

Conceptual development of beamstrahlung photon absorber for FCCee

Tuesday, 29 October 2024 16:10 (25 minutes)

The FCCee is a proposed 90-km electron-positron collider to be developed at CERN, intended to succeed the LHC.

During its operation, the FCCee will generate high-energy photon beams on both sides of the experimental insertions with an anticipated power of up to 500-600 kW in the 45.6 GeV, ~1.4 A operating phase. Photon energies will average between 2 to 63 MeV, with higher energy tails reaching several hundred MeV at the Z-pole and up to a few GeV at the ttbar threshold (182.5 GeV).

The significant power output presents challenges for photon absorption, particularly due to the absorber's geometric constraints and the specific characteristics of photon interaction. The design requires windows to separate the ultra-high vacuum (UHV) of the machine from the inert atmosphere of the absorber.

This contribution explores initial absorber concepts and system designs, ranging from gas-cooled graphite solutions to pure liquid lead sloped flow systems. Additionally, it outlines the research and development (R&D) and prototyping activities planned to address these challenges.

Primary author: CALVIANI, Marco (CERN)

Co-authors: FRASCA, Alessandro (CERN); Dr LECHNER, Anton (CERN); PERILLO-MARCONE, Antonio (CERN); CARRELLI, Carlo (ENEA); LERNER, Giuseppe (CERN); BISGAARD CHRISTENSEN, Kenneth (CERN); TARANTINO, Mariano (ENEA); WIDORSKI, Markus (CERN); Mr SEIDENBINDER, Regis (CERN); Mr FRANQUEIRA XIMENES, Rui (CERN); CANDIDO, Silvio (CERN)

Presenter: CALVIANI, Marco (CERN)

Session Classification: Liquid/solid and particle beam interactions and associated studies: pressure waves, cavitation, erosion, corrosion etc and mitigation techniques

Track Classification: Liquid/solid and particle beam interactions and associated studies: pressure waves, cavitation, erosion, corrosion etc and mitigation techniques.