PPPS 2019



Contribution ID: 511

Type: Poster

2P06 - Frequency tunable X-band Relativistic Backward Wave Oscillator

Tuesday 25 June 2019 13:00 (1h 30m)

Relativistic tubes are generally used for High Power ElectroMagnetic (HPEM) applications. Most of these tubes radiate high level electromagnetic fields but operate at a fixed frequency. Nevertheless, in most cases, a variable frequency is useful if not required. In a precedent study, CEA worked on a very compact HPEM source named CLAIRE. The used tube was an optimized X-band sub-gigawatt relativistic resonant Backward Wave Oscillator (BWO) using low-level magnetic field. A new BWO design (based on the previous one) has been achieved with frequency tunable capability. This tube is cautiously designed to be compatible with the CLAIRE generator and to provide at least 500 MHz frequency range. Pros and cons of mechanical and electrical tunability are firstly evaluated. Particles In Cell Simulations (PIC) were carried out and revealed that an optimized mechanical solution provides the desired performances. Desired tunable frequency range is obtained by changing the distance "D" is mechanically actuated by moving the resonant reflector of few millimeters. A particular attention has been paid on the realization for two reasons. Firstly, operating in X-band implies high mechanical accuracy in order to achieve great performances. Secondly, it's necessary to maintain good vacuum state while mechanically moving the resonant reflector. This paper presents the design, numerical PIC simulations, and first experiments.

Authors: DIOT, jean-christophe (CEA); Dr CHAULOUX, Antoine (CEA); Mr POTHEE, jeremy (CEA); CHAN-CONIE, Thierry (CEA Gramat); TORTEL, Stéphane (CEA)

Presenter: DIOT, jean-christophe (CEA)

Session Classification: Poster - Microwave Generation and Plasma Interactions and Pulsed Power Switches and Components

Track Classification: 2.3 Slow-Wave Devices