

## **A MICROWAVE SMITH-PURCELL EXPERIMENT – DEPENDENCE ON THE BEAM PARAMETERS**

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Experimental studies on Smith-Purcell radiation have been conducted at CEA/CESTA since 2009. Initially, the main goal was to compare the results with the predictions of MAGIC simulations<sup>1</sup> and with theory published by Andrews & Brau<sup>2</sup>. At ICOPS 2009, we presented the first experimental results<sup>3</sup>. Strong beam bunching, at the frequency of the evanescent mode of the grating, was measured along with a high emission level of coherent SP (CSP) emission at several harmonics of the fundamental frequency.

We recently restarted the experiment in order to study CSP physics in more details. In particular we have measured the gain as a function of beam current, and also the value of the start current. They are of particular interest for THz CSP physics. Experimental results are compared with both existing theories and PIC simulations. Finally, we are studying the limits, in terms of flatness and thickness, of the electron beam. The aim is to increase the frequency of operation of our CSP experiment towards the THz range. We think our set-up could be used to produce a powerful tunable compact device at a frequency between 100 and 200 GHz.

1. J. T. Donohue and J. Gardelle, Phys. Rev. ST Accel. Beams **8**, 060702 (2005).
2. H. L. Andrews and C. A. Brau, Phys. Rev. ST Accel. Beams **7**, 070701 (2004).
3. J. Gardelle, L. Courtois, P. Modin and J.T. Donohue, Phys. Rev. ST Accel. Beams **12**, 110701 (2009).