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Searches for daily modulations with the CAST-CAPP detector

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Despite the overwhelming observational evidence, dark matter has so far been elusive to all experimental searches. As an example, haloscope experiments, which are the most sensitive ones, are focusing on narrow resonant searches while trying to minimize the noise and increase the signal power. However, a broadband approach might be the key to the discovery of the axion. Axion Quark Nuggets (AQN) were originally proposed to explain the similarity of the dark and visible cosmological matter densities. Relativistic axions (~0.6c) are then emitted from AQNs when they propagate through the Earth's atmosphere and interior. AQN production mechanism should manifest itself in (i) a daily modulation of flux up to 20% and (ii) a seasonal phase shift. These features, together with a broadband detection strategy could provide a novel tool in the search for axions. In this talk, we will present the preliminary analysis results of selected data from the CAST-CAPP detector that were used as a proof of principle and were compared with the B=OFF data where no signal should be present. The applied analysis sets the ground for future analyses also with other haloscope experiments and has the potential to re-shape direct axion searches.

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