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Title: W-band Gyro-BWO with a Four-stage Depressed Collector.

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Source title: Journal Terahertz & Technology

Volume:4

Publication year:2011

Pages:76-84

Document type:Journal Online

Abstract: An energy recovery system using a four-stage depressed collector was simulated and designed to improve the overall efficiency of the W-band gyrotron backward wave oscillator (gyro-BWO) at the University of Strathclyde. The spent beam information was exported from the simulation of the gyro-BWO using the 3D PIC code MAGIC. The geometry of the depressed collector was optimized using a genetic algorithm to achieve the optimum overall recovery efficiency for specific parameters of the spent beam. Secondary electron emissions and their effects on the recovery efficiency and the backstreaming of the electrons from the collector region were simulated. The heat power distribution on the electrodes was also simulated to avoid the " hot spot " .

Keywords: Gyro-BWO, Depressed collector, Energy recovery, Secondary electron emission.