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Imaging a high-power hollow electron beam non-invasively with a gas-jet-based beam profile monitor

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The Hollow Electron Lens (HEL) was proposed to actively remove the beam halo of the proton beam for the HL-LHC upgrade. Currently, the concept of generating such an electron beam is being tested in a dedicated Electron Beam Test Stand (EBTS) at CERN. It currently produces a hollow electron beam with 7 keV energy and 0.4 A current 25 us pulsed with 2 Hz which will be confined in a strong solenoid field. A gas curtain-based beam profile monitor was developed to characterize the beam non-invasively during operation. It injects a directional gas sheet at 45 degrees to interact with the electron beam. Gas particles are excited and emit fluorescent photons which are collected by an intensified camera system. This allows the reconstruction of the profile of the hollow electron beam.

This contribution presents the design of the monitor and discusses the initial results obtained with a hollow electron beam at the EBTS.

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Footnotes

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Yes

Primary author: ZHANG, Hao (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); WENANDER, Fredrik (European Organization for Nuclear Research); SCHNEIDER, Gerhard (European Organization for Nuclear Research); SIDOROWSKI, Krystian (European Organization for Nuclear Research); ADY, Marton (European Organization for Nuclear Research); SAMEED, Muhammed (European Organization for Nuclear Research (CERN)); STRINGER, Oliver (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: ZHANG, Hao (Cockcroft Institute)

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