Contribution ID: **86** Type: **Oral Presentation**

# Development of a Compact Narrow-band High Power Microwave System

*Friday 8 July 2016 10:30 (15 minutes)*

We describe a very Compact High Power Microwave system which is under development at CEA Gramat.
The electric pulses generation is provided by a compact and innovative 400 kV, 100 Hz Marx PFN. Its specific design provides a very fast rise time and its U shape agrees with severe geometry constraints.
A specific compact 45 kV capacitor charger for the Marx has been developed by TECHNICS Company [1]; double resonance technology, very low leakage inductance of the transformer and oil tank used as a heat sink provide low volume and weight.
The HPM source is an optimized X-band sub-gigawatt relativistic resonant BWO using low magnetic field (0.6 T); Starting from a preliminary study [2], it makes use of an optimized geometry for compactness constraints.
The antenna is a vacuum radial line helical circular array antenna providing high gain (>28 dB) and circular polarization. A TM01-TEM mode converter is build-in and the antenna presents a very small volume (11 cm length and 42 cm in diameter including mode converter).
We have experimented and characterized the entire assembled system (except batteries) in the MELUSINE test area in Gramat. We have shown the possibility to integrate all the system, including batteries and vacuum pumps into a virtual 65 x 65 x 65 cm cube.
Next phase will be the final integration, including prime power, into the virtual cubic volume.

[1] Willy Debache & al., "Compact high power capacitor charger"in 2012 IEEE International Power Modulator and High Voltage Conference, San Diego.

[2] V. V. Rostov & al. "Simulated parameters of subgigawatt relativistic BWOs with permanent magnetic systems"in IEEE 18th International Pulsed Power Conference, Chicago, 2011

[3] S. Pottier & al. "High Pulsed Power Compact Antenna for High-Power Microwaves Applications" IEEE Transactions on Plasma Sciences, vol. 42, no. 6, June 2014.

⊠⊠Work supported by the DGA (Direction Générale pour l'Armement).

**Author:** Dr VEZINET, Rene (CEA, DAM, GRAMAT, F-46500 Gramat)

**Co-authors:** Mr MORELL, Alain (CEA, DAM, GRAMAT, F-46500 Gramat); Mr PAUPERT, Alain (CEA, DAM, GRAMAT, F-46500 Gramat); Mr CATRAIN, Alexandre (CEA, DAM, GRAMAT, F-46500 Gramat); Mr LOYEN, Arnaud (CEA, DAM, GRAMAT, F-46500 Gramat); Dr LASSALLE, Francis (CEA, DAM, GRAMAT, F-46500 Gramat); Dr DIOT, Jean-Christophe (CEA, DAM, GRAMAT, F-46500 Gramat); Mr TORTEL, Stephane (CEA, DAM, GRAMAT, F-46500 Gramat)

**Presenter:** Dr VEZINET, Rene (CEA, DAM, GRAMAT, F-46500 Gramat)

**Session Classification:** Oral 9

**Track Classification:** High Power Microwaves