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DEVELOPMENT AND TEST OF A COMPACT PFN MARX FOR 100 PPS REPETITIVE OPERATION AT 400 kV −85 ns −5 ns RISE TIME ON A 100 Ohm LOAD

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A 400 kV - 85 ns PFN-Marx has been developed. Based on an innovative design [1], named the "zigzag design" , the 16 stages of this generator, which delivers an open circuit output voltage of 720 kV, fit in a 650 mm length. For a slightly overmatched load (Zload = 100 Ohm), the output voltage reaches 400 kV with a rise time as less as 5ns. The inductance reduction associated to the innovative zigzag design, which allows this sharp rise time with no need for a peaking stage, is described. The 85 ns plateau duration of the pulse is given by the PFN construction of each stage, which is based on 6 ceramic capacitors (2.1 nF −45 kV) connected within a strip line. The 16 PFN stages are housed in a 360 mm diameter gas pressurized vessel. Burst mode operation for a duration of 10 s at a pulse repetition frequency of 100 Hz is reported, for a resistive load and for the electron beam diode of a X-band relativistic BWO [2]. To reach further compactness, the BWO system is integrated on side of the generator vessel and a U shaped gas pressurized line connects both systems through a compact conical vacuum insulator.

[1] This design is undergoing the patent request "Générateur d'impulsions de haute tension" number 15 52131, filed on the 16th of march 2015 at French's national institute for intellectual property INPI.
[2] R. Vezinet, F. Lassalle, S. Tortel, J.C. Diot, A. Morell , A. Loyen, A. Catrain, Q. Saurin, A. Paupert; "Development of a Compact Narrow-band High Power Microwave System"; 2016 IEEE International Power Modulator and High Voltage Conference.

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Author: LASSALLE, Francis (CEA Gramat)

Co-authors: Mr CHANCONIE, Thierry (CEA Gramat); Mr LOYEN, Arnaud (CEA Gramat); Mr MORELL, Alain (CEA Gramat); Mr ROQUES, Bernard (CEA Gramat); TOURY, Martial (CEA Gramat)

Presenter: TOURY, Martial (CEA Gramat)

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