

Abstract Submitted
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Development and Application of Self-Oscillating LC Circuit Driven by a Topological Kondo Insulator in Extreme Conditions SARAH ADAMS, HYUNSOO KIM, JOHNPIERRE PAGLIONE, Center for Nanophysics and Advanced Materials, Department of Physics, University of Maryland, College Park, MD 20742, USA — Self-oscillating circuits are desirable for use in the study of quantum materials due to their high-precision but are challenging to execute in high-field, low-temperature environments. Recently, it has been shown that single crystals of the mixed-valence Kondo insulator SmB₆ can exhibit negative differential resistance (NDR) in the characteristic V-I curve at low temperatures which could have useful applications in research of quantum materials. Here, we will present a study of the feasibility of using such crystals as elements in a self-oscillating circuit. We explore the bounds of the joule-heating-driven mechanisms with measurements down to 20mK temperatures and fields up to 20 Tesla. We will explore the tuning of crystal size and analyze the oscillating behavior with respect to temperature, field, size, and geometry, to develop a prototype for applying these crystals to generic studies of quantum materials.

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