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**Scanning SQUID microscopy in a cryogen-free refrigerator** BRIAN T. SCHAEFER, DAVID LOW, LASSP/Department of Physics, Cornell University, Ithaca, New York, USA, GUENEVERE E. D. K. PRAWIROATMODJO, Center for Quantum Devices, Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark, J. KEVIN NANGOI, JIHOON KIM, KATJA C. NOWACK, LASSP/Department of Physics, Cornell University, Ithaca, New York, USA — With helium prices rising and supply becoming increasingly uncertain, it has become attractive to use dry cryostats with cryocoolers rather than liquid helium to reach low temperatures. However, a cryocooler introduces vibrations at the sample stage, making scanning probe experiments more challenging. Here, we report our progress on a superconducting quantum interference device (SQUID) microscope implemented for the first time in a compact, cryogen-free 5 K system. Our microscope is designed to reach submicron spatial resolution and a flux sensitivity of approximately 1 $\mu\Phi_0/\sqrt{\text{Hz}}$, where $\Phi_0$ is the magnetic flux quantum. To enable height feedback while approaching and scanning samples, we mount the SQUID on a quartz tuning fork. Our system promises to meet the capabilities of similar systems implemented in helium cryostats.

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