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Pseudospark discharge as a sheet electron beam source for mm-wave generation K RONALD, H YIN, A CROSS, L ZHANG, W HE, A PHELPS, SUPA and Department of Physics, University of Strathclyde, Glasgow, UK, G SHU, College of Electronic Science and Technology, Shenzhen University, Shenzhen, China, J ZHAO, High Voltage Division, School of Electrical Engineering, Xian Jiaotong University, Xian, China, G LIU, Y YIN, School of Physical Electronics, University of Electronic Science Technology of China, Chengdu, China — A pseudospark discharge supports extremely high currents with short rise times through its hollow cathode structure [1]. An electron beam generated during the discharge process possesses high current density and brightness, and may propagate through sub-millimeter planar structures via ion channel focusing. This makes it an attractive electron beam source for millimeter-wave generation [2]. A 32 kV, 5 A pseudospark-sourced sheet electron beam has been used to drive a planar slow wave extended interaction oscillator (EIO) structure [3]. The EIO produced ˜1.2 kW peak output power at 105 GHz, an increase of six times in the measured power compared with a W-band EIO based on a pseudospark-sourced pencil electron beam [4]. Such a methodology offers a promising solution for portable, low-cost and powerful millimeter-wave and terahertz-wave radiation sources. Results from the experimental demonstration of this novel radiation source will be presented. [1] H. Yin, et al., J. Appl. Phys., 90, 2001, 3212-3218, [2] W. He, et al., Appl. Phys. Lett., 107, 2015, 133501, [3] G. X. Shu, et al, IEEE Trans. Electron Devices, 63, 2016, 4955-4960, [4] J. Zhao, et al, Phys. Plasmas, 24, 2017, 060703.

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