Contribution ID: **1989** Contribution code: **THPL065** Type: **Poster Presentation**

Optimisation of a gas jet-based beam profile monitor for high intensity electron beams

Thursday, 11 May 2023 16:30 (2 hours)

A beam profile monitor using gas jet technology is being designed and manufactured at the Cockcroft Institute for high intensity electron beams. It generates a thin, supersonic gas sheet that traverses the beam at a 45-degree orientation and measures the beam-induced fluorescence interactions to produce a 2D beam profile image. The gas sheet acts similar to a scintillating screen, but remains non-invasive. This contribution summarises the method developed towards optimising the injection of a gas jet monitor for the example use-case of the Hollow Electron Lens. A multi-objective genetic algorithm is used with a Monte-Carlo particle tracking simulation to optimise the geometric features of the jet injection chambers. The algorithm optimises for several key features of the jet that will improve it as a diagnostic tool. Specifically, at the point of interaction, the jet's density, uniformity and geometric dimensions are considered. The work developed in this contribution is not limited to diagnostics and can be expanded upon in other disciplines such as plasma wakefield gas injections.

Funding Agency

This work was supported by the HL-LHC-UK phase II project funded by STFC under Grant Ref: ST/T001925/1 and the STFC Cockcroft Institute core grant No. ST/V001612/1.

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: STRINGER, Oliver (Cockcroft Institute)

Co-authors: ROSSI, Adriana (European Organization for Nuclear Research); WEBBER-DATE, Alexander (Cockcroft Institute); CHURCHMAN, Ashley (European Organization for Nuclear Research); Prof. WELSCH, Carsten (The University of Liverpool); SEQUEIRO, Cristina (European Organization for Nuclear Research); SCHNEIDER, Gerhard (European Organization for Nuclear Research); ZHANG, Hao (Cockcroft Institute); SIDOROWSKI, Krystian (European Organization for Nuclear Research); ADY, Marton (European Organization for Nuclear Research); SAMEED, Muhammed (European Organization for Nuclear Research (CERN)); KUMAR, Narender (Cockcroft Institute); SEDLACEK, Ondrej (The University of Liverpool); FORCK, Peter (GSI Helmholtzzentrum für Schwerionenforschung GmbH); VENESS, Raymond (European Organization for Nuclear Research); UDREA, Serban (GSI Helmholtzzentrum für Schwerionenforschung GmbH); MAZZONI, Stefano (European Organization for Nuclear Research); LEFEVRE, Thibaut (European Organization for Nuclear Research)

Presenter: STRINGER, Oliver (Cockcroft Institute)

Session Classification: Thursday Poster Session

Track Classification: MC6: Beam Instrumentation, Controls, Feedback and Operational Aspects: MC6.T03: Beam Diagnostics and Instrumentation