Contribution ID: **111**            Type: **Plenary/Parallel talk**

# Direct detection with superconducting nanowires

*Thursday, 25 August 2022 16:10 (20 minutes)*

Superconducting nanowires, a mature technology originally developed for quantum sensing, can be used as a target and sensor with which to search for dark matter interactions with electrons. We leverage recent developments in the theory of dark matter interactions in dielectrics to robustly predict the event rate in a nanowire device, fully accounting for the many-body physics of the detector. As a proof of concept, we use data from a 180-hour measurement of a prototype device to place new constraints on dark matter–electron interactions, including the strongest terrestrial constraints to date on sub-MeV (sub-eV) dark matter that interacts with electrons via scattering (absorption) processes. We present a roadmap for the development of future experiments and demonstrate the prospects for superconducting nanowires to lead exploration of the light dark matter parameter space.

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**Session Classification:** Parallel Session Main Cupula: DM

**Track Classification:** Dark matter, neutrinos & astroparticle physics