

COSMIC FRONTIER

*Jonathan Feng, UC Irvine
for the Snowmass 2013 Cosmic Frontier Group*

Snowmass on the Pacific, KITP Santa Barbara

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OVERVIEW

- The Cosmic Frontier includes dark matter, dark energy, the matter-anti-matter asymmetry, inflation, cosmic particles and fundamental physics, etc. – a long list that includes several of the most compelling and exciting topics in all of basic science.
- Information on the group's activities and useful links are at <http://www.snowmass2013.org/tiki-index.php?page=Cosmic%20Frontier>
- This talk is a brief introduction to the Cosmic Frontier: its organization, past activities, and future plans.

ORGANIZATION

The Cosmic Frontier Group consists of 6 CF Subgroups, some further divided into Topical Subgroups. They and their conveners are:

- CF1: WIMP Dark Matter Direct Detection (Priscilla Cushman, Cristian Galbiati, Dan McKinsey, Hamish Robertson, Tim Tait)
- CF2: WIMP Dark Matter Indirect Detection (Jim Buckley, Doug Cowen, Stefano Profumo)
- CF3: Non-WIMP Dark Matter (Alex Kusenko, Leslie Rosenberg)
- CF4: Dark Matter Complementarity (Dan Hooper, Manoj Kaplinghat, Konstantin Matchev)

ORGANIZATION

- CF5: Dark Energy and CMB (Sarah Church, Scott Dodelson, Klaus Honscheid)
 - Cosmological Distances (Alex Kim, Nikhil Padmanabhan)
 - Growth of Structure (Dragan Huterer, David Kirkby)
 - Cross-Correlations (Jason Rhodes, David Weinberg)
 - Novel Probes of Dark Energy (Bhuvnesh Jain, Chris Stubbs)
 - Inflation (John Carlstrom, Adrian Lee)
 - Neutrinos in the Cosmos (Kev Abazajian, John Carlstrom, Adrian Lee)
- CF6: Cosmic Particles and Fundamental Physics (Jim Beatty, Ann Nelson, Angela Olinto, Gus Sinnis)
 - CF6-A Cosmic Rays, Gamma Rays and Neutrinos (Gus Sinnis, Tom Weiler)
 - CF6-B The Matter of the Cosmological Asymmetry (Ann Nelson)
 - CF6-C Exploring the Basic Nature of Space and Time (Aaron Chou, Craig Hogan)

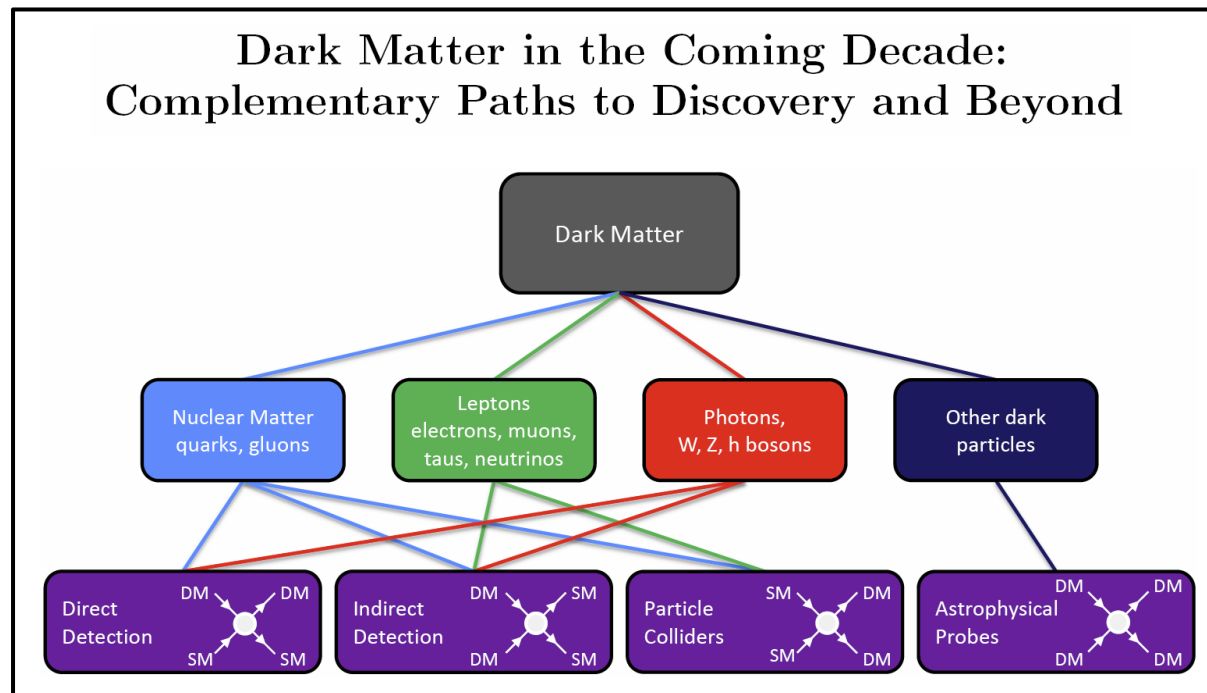
MEETINGS

- Cosmic Frontier Snowmass meetings
 - Community Planning Meeting, Fermilab, 11-13 October 2012
 - Cosmic Frontier Workshop, SLAC, 6-8 March 2013
 - SnowDARK: Non-WIMP Dark Matter, Snowbird, 22-25 March 2013
 - Snowmass on the Pacific, KITP Santa Barbara, 29-31 May 2013
 - Snowmass in Minnesota, 29 July – 6 August 2013
- Cosmic Frontier Workshop
 - <http://www-conf.slac.stanford.edu/cosmic-frontier/2013>
 - 350 participants
 - 200 talks, discussions, panels
 - Woodstock of the Cosmic Frontier



DELIVERABLES: DM COMPLEMENTARITY DOCUMENT

- Before the Snowmass process began, DOE and NSF asked for a community document summarizing dark matter discovery approaches and their relation to each other
- The report is now available as [arxiv:1305.1605](https://arxiv.org/abs/1305.1605)



DELIVERABLES: SNOWMASS SUMMARIES

Contributed Papers from collaborations, groups, individuals

- Send to Subgroup Conveners
- Submit to <https://www-public.slac.stanford.edu/snowmass2013> to be included in Snowmass e-proceedings (harvested from arxiv.org on September 30, but post long before then to have impact)



~30-page CF Subgroup Summaries (written by CF Working Group participants; outlines done; 1st draft: June 14, mature draft: June 28)



~30-page CF Summary (written by all CF Conveners with broad input; 1st draft: July 5, mature draft: July 19)



~30-page Snowmass-wide Summary (written by Frontier Conveners with broad input, presented in bullet form at DPF 2013 in Santa Cruz)

CF PLANS AND PERSPECTIVES

- The Snowmass white papers and summaries will present the key issues, opportunities, and projects for CF physics in the next 10-20 years.
- Snowmass is not a prioritization exercise, but it feeds into P5, which is.
- The Snowmass output should be an invaluable “resource book” for P5, not simply a laundry list of possibilities to pursue given infinite resources. How to add value without prioritization?
 - Present the possible projects for P5 to consider in an organized way – non-trivial in an area characterized by great diversity.
 - Present the potential strengths and weaknesses of proposals.
 - Answer the question: what criteria should guide prioritization?
 - Address “tough questions”: CF has posed ~25 pointed questions for ourselves and the other frontiers. Energy Frontier has responded with its own list, with many for CF, which are very helpful. Looking forward to those from the Intensity Frontier and others.
 - Formulate the Minnesota meeting in a maximally useful way: welcome “last minute” new ideas, allow refinement of summary write-ups, and, most importantly, encourage cross-frontier discussions to build consensus and optimize the overall program.