Abstract Submitted
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Design and Construction of Electronics for Measuring Superconducting-to-Normal State Switching Statistics of a Josephson Junction[1] ERIK CAULEY, University of the Sciences, ROBERTO RAMOS COLLABORATION, DAN FAUNI COLLABORATION, KEERAN O RAMANTHAN COLLABORATION — Escape of a Josephson phase particle from the zero-voltage state of a current-biased, hysteretic Josephson junction has been extensively studied experimentally, in agreement with the classic Kramers theory for the escape of a Brownian particle from a potential well. The dynamics of the junction is analogous to that of a phase particle confined to a one-dimensional, tilted cosine potential or washboard potential. The effect has been investigated in Josephson junctions based on single-gap superconductors such as Al and Nb, high-Tc superconductors, and multi-gap superconductors such as MgB_2. These experiments are typically studied using sophisticated cryogenics instrumentation such as dilution refrigerators. We report on progress in designing and building electronics that would allow physics undergraduates to perform similar experiments using a 2 Kelvin cryocooler. The electronics consist of current ramp and a Schmidt trigger detection circuit that amplifies and measures the switching of voltage of a Josephson junction, and a universal time interval counter to measure switching statistics, which is plotted on a switching histogram.

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