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## Design and simulations of the source of polarized slow positrons at ELI-NP

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We present the status of simulations to obtain an intense beam of moderated positrons ( $e_s^+$ ) with an intensity of the primary positron beam of  $1-2 \times 10^6 e_s^+/s$  by the ( $\gamma, e^+e^-$ ) reaction, using an intense  $\gamma$  beam of  $2.4 \times 10^{10} \gamma/s$  with energies up to 3.5 MeV. Using fully circularly polarized  $\gamma$  beam we aim to obtain an intense beam of slow polarized positrons with a polarization degree of 31-45%. The beam will be transported to different detector systems through beam lines, via solenoidal magnetic fields. In applied physics studies of Fermi-surfaces, defects, interfaces etc. positrons offer excellent diagnostics tools. Furthermore, polarized positron beams open up a totally unexplored research area, where polarized electrons in, e.g., magnetic structures can be studied. A simple, fast scintillator detector system for gamma-induced positron annihilation lifetime spectroscopy for studies of bulk samples is also proposed. The positron spectroscopy laboratory at ELI-NP will be user-dedicated and unique for positron research in the Eastern Europe. It will provide a simple source setup, with easy access for upgrade of the converter/moderator assembly toward more sophisticated setups providing a more intense and brighter positron beam. The beam will have the world highest intensity of slow polarized positrons for material science studies and therefore it will become a unique tool for the investigation of magnetic samples.

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