

Abstract Submitted
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Tunnel Diode Oscillators for Precise Electromagnetic Measurements ALEXANDER BLANTON, OWEN HUFF, NICHOLAS BRESLIN, RYAN GORDON, Western Illinois University — My presentation will give an overview of the work being done to construct a variety of different types of tunnel diode resonator (TDR) circuits in Physics Department at Western Illinois University. These circuits consist primarily of an LC tank oscillator, having a megahertz natural resonant frequency, whose resonance is sustained by a biased tunnel diode. Changes in the TDRs resonant frequency can be measured to a high degree and the drift in its frequency can be as low as parts-per-billion, under the best conditions, making it an ideal tool for studying electromagnetic properties of materials. Two basic designs for TDR measurements are being developed in our lab. One of these involves the insertion of a sample into the inductor coil of the TDR, where coupling to its magnetic field leads to a frequency shift. The second design involves the insertion of a sample into the TDRs capacitor, where coupling to its electric field leads to a frequency shift. The details of these designs will be discussed and plans for future measurements of materials will be outlined in my presentation.

Alexander Blanton
Western Illinois University

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