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Enhancing positron sources for future colliders through conical converter targets

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We propose a concept for a e^+ source based on high energy e^- beams incident on conical converter targets, in pursuit of its implementation in future lepton colliders such as FCC-ee. Two conical target solutions were optimized for a state-of-the-art capture system based on a high-temperature superconducting solenoid, allowing for a full target immersion in a 12.7 T peak field. According to simulation studies, conical targets would increase by up to 70% the e^+ yield accepted by the FCC-ee damping ring, including the detrimental impact of their mechanical interface and cooling pipes. A thermo-mechanical study of 2 conical targets and their supports is also presented, using the baseline parameters of the FCC-ee injector linac, as well as a mechanical integration concept for P^3 , the future FCC-ee e^+ source test facility.

Primary authors: VALLIS, Nicolas (PSI/EPFL); CRAIEVICH, Paolo

Presenter: VALLIS, Nicolas (PSI/EPFL)

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