Contribution ID: **117** Type: **Poster**

Intensity interferometry for ultralight bosonic dark matter detection

Tuesday 9 August 2022 16:46 (3 minutes)

Ultralight bosons with masses bellow 1 eV/c² are a promising candidate to be a predominant component of dark matter. These particles can be described by a classical wave-like field oscillating near the Compton frequency of the bosons. Assuming that they are virialized in the galactic gravitational potential, the random velocities produce slight deviations from the Compton frequency. These result in a near-zero-frequency (dc) stochastic fluctuation of the amplitude of the field on a time scale determined by the spread in kinetic energies.

Ultralight bosonic dark matter can couple to Standard Model (SM) particles through a variety of interactions. If a measurement scheme for the direct detection is sensitive to a signature quadratic in the field, then there is a dc component of the signal. Thus, a detector with a given finite bandwidth can be used to search for bosons with Compton frequencies many orders of magnitude larger than its bandwidth. Additionally, a search for such a signal would not require an accurate tunning to the unknown Compton frequency of the field. We show that existing optical magnetometers and atomic clocks networks have sufficient sensitivity to search experimentally unexplored parameter space using this scheme.

Primary author: MASIA ROIG, Hector

Co-authors: Mr FIGUEROA LEIGH, Nataniel (Helmholtz Institut Mainz); Mr BORDON, Ariday; Dr SMIGA, Joseph A.; Dr STADNIK, Yevgeny V. (Kavli Institute for the Physics and Mathematics of the Universe (WPI), The University of Tokyo Institutes for Advanced Study, The University of Tokyo, Kashiwa, Chiba 277-8583, Japan); Prof. BUDKER, Dmitry; Mr CENTERS, Gary P. (Helmholtz-Institut Mainz); Dr GRAMOLIN, Alexander V. (Department of Physics, Boston University, Boston, Massachusetts 02215, USA); HAMILTON, Paul S.; KHAMIS, Sami; PALM, Christopher A.; Prof. PUSTELNY, Szymon (Jagiellonian University in Kraków); SUSHKOV, Alex (Boston University); WICKENBROCK, Arne; Prof. JACKSON KIMBALL, Derek (California State University, East Bay)

Presenter: MASIA ROIG, Hector

Session Classification: Poster Lightning Talks