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Phase control in a klystron-like relativistic backward wave oscillator operating at low guiding magnetic field with 10 kW input signal

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Investigation of phase control in a klystron-like relativistic backward wave oscillator is presented in this paper. The guiding magnetic field, the distance between the input cavity and the pre-modulation cavity, the rise time of diode voltage, and the input signal frequency are optimized to decrease the phase jitter of output microwave. Particle-in-cell simulations show that when the diode voltage is 770 kV with rise time of 10 ns, the beam current is 8.8 kA, the guiding magnetic field is 0.75 T, and the input power is 10 kW, and the input signal frequency is 9.30 GHz, the output microwave power is 2.7 GW, and the phase jitter is controlled to be less than 30°, corresponding to a beam-wave conversion efficiency of 40% and an injection power ratio of -54.3 dB.

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