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Bi-periodic undulator innovative insertion device for SOLEIL II

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The Upgrade from the third to the fourth-generation light source of the SOLEIL synchrotron requires significant work on the reorganization of the equipment in the storage ring. Higher performance such as low emittance, small transverse size and high brightness are expected but requires redesigning the lattice. New constraints appear, requiring innovative designs of insertion device (ID) in order to keep the spectral range currently offered to users as large as today. The current straight sections can welcome two juxtaposed undulators to allow the beamline to cover a wide spectral range. However, the average space of straight sections dedicated to ID of SOLEIL II will be decreased in the future by 30%. SOLEIL Insertion Group studied several technical solutions combining two magnetic periods in a shorter space. Bi-periodic undulator project would make it possible to design a unique compact device with special magnet arrangement allowing to operate the ID alternatively with one periodicity to its triple value by means of longitudinal displacement of magnet arrays. Such an undulator enables to cover a wide spectral range of photons and only requires short space. A complete magnetic design with magnetic and spectral/optical performance will be presented and compared to usual solutions. Impact on the electron beam dynamics and magnetic forces will be also considered to have a complete knowledge on the feasibility of this project.

Funding Agency

Footnotes

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Yes

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