Contribution ID: **64** Type: **not specified**

The EDGES 21 cm anomaly, and axion dark matter

Thursday, 6 December 2018 15:45 (15 minutes)

Recent observations by the EDGES collaboration have energised the worldwide cosmological community by opening a first observational window into the 'cosmic dawn', when the first stars and galaxies emerged. Yet more excitingly, their findings also suggest that the primordial hydrogen gas present at that time may have been much colder than expected, possibly betraying the indirect influence of the mysterious dark matter known to invisibly permeate our Universe. We report on recent research (Phys. Rev. Lett. 121, 111301 (2018)) demonstrating that, by virtue of the ability to mediate cooling processes whilst in the condensed phase, a small amount of axion dark matter can explain these observations within the context of standard models of axions and axion-like-particles. The EDGES best-fit result favours an axion-like-particles mass in the (10, 450) meV range, which can be compressed for the QCD axion to (100, 450) meV in the absence of fine tuning. Future experiments and large scale surveys, particularly the International Axion Observatory (IAXO) and EUCLID, should have the capability to directly test this scenario.

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Session Classification: Parallel Session 1