is communicated via community interactions.
### Session overview

- **Updates/overviews from various Topical Groups**
- **Open discussion**
  - What topics connect with CMB-S4?
  - How do we organize to develop our ideas?
  - What aspects of the Snowmass21 process are relevant and who will engage?

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:35</td>
<td>Snowmass Planning and CMB-S4: Plenary Introduction</td>
<td>Clarence Chang</td>
<td>10:35 - 10:50</td>
</tr>
<tr>
<td>11:10</td>
<td>CF3. Dark Matter: Cosmic Probes</td>
<td>Alex Drlica-Wagner</td>
<td>11:10 - 11:25</td>
</tr>
<tr>
<td>12:10</td>
<td>CF7. Cosmic Probes of Fundamental Physics</td>
<td>Ke Fang</td>
<td>12:10 - 12:25</td>
</tr>
<tr>
<td>12:25</td>
<td>Mid-Parallel Break</td>
<td></td>
<td>12:25 - 12:45</td>
</tr>
<tr>
<td>12:45</td>
<td>TF09: Astro-particle physics and cosmology</td>
<td>Daniel Green</td>
<td>12:45 - 13:00</td>
</tr>
<tr>
<td>13:00</td>
<td>Discussion</td>
<td>Scott Dodelson</td>
<td>13:00 - 14:00</td>
</tr>
<tr>
<td>14:00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How to Engage with Snowmass21

- Snowmass is an opportunity to shape the future of High Energy Physics and Astrophysics (HEPA)
- There are many ways to engage!
  - Go directly to Frontier and Topical Group conveners, write white papers, get your ideas out there! Visit the Snowmass 2021 webpage
  - **Snowmass Early Career** can help connect you via the #welcome-to-snowmass Slack channel
    - Early Career liaisons in each of the frontiers
  - Also a #snowmass-young Slack channel for general EC announcements
Opportunities for Networking, Community Building, and Advocacy

- Early in Snowmass process, there was wide community feedback that the community wants an Early Career organization that persists beyond Snowmass

- **SEC Core Initiatives** are engaging in the Snowmass process and we plan for them to persist beyond Snowmass
  - Long-term organization
  - Diversity, equity, and inclusion
  - Inreach
  - Survey

- [#welcome-to-snowmass](#) Slack channel to join
An Opportunity to Make Your Individual Voice Heard

Take the Survey HERE

- Encourage full HEPA community to participate in survey
- Deadline of August 15th (~1 week left)
- Collects opinions & experiences across
  - Careers
  - Physics Outlook
  - Workplace Culture
  - Harassment/Racism
  - Visa Policies
  - COVID-19
  - Demographics

- Fermilab News Article
- Any questions? Suggestions? Ping us at SNOWMASS21-SURVEY@fnal.gov
Snowmass Day: September 24, 2021
CSS@UW-Seattle: July 17-27, 2022

Visit the Snowmass 2021 webpage to learn about Frontiers, white papers, and SEC!

We hope to see you on the #welcome-to-snowmass Slack channel!