SRF2025 TOKYO

22ND INTERNATIONAL CONFERENCE ON RF SUPERCONDUCTIVITY

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Detection of high-f gravitational waves using SRF cavities

Friday 26 September 2025 12:20 (20 minutes)

Today, apart from some isolated R&D efforts, there are no GW experiments, yet which explore a large part of the vast frequency range above the LIGO/Virgo band. It is planned to establish an experiment at DESY and FNAL to search for high-frequency GWs in the frequency range of 10 kHz to 100 MHz. The basic idea is to use superconducting radiofrequency (SRF) cavities to detect tiny harmonic deformations induced by GWs which change the boundary conditions of the oscillating electromagnetic field.

This talk deals with a brief motivation of this search, which dictates the challenging environmental boundary requirements, and the R&D to operate a cavity using a LLRF system which pushes beyond state-of-the-art accuracy and resolutions and a seismic noise mitigated cryostat at 1.8 K.

A focus of the presentation will be the warm and cold commissioning of a prototype cavity, built 20 years ago during the MAGO collaboration, and its first measurement in our collaborative research project. We will address the questions “What can we learn from this prototype?”and “how to design and build an optimized cavity for high-f GW search?”and the preparations for a first physics run in 2026 to explore an uncharted phase space in GW physics.”

I have read and accept the Privacy Policy Statement

Yes

Footnotes

Funding Agency

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