



European Research Council  
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## Open Postdoctoral Research Associate position at École Polytechnique

Laboratory: Laboratoire d'Optique Appliquée (LOA), ENSTA ParisTech, CNRS, Ecole Polytechnique, Université Paris-Saclay, 91762 Palaiseau, France

Team: Plasma-based particle accelerators

Funding: ERC Starting Grant project M-PAC

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### Context

As we push the frontier of particle physics to higher particle energies, conventional accelerator techniques are attaining their limits and new concepts are emerging. The use of an ionized gas —or plasma— circumvents the most significant barrier of conventional techniques by increasing the energy gained per unit length by several orders of magnitude. One class of plasma accelerators, relevant for high energy physics and light source applications, consists in using a particle beam, « the driver », to excite a plasma wave, that can then accelerate the main particle beam. These beam-driven plasma accelerators have made considerable progress in the past few years, with groundbreaking results such as the high-efficiency acceleration of an electron beam [1] and the multi-gigaelectronvolt and low energy spread acceleration of positrons [2]. Though these milestones have brought plasma accelerators one step closer to becoming a viable accelerator technology, there is still considerable research needed and fundamental challenges to tackle and overcome.

[1] M. Litos et al., High-efficiency acceleration of an electron beam in a plasma wakefield accelerator, *Nature* 515, 92 (2014).

[2] S. Corde et al., Multi-gigaelectronvolt acceleration of positrons in a self-loaded plasma wakefield, *Nature* 524, 442 (2015).

## **The position**

Within Ecole Polytechnique's Department of Physics, the Postdoctoral Research Associate will join the "plasma-based particle accelerators" team at Laboratoire d'Optique Appliquée (LOA). The primary goal of this postdoctoral position is to implement and conduct experiments aimed at advancing beam-driven plasma accelerator research and to evaluate the potential of hybrid schemes, combining laser-driven plasma accelerators (also referred to as LWFA), and beam-driven plasma accelerators (also referred to as PWFA), for the production of high-brightness beams and light sources. As the Research Associate will join an international collaboration, the experiments will not only take place at LOA, but also at other major international facilities involved in PWFA research, such as the upcoming FACET II facility (SLAC National Accelerator Laboratory). Depending on the applicant's profile, the experimental work can also be complemented with numerical and theoretical studies.

The Postdoctoral Research Associate will also have the opportunity to teach at Ecole Polytechnique. The position is a two-year appointment, renewable for another two years, funded from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (M-PAC project). The starting monthly salary is negotiable.

## **Requirements**

- PhD in physics
- Research record demonstrating a strong potential for research
- Highly motivated young researcher
- Human qualities to work effectively within a team and coordinate the research with students, postdocs and technicians.
- Experience in either laser and optical physics, particle beam physics or plasma physics is recommended, but not mandatory
- Teaching experience is appreciated, but not mandatory

## **How to apply**

Applications shall be made by email to Sebastien Corde ([sebastien.corde@polytechnique.edu](mailto:sebastien.corde@polytechnique.edu)), enclosing a cover letter, a detailed curriculum, a list of publications, and any other relevant documents (e.g. letters of recommendation sent directly from their authors). Applicants not yet holding a PhD degree may be considered provided the PhD defense is expected to take place in a very near future.