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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Theorie-Palaver

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Lorentz room (Staudingerweg 7, 5th floor)

Jeff Dror
UC, Santa Cruz

The Cosmic Axion Background

Existing searches for cosmic axions relics have relied heavily on the axion being non-relativistic and making up dark matter. However, light axions can be copiously produced in the early Universe and remain relativistic today, thereby constituting a Cosmic axion Background (CaB). In this talk I will study the production and detection of a CaB. Prototypical examples of axion sources are thermal production, dark-matter decay, parametric resonance, and topological defect decay. Each of these has a characteristic frequency spectrum that can be searched for in axion direct detection experiments. I will focus on the axion-photon coupling and study the sensitivity of current and future versions of ADMX, HAYSTAC, DMRadio, and ABRACADABRA to a CaB, finding that the data collected in search of dark matter can be repurposed to detect axion energy densities well below limits set by measurements of the energy budget of the Universe. In this way, direct detection of relativistic relics offers a powerful new opportunity to learn about the early Universe and, potentially, discover the axion.

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