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On the Betatron radiation in cylindrically symmetric plasma-ion channels

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The relativistic interaction of short pulsed lasers or electrons with plasma has recently led to the birth of a new generation of femtosecond X-ray sources. Radiations with properties similar to those that can be observed from a wiggler or undulator, can be generated by the oscillations induced in the excited plasma by electrons (PWFA) or by lasers (LWFA), making plasma an interesting medium both for the acceleration as well as for the radiation source, with properties of being compact, providing collimated, incoherent, femtosecond radiation, and a lot of effort is being made to understand and improve this new source to make it really competitive. This paper summarizes and shows some theoretical results and numerical simulation of a simplified model called plasma ion column, using as a starting point the parameters expected for EuPRAXIA@SPARC_LAB facility, highlighting strengths, limitations and scaling laws, which allow for a comparison with other types of more consolidated sources of light as Compton, Synchrotron and Free electron lasers.

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Footnotes

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