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Fast Opening Microwave Barrier and Independency of Polarization in Plasma tubes TED ANDERSON, IGOR ALEXEFF, University of Tennessee, and Haleakala Research and Development, Inc., ESMAEIL FARSHI, University of Tennessee, Haleakala Research and Development, Inc., FRED DYER, JEFFRY PECK, Impeccable Instruments, ERIC P. PRADEEP, NANDITHA PULSANI, NARESH KARNAM, UNIVERSITY OF TENNESSEE COLLABORATION, HALEAKALA RESEARCH AND DEVELOPMENT, INC. COLLABORATION, IMPECCABLE INSTRUMENTS COLLABORATION — Plasma barriers are used to protect sensitive microwave apparatus from potentially damaging electronic warfare signals. We have found both experimentally and theoretically that we can open such a barrier on a time scale of microseconds instead of typically many milliseconds. We do this by increasing the plasma density rather than waiting for it to decay. We produce a standing wave between the two layers that results in microwave transmission, analogous to the transmission found in an optical Fabry-Perot Resonator. The plasma tubes work extremely well in intercepting microwave radiation when the incident wave electric field is parallel to the tubes. However, if the electric field is perpendicular to the tubes, the normally induced plasma current cannot flow, and the plasma effects are not expected to appear. To our surprise, when the plasma tubes were experimentally tested with the electric field perpendicular to the tubes, the plasma tubes not only intercepted the microwave signal, but the observed cut-off with a pulsed plasma lasted about twice as long. The effect appears to be due to an electrostatic resonance, and preliminary calculations suggest that a normally ignored term in Maxwell's Equations is responsible.

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