

Energy Recovery Linac Design and Studies for Electron Cooling of EIC Hadron Beams

Tuesday, 4 October 2022 09:10 (20 minutes)

The baseline scheme for hadron beam cooling in the Electron Ion Collider (EIC) calls for Coherent electron Cooling (CeC) of the hadrons with non-magnetized electrons at high energy (150 MeV electrons), and additional cooling via conventional bunched beam cooling using a pre-cooler system. The electron beam parameters for these concepts are at or beyond the current state of the art, with electron bunch charges of the order of 1 nC and average currents on the order of 100 mA and require an Energy Recovery Linac (ERL)-based accelerator to produce such beams. Using specifications provided by BNL and Jefferson Lab, physicists and engineers at Xelera Research are working on a complete design of an ERL system capable of satisfying such a cooler. This work includes designs for the injector, merger, multi-pass Linac, merger into the cooling section, demerger into the return line (which includes 180-degree arcs), and final extraction of the energy-recovered beam, beam breakup simulations, tolerance studies, start-to-end simulations, and beam halo studies.

Primary authors: GULLIFORD, Colwyn (Xelera Research); Dr MAYES, Christopher (Xelera Research); Dr TAYLOR, Nick (Xelera Research); CONWAY, Joe (Xelera Research); Dr DOUGLAS, Dave (Xelera Research); SMOLENSKI, Karl (Xelera Research); Dr DUNHAM, Bruce (Xelera Research); KOLSTRUN, Val (Xelera Research); WANG, Erdong; Dr BERGAN, William (BNL); PEGGS, Stephen; Dr BENSON, Stephen (Thomas Jefferson National Accelerator Lab); Dr DEITRICK, Kirsten (JLAB); WANG, Ningdong (Cornell University); HOFFSTAETTER, Georg (Cornell University (US)); SAGAN, David

Presenter: GULLIFORD, Colwyn (Xelera Research)

Session Classification: Beam Dynamics and Instrumentation

Track Classification: Uses and Applications