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A positron source for applications using the TARANIS laser

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The realization of compact positron source is of great importance for a wide range of applications such as positron annihilation spectroscopy for material science. Moreover, a number of applications could benefit from short pulse duration (sub-100 ps) positron beams.

The interaction of a high-intensity laser with high-Z solid targets can be used to produce a population of relativistic electrons which, in turn, initiate an electromagnetic cascade in the target emitting a positron beam together with electrons and X-rays. This technique can be used to produce high-current mildly relativistic to relativistic positron beams suitable for applications in a compact setup.

Preliminary experiments using the TARANIS laser facility at Queen's University providing intensities $\sim 10^{19} \text{ W/cm}^2$ on target and simulations using the Monte-Carlo scattering code FLUKA were performed to design a compact and high-quality positron source at the Queen's University of Belfast. Results of preliminary experiments, simulations and plans to optimize the positron source will be presented.

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