

CF03: Cosmic Probes of Dark Matter Physics

2022 February 2nd Meeting

SnowMass2021

February 28, 2022

Proposed timeline for paper writing:

- Mid-November 2020: identify “solicited” white papers and “facilitators”
- August 30, 2021: identify writers for each white paper
- October 18, 2021: White paper outlines/skeletons -- what will the paper cover, begin to articulate key questions and opportunities; identify key questions and opportunities for each white paper
- January 24, 2022: first draft of white paper to CF03 conveners, for feedback and discussion; share among sub working groups; reminder, topical group report is written in parallel to white papers (so need to know early)
- February-Mid March 2022: further polish the white papers. Detailed timeline on the next slide.
- March 15, 2022: White paper drafts due to arXiv
- May 31, 2022: Preliminary reports by the Topical Groups



Draft Timeline for White Papers

- **Jan 24 - CF3 Meeting; first drafts; paper writing continues;**
- Jan 31 - Open (conveners unavailable)
- **Feb 1 - Paper exchange starts; (start sooner?)**
- **Feb 7 - CF03 Meeting**
- Feb 14 - Open (conveners unavailable)
- ~~Feb 15-18 - Dark matter complementarity workshop(?)~~
- **Feb 22 - Feedback due**
- **Feb 28 - CF03 Meeting**
- **Mar 1 - White papers circulated for endorsement? Too difficult...**
- **Mar 7 - CF03 White Paper Hack Session (proposed)**
- **Mar 14 - CF03 White Paper Hack Session (proposed)**
- **Mar 15 - White papers submitted to arXiv**

White Paper Exchange

The white paper exchange was launched last week. Some useful things that we hope will come from this feedback are:

- Identifying areas of overlap/synergy between white papers
- Identifying ideas that may have been overlooked or fallen through the cracks
- Coming up with clear, compelling, and consistent ways to express ideas

Each white paper has been read carefully by multiple people and detailed comments are provided. Thank you!

Google Drive with feedback documents:

<https://drive.google.com/drive/folders/1GSXRjYqzz53kXA2w-hzjTsYZyJVQMOFv>

White Paper Exchange

Facilities (feedback from Halos)

Draft: [link](#)

Feedback: [link](#)

PBH (feedback from Facilities)

Draft: [link](#)

Feedback: [link](#)

Sims (feedback from PBH)

Draft: [link](#)

Feedback: [link](#)

Halos (feedback from Sims)

Draft: [link](#)

Feedback: [link](#)

Xtreme (feedback from the conveners)

Draft: [Feb 11th]

Feedback: [Feb 11th]

Overall impressions: Two classes of comments

Editorial aspect: coherence among sections and subsections written by *different* authors; typos; missing references; etc.

Content aspect: Some of the discussions are too specific or technical

Most importantly, each white paper needs **a compelling executive summary**; We need more work on this...

Section 1: Executive Summary (Introduction)

We need the following elements:

A pedagogical introduction to the research area and explain why it is important to the HEP community.

A list of **Key Research Opportunities** for the next decade; this should double as a list of **action items** that enable us to achieve those goals, i.e., the research activities that need support-:); use bullet points to highlight them.

Practical suggestions

The importance of dark matter research is obvious, but the cosmic and astro probes are not broadly appreciated in the HEP community

Bright future in the coming decade: big data from observational facilities, great progress in the search for dark matter in diversified ways, theoretical work in dark matter theories beyond CDM/WIMPS, advancement of computational powers and simulation algorithms...

Science opportunities and goals: essentially you could rephrase the title of each section of the white paper

We do see narratives on future work in the white papers; however, the relevant discussions are often hidden in the main body of the text for a specific research project. **Generalize the goals and highlight them in an Executive Summary.**

Example: from the white paper on simulations

“

1. Close collaboration between simulators and particle theorists to both identify key models and areas of parameter space and to successfully implement these models.
2. Algorithm development and code comparison tests ensuring that simulations meet the required precision targets set by the sensitivity of the new facilities.
3. Performing simulations with full hydrodynamics with validated subgrid models and numerical resolution at the relevant redshifts and cosmological scales.
4. Analysis of outputs in the realm of observations including mass functions, luminosity functions, galaxy morphology, kinematics, intracluster light all measured in an apples-to-apples manner with observations from current and upcoming facilities.
5. Fast realizations of observables for inference of DM properties.
6. Identifying novel signatures from simulations and guidance to observers derived both from numerical simulations and fast realizations that point to signatures of dark matter physics.”

The importance of Executive Summary

For each white paper, the narrative of the entire main body is to support Executive Summary

Our CF03 report will draw heavily from the Executive Summaries; we would like the white paper facilitators to be co-authors on this report.

To-do list for the next step

For each white paper, please organize an internal editing process, take into account feedback comments, and prepare for a final draft; check coherence, correct typos and references

Write a **compelling** Executive Summary



Proposed timeline before submission:

- February 28-March 7: Complete the internal editing process
- March 7: CF03 meeting/hack session
- March 7-March 14: Proofread the final draft among the authors and conveners
- March 14: CF03 meeting/hack session for final updates
- March 15: submission to arXiv

We can collect additional input between March 15th and the Snowmass Summer Study in July. However, we believe that it is important to have something on the arXiv by the March 15th deadline.

We would like to help finalize the white papers

Alex: Facilities and PBH

Chanda: Simulations

Hai-Bo: Halos and Extreme

Questions and Discussions