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Review of SRF technology developed for accelerators applied to searches for dark matter and other beyond the standard model physics

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Recent efforts have shown that the SRF technology developed for accelerators can be successfully applied to new applications, including quantum computing, dark matter searches and beyond the standard model physics. The ultra-high quality factor of SRF cavities can allow to achieve unprecedented sensitivity in fields outside of the usual accelerator applications, for examples in dark photon and axion searches (both as dark matter candidates and lab-produced particles), to study the superconductor nonlinear behavior and could also allow to set a limit on photon-photon scattering. Applications of SRF cavities for gravitational waves searches are also being investigated. In this work we propose an overview of the applications of SRF technology originally developed for accelerators to new frontiers. The SQMS Physics and Sensing thrust is working on this effort as it strives to combine SRF cavities with the quantum technology, with a focus on new particle and BSM physics.

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Footnotes

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Yes

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