

CF03: Cosmic Probes of Dark Matter Physics

2021 Relaunch

SnowMass2021

July 12, 2021

Outline

- Recap: solicited white papers and facilitators
- APS DPF and internal timelines
- Guidance/Suggestions to the facilitators
- Survey results from potential contributors/writers
- Discussion on organization challenges and others

CF3 “Solicited” White Paper Topics

- **Dark matter physics from halo measurements** [[#wp-cf03-dark_matter_halos](#)]
Dark matter physics from dark matter halos ranging from large-scale structure to sub-galactic scales.
Facilitators: **Keith Bechtol, Simon Birrer, Francis-Yan Cyr-Racin, Katelin Schutz**
- **Primordial Black Holes & Gravitational Waves** [[#wp-cf03-dark_matter_pbh_gw](#)]
Primordial black holes as dark matter and probes of inflation (joint with CF7?)
Facilitators: **Andrea Albert, Simeon Bird, Will Dawson**
- **Numerical simulations and systematics** [[#wp-cf03-dark_matter_sims](#)]
Importance of numerical simulations for extracting dark matter physics (joint with CompF2?)
Facilitators: **Arka Banerjee, Annika Peter, Ferah Munshi**
- **Connecting dark matter to early universe physics** [[#wp-cf03-dark_matter_early_universe](#)]
Light relics, 21cm (EDGES), etc. (joint with CF5 & TF9?)
Facilitators: **Kim Boddy, Cora Dvorkin, Vera Gluscevic, Julian Muñoz**
- **Dark matter physics in extreme astrophysical environments** [[#wp-cf03-dark_matter_xtreme](#)]
Includes stellar interiors, neutron stars, non-primordial black holes (joint with TF9?)
Facilitators: **Masha Baryakhtar, Regina Caputo, Djuna Croon, Kerstin Perez**
- **Facilities for cosmic probes of dark matter physics** [[#wp-cf03-dark_matter_facilities](#)]
Proposed facilities for cosmic probes of dark matter including MSE, MegaMapper, CMB-HD, etc.
Facilitators: **Ting Li, Josh Simon, Sukanya Chakrabarti, Neelima Seghal**

White Papers with CF3 Contributions

- Led by TF09
 - Data Driven Cosmology: Raphael Flauger, Marilena LoVerde, Annika Peter, Mark Vogelsberger, and Risa Wechsler [[#tf09_topic_2_data_driven_cosmology](#)]
 - Early Universe Model-Building (with TF08): David Curtin, Eric Kuflik, Yonit Hochberg, Neal Weiner, and Keisuke Harigaya [[#tf09_topic_3_early_universe_model_building](#)]
- Led by TF10
 - Theory and complementarity (led by CPM #150 through [#cpm_topic_150](#))
- Led by CF01
 - The landscape of cosmic-ray and high-energy photon probes of particle dark matter
Facilitators: ???
 - Puzzling excesses and how we can resolve their origin/existence (small-scale structure issues, H0 tension, Galactic center gamma-ray excess...) (with CF1 related to [CPM #139](#))
Facilitators: ???
 - Synergies between DM searches and multiwavelength/multimessenger astrophysics / understanding astrophysical backgrounds (led by CF1, with input from CF3 & CF7)
Facilitators: Kerstin Perez, ...
 - Ultraheavy particle dark matter / probing the heaviest particle dark matter candidates (led by CF1, input from CF7?)
Facilitators: ???
- Led by IF02
 - Instrumentation for future facilities (led by IF2 through CPM #69)
- Led by CF06
 - ~~Optical/NIR survey facilities?~~ (discussion in CF6 through CPM #144; current proposal is to directly include in CF6 report without white papers [#cf06-dark_energy_comp](#))
 - Statement on DOE's aversion to building telescopes (joint with CF4 & CF6?)
- Diversity & Inclusion in (cosmic frontier | cosmic probes of dark matter | dark matter | ...)

DPF Timeline from Tao Han (APS DPF Chair) in the January Snowmass newsletter

- White Paper submission to arXiv: no later than March 15, 2022. Late submissions and updates are likely not to be incorporated in the working group reports, but will be included in the Snowmass online archive documents.
- Preliminary reports by the Topical Groups due: no later than May 31, 2022.
- Preliminary reports by the Frontiers due: no later than June 30, 2022.
- Snowmass Community Summer Study (CSS): July, 2022 at UW-Seattle.
- All final reports by TGs and Frontiers due: no later than September 30, 2022.
- Snowmass Book and the on-line archive documents due: October 31, 2022.

CF03 Internal White Paper Timeline (updated)



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 17, 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)
- On the deadline dates, we also have CF03 meetings
- February-Mid March 2022: further polish the white papers and submit them

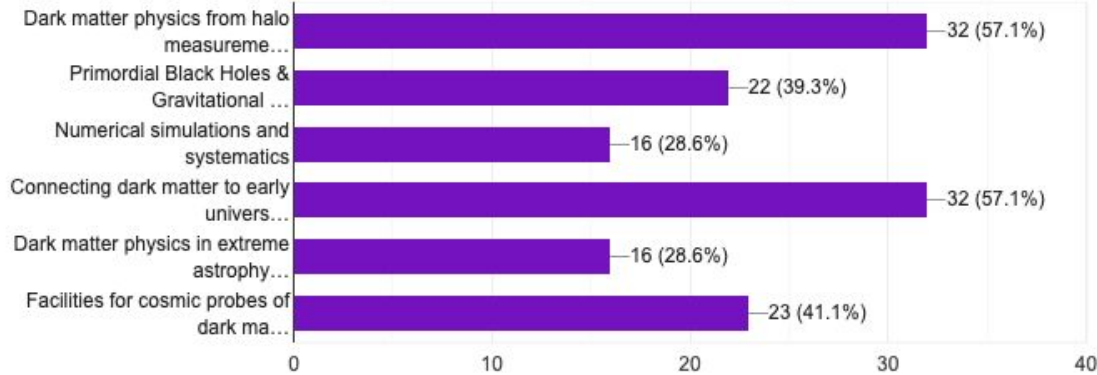
Goals as Facilitators

- Ensure that the interests of the community are expressed (reflecting contributions to the LOIs, community meetings, Slack conversations, etc.)
- Contact LOI writers and help incorporate LOI content into white papers
- Further solicit participation/input from a broad range of community members
- Help provide updates on white paper progress to the broader CF03 group
- Develop the framework/message of white papers based around “**key questions**” and “**key opportunities**” as put forth by the community
- Contribute, edit, and finalize white paper content
- Help us synergize white paper content into the CF03 topical group report

CF3 White Paper Participation Survey

Check any of the solicited white papers that you would like to be involved in.

56 responses



- 56 Responses!
- We will try to add people to the relevant paper channels

Both facilitators and writers/contributors will have access to the file

https://docs.google.com/spreadsheets/d/1Lxiyr_dDK9km-armJdv-8AXIroRDK68A8guiACRw6nY/edit#gid=1804301380

Discussion

What is the most effective way to organize meetings?

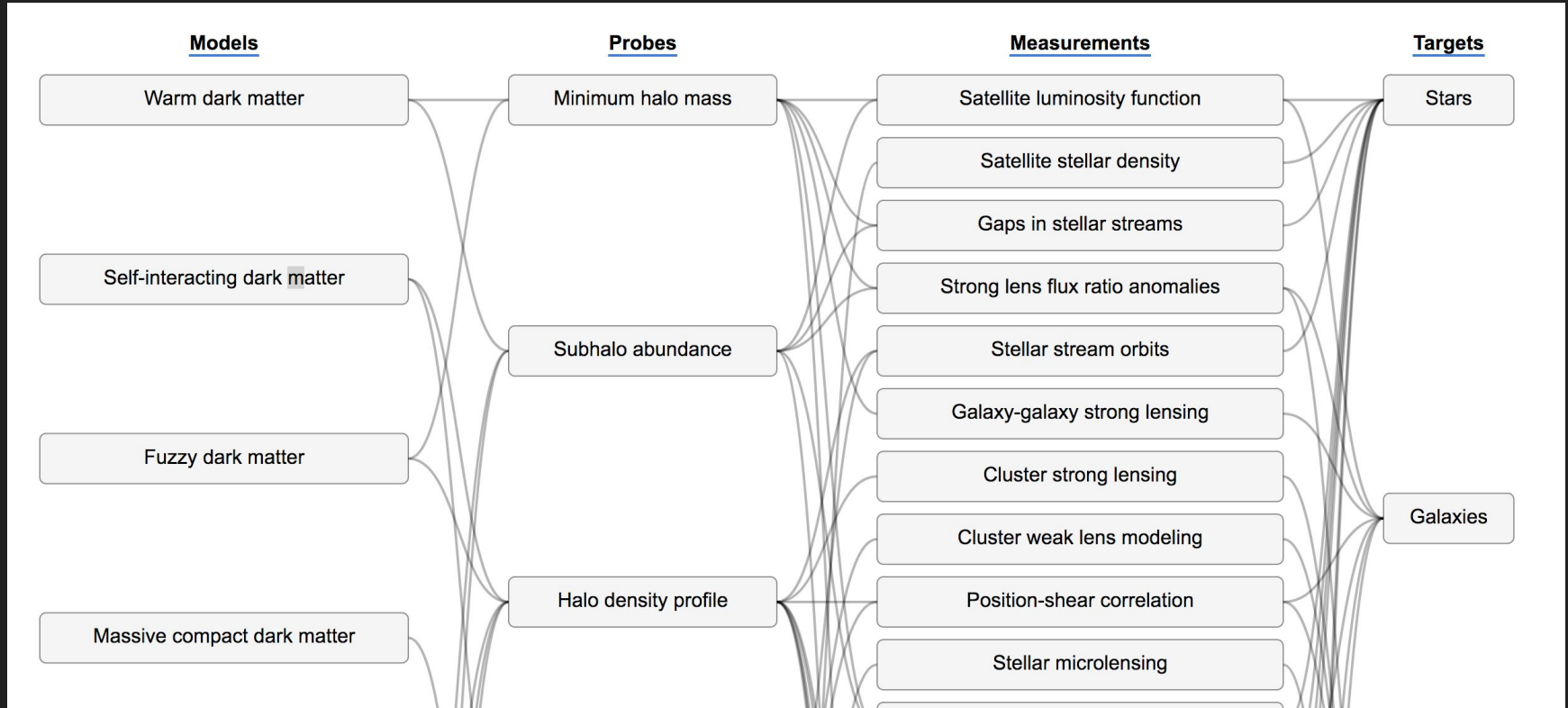
Optimal frequency and time for meetings within the whole CF03 group, each white paper topical group, facilitators+conveners...

CF03 meetings: once a month before January, twice a month afterwards?

Best mechanism for providing feedback on white papers? Share within the whole CF03 working group?

Ideas for running a CF03 workshop between January-March (February) 2022?

Think about the “key” plot from CF03!



<https://lsstdarkmatter.github.io/dark-matter-graph/network.html>

Example

Discussion

Think about the “key” plot from CF03!

Example

