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RF design of a compact C-band RF pulse compressor for a VHEE linac for flash radiotherapy

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In this paper, the design of a compact C-band SLED RF Pulse Compressor for a Very High Electron Energy (VHEE) FLASH machine is presented. A spherical cavity RF pulse compressor - selected because of its compactness and relative ease of fabrication - is adopted to compress the 50 MW 3 μ s RF pulse, down to 1 μ s obtaining a peak power gain greater than 3. The main parameters -operating resonant mode, unloaded quality factor, coupling factor, peak power gain, geometry, peak surface fields - and S-parameters of the full RF design (spherical storage cavity + mode converter/polarizer) are computed and analyzed.

Moreover, the pulse-compression effect on the acceleration performances is analyzed through the evaluation of the main figures of merit (charge per pulse, energy gain, accelerating gradient and efficiency)

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