

Positron source for e+e- colliders based on oriented crystals

Positron sources are the key elements for the future and current e-e+ collider projects, introducing challenging critical requirements for high intensity and low emittance beams in order to achieve high luminosity.

The conventional way to realize a e+ source consists in using a target with high atomic number Z hit by a high energy primary electron beam. Photons are produced by Bremsstrahlung within the target and are then converted in e+e- pairs. A severe heat load and a high density of energy deposited in the target represent a crucial constraint for the intensity achievable with this technology.

A possible way to overcome such limitations will be presented, exploiting the intense channeling radiation in oriented crystals to achieve a high rate of e+e- pairs, while strongly decreasing the energy deposited and the peak deposition density in the target. An e+ source using channeling is conceived as a compound or hybrid target with two elements: a thin crystal with the function of radiator followed downstream by a thicker amorphous target acting as converter of photons into e+e- pairs.

A realistic proposal for a crystal-based intense e+ source recently proposed in the e+BOOST project will be outlined, together with the prospects applications at Future Colliders.

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