Abstract Submitted
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A real time, continuously operating, fluxlocked superfluid interferometer[1] ADITYA JOSHI, RICHARD PACKARD, University of California, Berkeley — Interferometers are widely used in basic and applied sciences. These instruments using sound, light or de Broglie matter waves, have an output amplitude (e.g., the Josephson critical current in a dc SQUID), which is a sinusoidally varying function of some variable of interest (magnetic flux in the case of the SQUID). To achieve widespread practical utility, it is very useful to have a method to linearize the instrument's response. We report here a real-time flux locking technique using thermal counter flow to linearize the output of a superfluid He-4 quantum interference device (SHeQUID), an analogue of the superconducting dc SQUID. A continuously changing rotation flux through the interferometer sense loop of the SHeQUID produces a changing phase-difference in the sense loop. This change is canceled via continuous negative feedback using the phase shift caused by a thermally driven superflow. The feedback signal (injected heater power) is then a linear measure of rotation flux and is used to track the rotation signal in real time.

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