Contribution ID: **43** Type: **Talk**

Surface absorption of crystalline silicon

Monday 6 October 2025 15:45 (15 minutes)

Due to a very low mechanical loss, resulting in low thermal noise, crystalline silicon is a very interesting mirror-substrate material for future cryogenic gravitational-wave detectors.
To maintain the low detector operation temperature, low optical absorption of the mirrors is required. This requirement includes all components of the mirrors, i.e. the mirror substrates as well as the coatings involved (highly-reflective as well as anti-reflective coatings). In the past, additional optical absorption of varying magnitude at, or close to, the mirror surfaces has been observed after polishing of crystalline silicon. The origin of this absorption is unknown.
In this presentation, we will give an overview of the issue, and of the efforts currently undertaken to identify and eliminate this absorption source with the aim to minimize the overall mirror absorption.

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Session Classification: MAD25: Session 1. Substrates