

Tuesday Morning, 22 May 1990
9:40 am -- Regency Ballroom G&H

Oral Session 3A
Intense Beam Microwave Sources - I
Chairman: S.H. Gold

3A-3

**Experimental Studies of High Power Plasma Filled
Backward Wave Oscillators***

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Recently, it has been demonstrated that a plasma loaded backward wave oscillator (BWO) powered by a relativistic electron beam can generate hundreds of megawatts of microwave radiation at high efficiency (about 40%). In this paper, the results of an experimental study of an 8.4 GHz BWO filled with an externally controlled background plasma is reported. It was found that the enhanced efficiency can be maintained even for large electron beam currents approaching to the vacuum space charge limiting current and we anticipate that this might hold even beyond the space charge limiting current. A small frequency up-shift (few percent) was detected for the plasma loaded BWO. A hydrogen flashover plasma gun was used and its characteristics, including plasma density, drift velocity and temperature, were investigated. Detailed studies of beam propagation in vacuum as well as in plasma loaded structures will be presented. It appears that a slightly over-moded device will be needed for peak power handling capability of 5-10 GW.

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