

Advances in Plasma-filled, Relativistic, Slow Wave Microwave Sources

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Significant improvements in the performance of microwave sources, both nonrelativistic and relativistic, have been achieved in recent years by introducing a controlled amount of background plasma. Recent advances in plasma-filled relativistic devices - both experimental and theoretical - are reviewed. In particular, plasma filling has been credited with increasing the electron beam current and frequency tunability (~300%). The formation of hybrid waves in plasma-filled, corrugated, slow wave structures and the role of these modes in improving the beam/wave coupling will also be discussed. We review those issues as well as recent experimental results of plasma-loaded backward wave oscillators (BWOs) operating over a wide range of beam currents (0.8-4 kA) and plasma densities (10^{10} - 10^{13} per cubic centimeter).