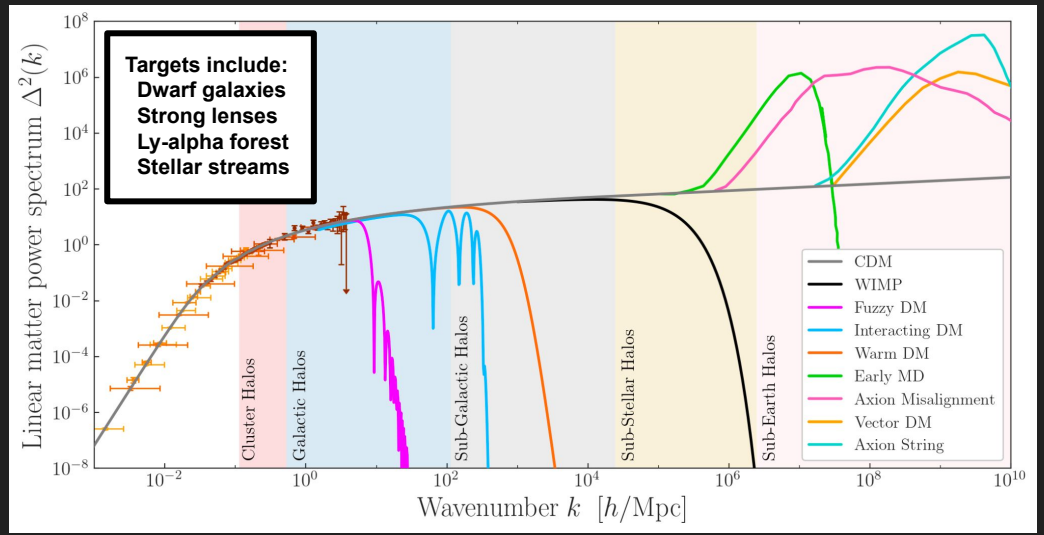
Dark Matter Physics in the Cosmos

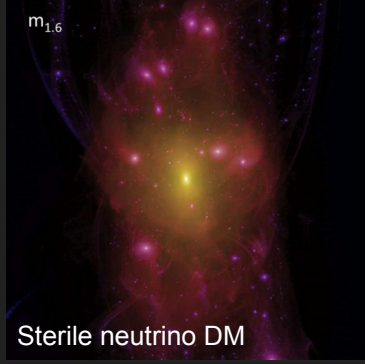
Alex Drlica-Wagner, Ethan Nadler, Annika Peter

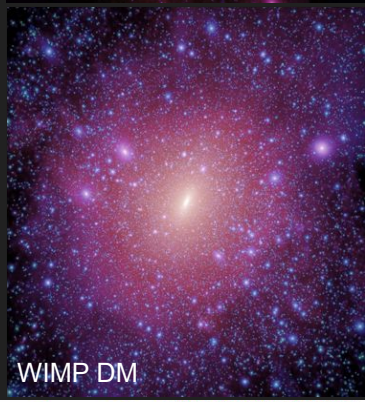
The particle properties of dark matter influence the growth and behavior of cosmic structure and astrophysical phenomena.

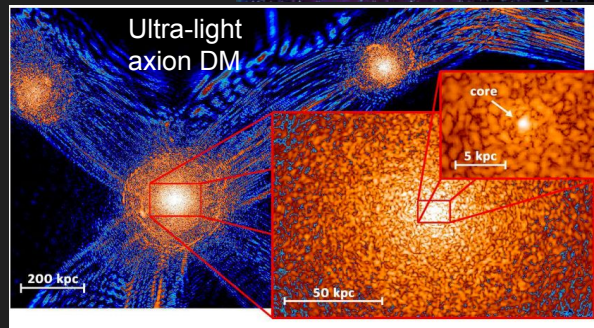
Cosmic probes are unique: they do not rely on the assumption that dark matter has interactions with normal matter beyond gravity.

Cosmic probes could be the only viable approach toward understanding the fundamental nature of dark matter.









Cosmic probes are highly complementary to terrestrial dark matter searches, and there is strong experimental synergy between cosmic probes of dark matter, dark energy, and inflation.

Identify the new physics of dark matter

- For example, funding for the Dark Matter Working Group within the LSST Dark Energy Science Collaboration (DESC) would enable it to contribute to and benefit from DESC infrastructure and science.

Cosmic probes represent an emergent field that requires strong synergy among particle theorists, dynamicists, simulators, observers, and experimentalists. Several things are needed to realize these opportunities:

- Support HEP Cosmic Survey Projects to study dark matter in the cosmos.
- Support numerical simulations to interpret observations in the context of new dark matter physics.
- Support theorists to interpret new results in the context of new models.
- New funding mechanisms to support these emerging, collaborative efforts.