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London penetration depth measurements of $\operatorname{Fe}_{1+y}(\operatorname{Te}_{1-x}\operatorname{Se}_x)$ single-crystals at ultra-low temperatures¹ ANDREI DIACONU, Department of Physics, AMRI, University of New Orleans, New Orleans, Louisiana 70148, USA, JIN HU, TIJIANG LIU, BIN QIAN, ZHIQIANG MAO, Department of Physics and Engineering Physics, Tulane University, New Orleans, Louisiana 70118, USA, LEONARD SPINU, Department of Physics, AMRI, University of New Orleans, New Orleans, Louisiana 70148, USA — The evolution of the superconducting properties as derived from the in-plane penetration depth measurements as a function of temperature in single crystals of $Fe_{1.02}(Te_{1-x}Se_x)$, with Se concentration spanning from 25% to 45%, was studied using a tunnel diode oscillator technique in a dilution refrigerator down to a temperature of 30mK. By using a set of two mutually coupled planar inductors parallel to the ab plane of the samples, the probing ac field is uniform across the sample along the c axis making the variation in susceptibility solely due to in-plane currents while significantly increasing the signal to noise ratio compared to usual inductors used in similar experiments The evolution of the topology of the superconducting gap from underdoped to optimally doped samples, as derived from exponential and power law behavior of λ_{ab} at low temperatures, is presented.

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