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Optical properties of titania-tantala coatings at cryogenic temperatures

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Cooling mirrors to cryogenic temperatures has been proposed as a strategy to improve the sensitivity of gravitational waves detectors (GWD). The effects of low temperatures on the optical response of mirrors have to be evaluated; additionally, important issues - such as the formation of an ice layer on the surface of mirrors - must be carefully studied to assess their impact on the GWD sensitivity. In this talk, an optical characterization of titania-tantala coatings at cryogenic temperatures will be presented, along with data analysis that allow to determine the temperature-dependent variations in the Urbach tail of the coatings. Results allow to better understand the fundamental properties of optical coatings, and have implications for next-generation GWD.

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