

Risshin Okabe "Axion detection via superfluid 3He ferromagnetic phase and quantum measurement techniques,"

Thursday, 9 November 2023 15:35 (25 minutes)

We propose to use the nuclear spin excitation in the ferromagnetic A1 phase of the superfluid 3He for the axion dark matter detection. This approach is striking in that it is sensitive to the axion-nucleon coupling, one of the most important features of the QCD axion introduced to solve the strong CP problem. We also show that the combination of the squeezing of the final state with the Josephson parametric amplifier and the homodyne measurement can enhance the sensitivity. It turns out that this approach gives good sensitivity to the axion dark matter with the mass of 10^{-6} eV. We estimate the parameters of experimental setups, e.g., the detector volume and the amplitude of squeezing, required to reach the QCD axion parameter space.

Session Classification: Short talks