DaMaSC IV Morning Panel Discussion

- Andrew Benson (Carnegie)
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DaMaSC IV Morning Panel Discussion

• Our task –
  • Let’s build on the discussions so far this morning…
  • …but think about observational, computational, and theoretical advances that we are looking at already, through the next twenty years
  • (These include James Webb, LSST, Extremely Large Telescopes, WFIRST, and into the 2030s, the next generation space-based flagship/s that we may want or need to put forward)

• We will take notes on our conversations, and would like to collate them for continuing discussions.
Probes of dark matter involving gravity

Halo scale where non-CDM behavior manifests in gravitational structures,

versus

a characteristic coupling scale.

Matt Buckley & Annika Peter
in prep

Figure 2: Landscape of viable DM models (Buckley & Peter, in prep.). The two classes of model we consider in this proposal are SIDM and WDM.
The collapse mass is just the beginning of the story, since within a halo, tidal evolution can strip 90% of a subhalo’s mass, or fragmentation & other physics may be important.
From the Princeton Center for Theoretical Science
“Workshop on non-WIMP Dark Matter”,
12/2016
After two decades of small-scale LCDM challenges, what is the current consensus? Are we sure the baryon physics can (or cannot) explain the small-scale issues (or some of them)? What are the observational signatures of the baryon physics explanation? Are they consistent with observations?

What could be irrefutable evidence that dark matter is NOT cold and collisionless?

What astrophysical observations may be ultimate test(s) for LCDM? (Now or later, or much later!)

How do we quantify (in a statistically rigorous way) the effects and uncertainties of baryonic physics on dark matter detection signals?

What should be guiding principles in particle physics dark matter model-building beyond WIMPs?

What can we learn from focusing on scales at the confluence of dark matter, baryons, and inflation?

How do we develop meaningful joint constraints from astronomical & experimental observations?

What simulation programs/theoretical developments are needed, for addressing the question of how to join constraints, and for evaluating in which observations critical insights are possible.