

Abstract Submitted  
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**New details in the phase diagram of  $\lambda$ -(BETS) $_2$ GaCl $_4$  made by advancing the art of RF penetration depth measurements in pulsed fields using a tunnel diode oscillator**<sup>1</sup> WILLIAM A. CONIGLIO, LAUREL E. WINTER, KYUIL CHO, BRAUNEN E. SMITH, C.C. AGOSTA, Clark University, L.K. MONTGOMERY, Indiana University — We report improvements to the Tunnel Diode Oscillator method of measuring the penetration depth of a superconductor at RF frequencies above 100 MHz. Optimizations to the circuit for high frequency and pulsed fields are briefly discussed as well as a digital demodulation technique for rendering the oscillation frequency with accuracy suitably better than the stability of the oscillator itself. Using a 390 MHz oscillator, we measured the penetration depth of  $\lambda$ -(BETS) $_2$ GaCl $_4$  with the magnetic field oriented parallel to the conducting planes of the sample using fields up to 21 T and temperatures from 400 mK to 5.5 K. Our new data crunching techniques have allowed us to resolve two phase transitions between the superconducting and normal states as well as a third transition that appears at low temperature as an enhancement to the upper critical field. We explore the properties of the phase diagram in two samples.

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