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Experimental Study of a Millimeter Wave Relativistic Backward Wave Oscillator*

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The results of an experimental investigation of a relativistic backward wave oscillator (RBWO) in E-band are presented. An overmoded slow wave structure (SWS) was designed to generate a higher order mode (TM03) at 78GHz.1 Rectangular corrugations were used for the SWS having surface waves with upper cutoff frequencies above 90 GHz (E-band). The characteristics of this millimeter wave source were studied for electron energies 400 –500 keV and beam currents 2.5 –3.5 kA.

The RBWO was driven by a voltage pulse that has a half sinusoidal wave-like shape and FWHM duration of 12 ns (SINUS-6 accelerator). Open-shutter photography and a neon bulb array were used to capture the radiation pattern of the TM03 output mode.

1. A. Elfrgani, A. Kuskov, M.I. Fuks, and E. Schamiloglu, "Millimeter Wave Overmoded Relativistic Backward Wave Oscillator,"in Proc. IVEC 2018 (Monterey, CA, 2018), p. 1.

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Authors: Dr ELFRGANI, Ahmed (University of New Mexico); Dr AYOUB, Firas (University of New Mexico); KUSKOV, Artem; Mr ANDREEV, Dmitrii (University of New Mexico); Mr DE ALLELUIA, Antonio (University of New Mexico); Mr MARTINEZ-HERNANDEZ, Braulio (University of New Mexico); Mr WANG HUANG, Kevin (University of New Mexico); Ms HERNANDEZ, Stacie (University of New Mexico); SCHAMILOGLU, Edl (University of New Mexico)

Presenter: Dr ELFRGANI, Ahmed (University of New Mexico)

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