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Type: **Invited talk in the parallel session**

Testing Fundamental Physics and Searching for Dark Matter using Precision Resonators and Oscillators

Tuesday, 6 July 2021 10:00 (30 minutes)

In this work we present our latest results using photonic, atomic, and mechanical oscillators to undertake experimental searches for dark matter and tests of fundamental physics. First, we will focus on our recent results on searching for scalar dark matter through frequency comparisons, due to oscillations in fundamental constants [1]. Next we will discuss upconverting low mass axion signals to microwave frequencies, a proof of principle experiment was undertaken and will be presented [2]. Finally, we will discuss on how our technology can be used for other fundamental experiments, such as the search for high frequency gravitational waves [3] and tests of Lorentz invariance violations.

[1] WM Campbell, et. al. Phys. Rev. Lett., vol. 126, 071301, 2021.

[2] CA Thomson, BT McAllister, M Goryachev, EN Ivanov, ME Tobar, Phys. Rev. Lett., vol., 126, 081803, 2021.

[3] M Goryachev et. al. arXiv:2102.05859 [gr-qc]

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Session Classification: Variation of the Fundamental Constants, Tests of the Fundamental Symmetries and Probes of the Dark Sector

Track Classification: Precision Tests: Variation of the fundamental constants, tests of the fundamental symmetries and probes of the dark sector