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A Cryogenic Testbed for High-Q Thin Films and Optical Coatings AARON MARKOWITZ, Caltech, BRITTANY KAMAI, Vanderbilt University, CHRIS WIPF, Caltech, JOHANNES EICHHOLZ, Australian National University, JORDAN KEMP, University of Chicago, MARIIA MATIUSHECHKINA, Max Planck Institute for Gravitational Physics, MANDY CHEUNG, Pasadena City College, CHING PIN OOI, University of Tokyo, RANA ADHIKARI, Caltech — A limiting source of noise for optomechanical experiments, including next-generation gravitational wave detectors, is coupling to the thermal bath of the mechanical system. We present a recently developed cryogenic testbed for measuring the internal friction of thin disk resonators with rapid sample turnover. The apparatus makes use of an amplitude-locked loop to continuously measure the quality factor and eigenfrequencies of several resonances of the system, permitting precise, non-contact temperature control. The testbed has been applied to the development of amorphous silicon coatings on silicon substrates for use in next-generation gravitational wave interferometers, and has application for other thin film development.

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