

Abstract Submitted
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Results of Switching Measurements in MgB₂ Josephson Heterojunctions: Search for Multiple Tunneling Channels and Leggett-Mode Signatures STEVE CARABELLO, JOSEPH LAMBERT, Drexel University, DANIEL CUNNANE, Temple University, WENQING DAI, Penn State University, KE CHEN, Temple University, QI LI, Penn State University, X. X. XI, Temple University, ROBERTO RAMOS, Indiana Wesleyan University — Josephson tunnel junctions made of multi-gap and single-gap superconducting electrodes provide a useful system for understanding multiple gap superconductivity. Peaks in the differential conductance curve have been used to characterize the energy gaps of such multi-gap materials [e.g. Chen, K. et al., Nat. Commun. 3:619 (2012)]. Superconducting-to-normal switching data can also provide useful insights. While ramping the current from zero to the critical current, the washboard potential is tilted, thereby adjusting the resonant frequency of the potential well, and altering the energy level spacing. By exciting the junction with microwaves, resonant modes may be explored. We report results of conductance and switching experiments on MgB₂/I/Pb and MgB₂/I/Sn junctions, with and without microwaves, in a helium dilution refrigerator with a base temperature 20mK. These results exhibit tunneling modes and resonances not observed in single-gap/single-gap junctions, including a peak in the escape rate that may be consistent with coupling to the Leggett mode.

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