

Abstract Submitted
for the APR18 Meeting of
The American Physical Society

Crab cavity requirements for the Jefferson Lab electron-ion collider SALVADOR SOSA, Old Dominion University, VASILY MOROZOV, Thomas Jefferson National Accelerator Facility, SUBASHINI DE SILVA, Old Dominion University, FANGLEI LIN, Thomas Jefferson National Accelerator Facility, JEAN DELAYEN, Old Dominion University — An electron-ion collider (EIC) has been agreed as the next step in the understanding of QCD. An EIC is being designed at Jefferson Lab, it considers the CEBAF 12 GeV as a full energy electron injector and envisions the construction of an ion facility and an electron ring. JLEIC detector is based on full acceptance. For this, a large beam crossing angle of 50 mrad is required, which in turn reduces the luminosity by an order of magnitude. JLEIC has a high luminosity requirement of $10^{34} \text{ cm}^{-2}\text{s}^{-1}$, thus a need for compensation. A local crab scheme can be used to compensate for geometric luminosity loss: superconducting radiofrequency crab cavities are placed at both sides of the interaction region. The upstream cavity gives each bunch a longitudinally dependent transverse kick, in such a way as to restore a head-on collision at the interaction point. The downstream cavity cancels the initial transverse kick, thus avoiding synchro-betatron coupling anywhere else along the ring. Based on beam dynamic studies and crab cavity designs, we present requirements on the crab cavity scheme for JLEIC such as voltage, tolerances on multipoles and damping requirements of higher order modes. We use a complete model of both electron and ion rings for particle tracking.

Salvador Sosa
Old Dominion University

Date submitted: 05 Feb 2018

Electronic form version 1.4