## Phenomenology 2021 Symposium



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## **Cosmological Tension of Ultralight Axion Dark** Matter and its Solutions

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A number of proposed and ongoing experiments search for axion dark matter with a mass nearing the limit set by small scale structure. I will discuss the late universe cosmology of these models and show that requiring the axion to have a matter-power spectrum that matches that of cold dark matter constrains the magnitude of the axion couplings to the visible sector. I will also survey mechanisms that can alleviate the bounds, namely, the introduction of large charges, various forms of kinetic mixing, a clockwork structure, and imposing a discrete symmetry. We provide an explicit model for each case and explore their phenomenology and viability to produce detectable ultralight axion dark matter.

**Summary** 

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