DaMaSC IV Morning Panel Discussion

- Andrew Benson (Carnegie)
- Leonidas Moustakas (JPL/Caltech)
- Laura Sales (UC Riverside)
- Tommaso Treu (UCLA)
- Hai-Bo Yu (UC Riverside)

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

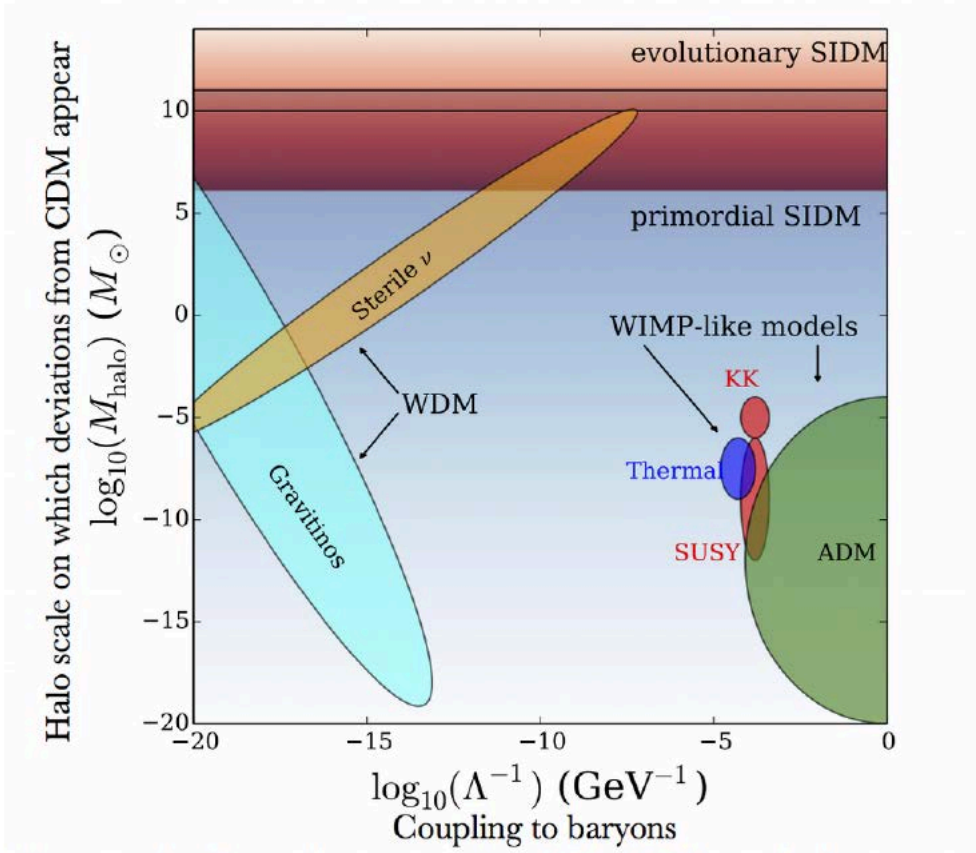
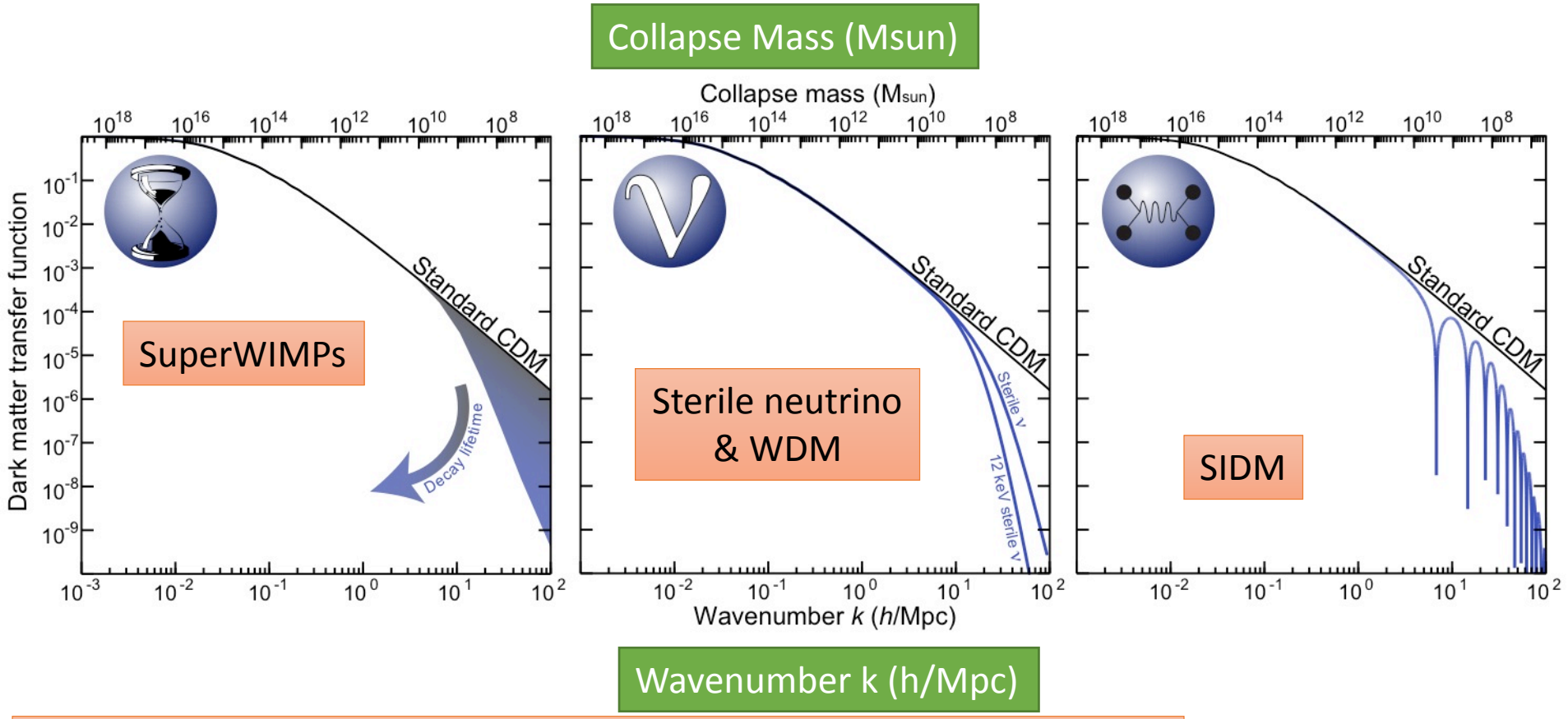


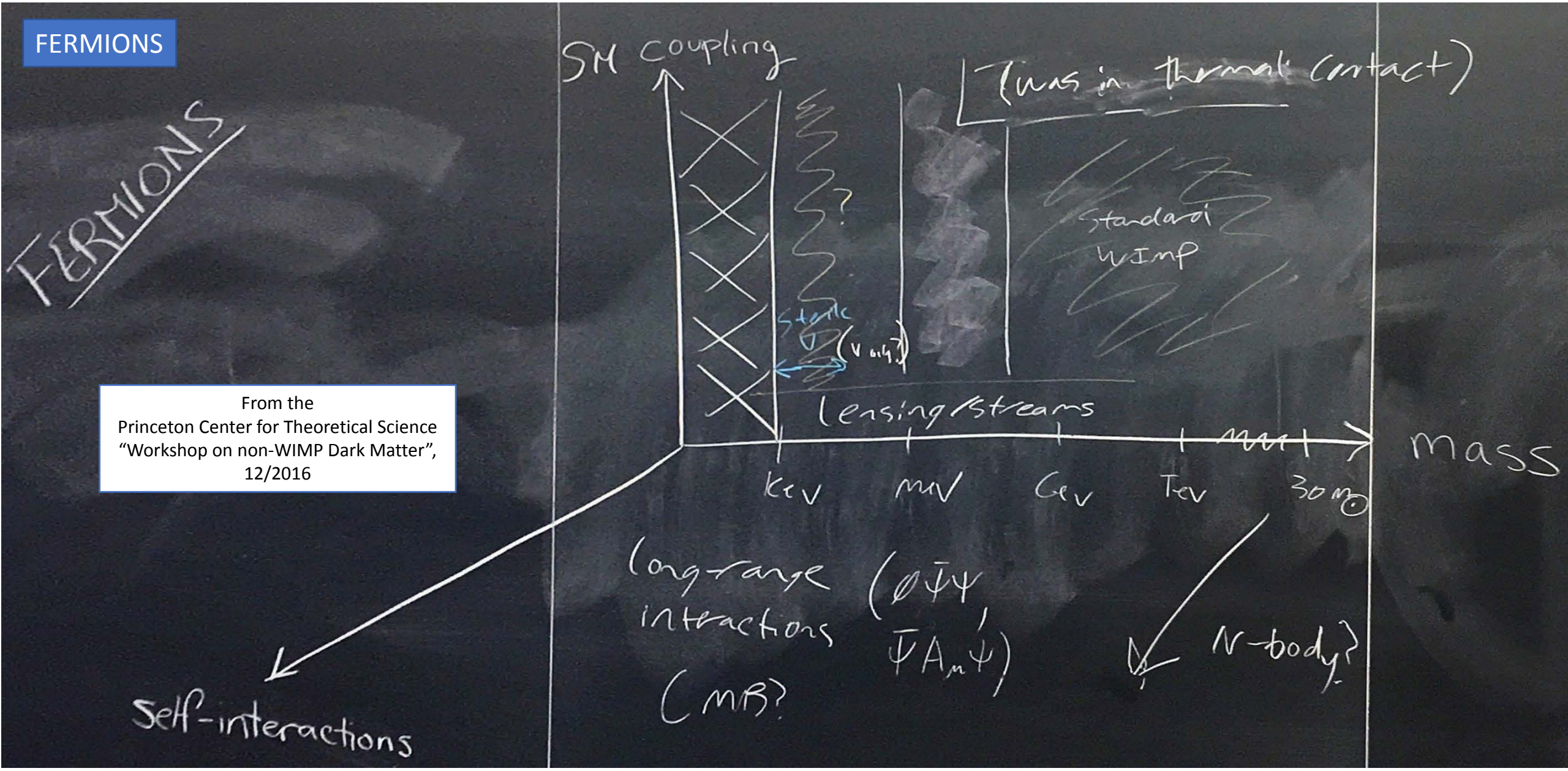
Figure 2: Landscape of viable DM models (Buckley & Peter, in prep.). The two classes of model we consider in this proposal are SIDM and WDM.

The Microphysics of Cosmology: Inflation, Dark Matter, *and* Baryons!

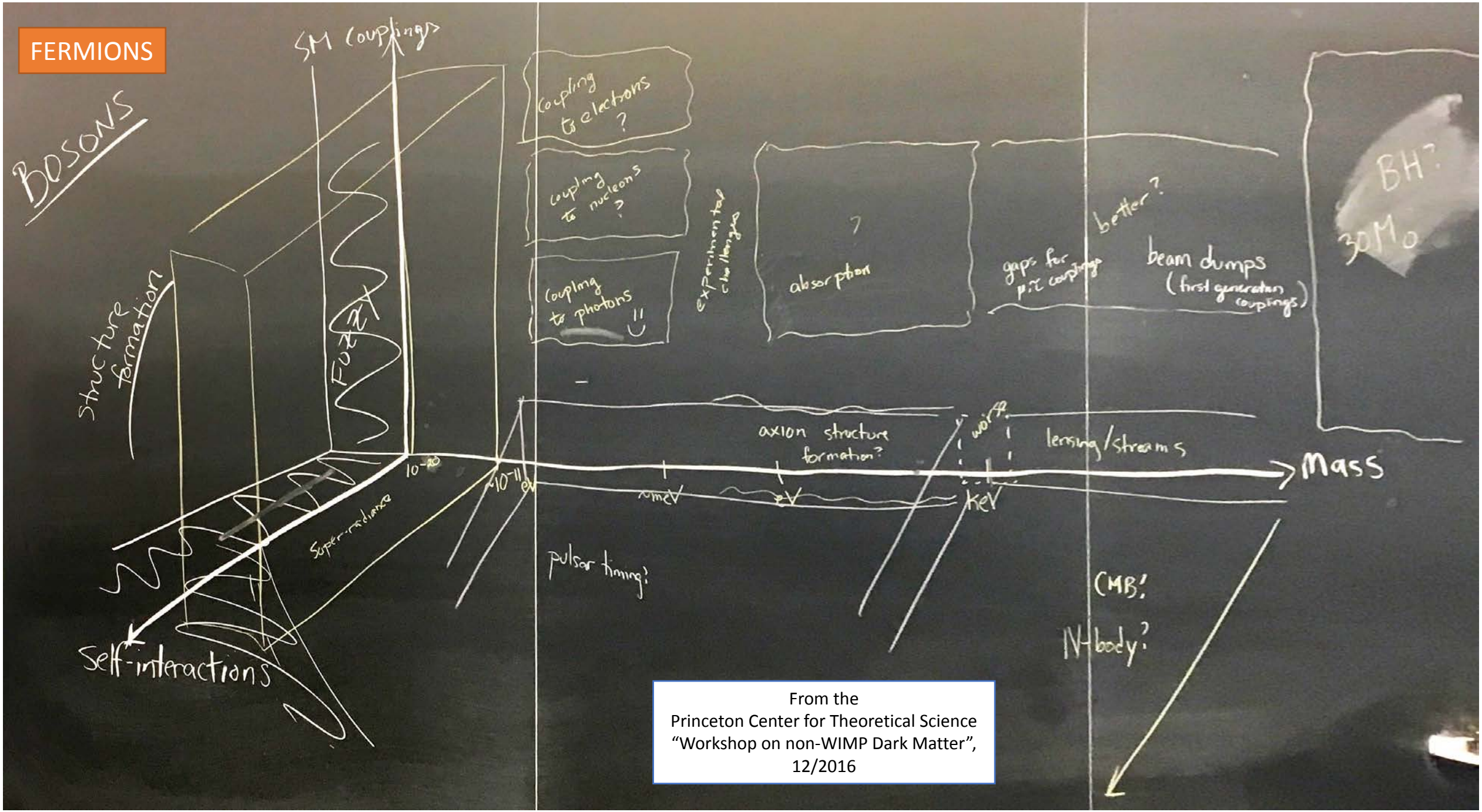


The collapse mass is just the beginning of the story, since within a halo, tidal evolution can strip 90% of a subhalo's mass, or fragmentation & other physics may be important.

Ackn R Massey



From the
Princeton Center for Theoretical Science
"Workshop on non-WIMP Dark Matter",
12/2016



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- 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*.