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Gas jet-based beam profile monitor for the electron beam test stand at CERN

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A non-invasive bidirectional beam profile monitor using beam-induced fluorescence upon a thin sheet of gas has been developed at the Cockcroft Institute in collaboration with CERN and GSI. This device is particularly suited to the Electron Beam Test Stand, and as such, a bespoke gas injection has been optimized for this specific use-case to provide diagnostics unavailable to conventional scintillator screens. The bidirectionality allows for the observation of beam reflections back along the beam path as a result of a beam dump with non-optimized repeller electrode potential. Furthermore, the heating effects of a high current DC beam are negated by the self-replenishing gas sheet. These benefits make this device ideal for use in the Electron Beam Test Stand.

This contribution summarizes the optimization study of the gas jet generation performed with a multi-objective genetic algorithm to meet required screen dimensions whilst maintaining acceptable vacuum levels.

Footnotes

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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); 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)

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