

# QUANTUM SENSORS FOR DIRECT DETECTION OF SUB-GEV DARK MATTER

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August 16, 2021

Meeting ID:  
925 9114 6494

1:00pm ET

The discovery of the particle nature of dark matter is one of the most pressing questions in modern physics. Evidence for such a dark matter particle is abundant from galactic dynamics and structure formation in the early universe, not little doubt remains that this evidence points to exciting new physics. Particle dark matter candidates exist in the huge mass window across almost 30 orders of magnitude, from planck-scale wave-like DM to TeV-scale 'WIMPZillas'. Over the last 20 years, searches for dark matter above the proton mass have advanced significantly across direct and indirect searches, but sub-GeV dark matter has until recently been comparatively unprobed. In this talk, I will discuss the state of the Sub-GeV direct detection field, and recent progress applying quantum measurement techniques to lowering mass thresholds for new searches with event thresholds at the eV-scale. I will then discuss the outlook for the field in the next 5-10 years, in the context of synergy with ongoing research in materials science and quantum information science. The goal over the next decade is to run background-free dark matter searches at gram-year exposures with meV-scale thresholds, an exciting challenge that requires a broad range of expertise, and comes with enormous scientific discovery potential.

