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Mechanical detection of flux quantums as a candidate for small force standard JAE-HYUK CHOI, HEON-HWA CHOI, YUN WON KIM, Korea Research Institute of Standards and Science, SOON-GUL LEE, Dep. of Display and Semiconductor Physics, Korea University, MAHN-SOO CHOI, Dep. of Physics, Korea University — Ultra-small force measurement with a micro-cantilever is a novel and powerful tool to probe micro- and nano-scale physical quantities, such as persistent current in mesoscopic metal rings, with unprecedented sensitivity. However, the precision of such small force is often limited by uncertainty of cantilevers spring constant, partly because of absence of small force standard. In this talk, I will introduce our metrological project for developing a small force standard based on superconducting flux quantum, from its concept to experimental progress. Our experimental results will cover the device fabrication, optical cooling effect, and mechanical detection of magnetic flux quantization and relaxation in a well-defined Nb micro-annulus at a temperature of 4 K.

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