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## Crystal-based positron source for the lepton colliders

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Future studies with high-precision on fundamental interactions developed on lepton colliders require high-intensity and low-emittance positron sources. Such sources are needed for  $e^+e^-$  and also  $\mu^+\mu^-$  (generated with positrons) facilities. The availability of powerful positron sources is, therefore, very important. In this context, positron sources providing higher yields, better emittance and reliability than the SLC source are needed. Improvements in conventional positron sources using high-intensity incident electrons on thick metallic targets are meeting some limits due to the important energy deposited in the target with a high-energy deposition density associated to the required small beam sizes. Innovative solutions using the channeling radiation of electrons in axially aligned crystals are providing high photon yields which, in turn, can provide high positron production rate in an associated amorphous target. Such system composed by a crystal-radiator and an amorphous-converter is known as a hybrid positron source. For linear colliders, involving high incident electron intensities, a bending sweeping magnet put between the two targets to sweep off the charged particles created in the crystal, allows the mitigation of the deposited energy in the converter. For the circular  $e^+e^-$  colliders using more moderate intensities, the use of the sweeping magnet in the hybrid source can be omitted. Both options will be presented together with the simulations of the photon and positron production. In this framework, a study of the radiation emitted by a high-quality tungsten crystal using the DESY beamtest facility T21 will be presented and discussed.

### In-person participation

Yes

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