

Abstract Submitted
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Revisiting the ion-channel laser for the production of coherent betatron radiation XAVIER DAVOINE, JOANA MARTINS, FREDERICO FÍUZA, GoLP/IPFN-LA, Instituto Superior Técnico, Lisbon, Portugal, RICARDO FONSECA¹, DCTI, ISCTE - Lisbon University Institute, Portugal, WARREN MORI, University of California, Los Angeles, California, LUIS SILVA, GoLP/IPFN-LA, Instituto Superior Técnico, Lisbon, Portugal — The Ion-Channel Laser (ICL) [1] is a possible alternative approach to Free Electron Lasers to produce coherent and high intensity light at different wavelengths taking advantage of an ion channel, which can be created in a laser or plasma wakefield accelerator. After comparing the ICL and conventional FEL, we show with PIC simulations that, under certain conditions, the betatron radiation emitted by the electrons oscillating in the ion channel can bunch the electron beam at the radiation wavelength, and coherent radiation is generated and amplified. The power of the coherent radiation increases exponentially until a saturation level. This is possible due to boosted frame simulations in the electron bunch frame, which are three orders of magnitude faster than simulations in the lab frame, and can avoid numerical instabilities associated with numerical Cerenkov radiation. [1] D. H. Whittum et al., Ion-Channel Laser, Phys. Rev. Lett. 64, 2511 (1990)

¹second affiliation: GoLP/IPFN-LA, Instituto Superior Técnico, Lisbon, Portugal

Luis Silva
GoLP/IPFN-LA, Instituto Superior Técnico, Lisbon, Portugal

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