Towards the In-situ Detection of Individual He_2* Excimers Using a Ti TES in Superfluid Helium

Faustin W. Carter, Scott A. Hertel, Michael J. Rooks,
Daniel N. McKinsey, and Daniel E. Prober

Yale University, New Haven, CT 06511 USA

E-mail: faustin.carter@yale.edu

Abstract — We characterize a single titanium (Ti) transition edge sensor (TES) designed for in-situ detection of individual He_2* excimers. We find a critical temperature of 420 mK, an electrothermal time constant of~3 μs, and a total energy resolution of 1.5 eV. We observe the detector response to short laser pulses, and present a successful analysis strategy for extracting direct-TES-hit pulse areas from a much larger substrate hit background. We discuss near-term plans for coupling multiple such TESs together with a shared aluminum (Al) absorber, increasing the He_2* collection area to millimeter scales. Finally, we briefly discuss the technical challenges (and solutions) of installing a hermetic superfluid volume in a cryogen-free dilution refrigerator.

Keywords (Index Terms) — Transition Edge Sensor, Helium excimer, UV Sensor