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Benchmarking for CODAL beam dynamics code: laser-plasma accelerator case study

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Laser-plasma electron beams are known for their large divergence and energy spread while having ultra-short bunches, which differentiate them from standard RF accelerated beams.
To study the laser-plasma beam dynamics and to design a transport line, simulations with *CODAL* [1], a code developed by SOLEIL in collaboration with IJCLab, have been used. *CODAL* is a 6D 'kick' tracking code based on the symplectic integration of the local hamiltonian for each element of the lattice. *CODAL* also includes collective effects simulations such as space charge, wakefield and coherent synchrotron radiation.
To validate the studies in the framework of Laser-Plasma Acceleratior developpement, results from *CODAL* have been compared to *TraceWin* [2], a well-known tracking code developed by CEA.
The comparison has been made using the outcome of Laser WakeField Acceleration (LWFA) particle-in-cell simulations as initial start particle coordinates from a case study of PALLAS project, a Laser-Plasma Accelerator test facility at IJCLab.

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Footnotes

[1] Alexis Gamelin. Collective effects in a transient microbunching regime and ion cloud mitigation in ThomX. *Theses, Université Paris-Saclay*, September 2018.

[2] Didier Uriot and Nicolas Pichoff. Tracewin documentation, 04 2019.

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Yes

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