

The Vacuum System Design of FEBE on CLARA at STFC Daresbury Laboratory

The Front End Beam Exploitation (FEBE) beamline on CLARA will provide users with an exciting opportunity to perform a variety of experiments using the full 250 MeV electron beam that CLARA will deliver. Following user consultation, STFC Daresbury Laboratory have developed the multi-use beamline design to allow beam experiments combining electron beams, lasers and gas jet target experiments. The design incorporates the flexibility to re-configure experiments easily and incorporates a number of diagnostics pre and post the interaction point in the FEBE experimental hutch.

This paper describes the detailed design of the vacuum systems for FEBE on CLARA. It details the results of Monte-Carlo modelling that have been used to verify the vacuum system design on the whole as well as detailing some of the issues associated with the FEBE beamline and how we intend to overcome these. One of the major issues the design team had to accommodate was how the vacuum system can cope with the high gas load (plasma-wakefield) experiments where users intend to inject H₂ or He to pressures in the 10⁻¹ - 10⁻² mbar range and what differential pumping arrangements have been put in place to protect the rest of the accelerator.

This paper will also show what designs have been adopted, how the design intends to protect the CLARA accelerator and what safety considerations have been included.

Summary

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Session Classification: Session 4