

Novel Method for the Detection of Axions by Daily Modulations

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Standard axion search methods rely on resonant cavities with a strong magnetic field. These cavities must be tuneable in discrete steps to search for axions with small linewidths. In this talk we will discuss a different method for searching for axions based on broadband search ideas. Specifically we will focus on the Axion Quark Nugget (AQN) model. The AQN model is based on earlier quark nugget model with an added axion domain wall which stabilizes the quark nugget. Axions produced in this model travel with a velocity of $v \approx 0.6c$. This means that line width of axions from the AQN model will be large (~ 1 GHz) and this will require a new detection strategy. We will discuss new methods for detecting broadband axions including a search for daily modulations which, up until now, have been up until now ignored in the literature. The idea is to collect the signal over entire season during a specific hour and fitting the resulting power excess as a function of time (measured in hours) during 24 hours period. We will discuss how a genuine signal can be discriminated from a spurious signal and background noise by considering $B=0$ data and by studying the phase drift of the daily modulations. Finally we will comment on how these broadband searches may be applied to current axion cavity experiments.

Primary author: ADAIR, Connor (Univeristy of British Columbia)

Presenter: ADAIR, Connor (Univeristy of British Columbia)

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