# Laser-driven generation of collimated, ultra-relativistic positron beams

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Recent development in laser-based accelerators is finally offering the possibility of building metre-size electron-positron colliders with specifications comparable to those based on conventional acceleration techniques. Electron beams with energies exceeding the GeV have been experimentally demonstrated [1] with the possibility of approaching 100 GeV with the next generation of laser systems [2]. It is thus timely to study the feasibility of generating laser-driven positron beams with similar characteristics. Here we report on the experimental demonstration of table-top, all-optical generation of short (beam duration ~ 30fs), ultra-relativistic and collimated positron beams with peak energies approaching the GeV and divergencies in the mrad range. Plasma-based afterburners [3] to further accelerate these beams will also be discussed. The reported results represent the first experimental step towards the generation of metre-scale all-optical electron-positron colliders. The intrinsic synchronisation of these sources with a high-intensity laser will prove fundamental for the study of highly non-linear photon-lepton interactions and the testing of matter-antimatter symmetry in a highly non-linear regime.

References:

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