Performance Model of the Hairpin Microwave Resonator and Experimental Results L.K. WARNE, W.A. JOHNSON, R.S. COATS, R.E. JORGENSON, G.A. HEBNER, Sandia National Laboratories, A.M. PATERSON, J.P. HOLLAND, Applied Materials — Microwave hairpin resonator structures are finding increased applications in a range of plasma systems. This poster presents circuit models for a hairpin resonator probe used for measuring electron density. A transmission line model is used along the resonator length and lumped loads are used to capture the parasitic capacitance at the open end and the parasitic inductance at the drive or shorted end along with a lumped radiation resistance. The impact of a plasma sheath surrounding the resonator wires as well as the finite conductivity of the wires are addressed. Electromagnetic simulations using a frequency domain method of moments code are also included as comparisons to the circuit model results. Finally, the impact of the external cavity formed by the electrodes is ascertained. The model calculations will be compared with experimental measurements to demonstrate these effects. This work was supported by the Division of Material Sciences, BES, Office of Science, U. S. Department of Energy, Applied Materials, and Sandia National Laboratories, a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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