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A Profile monitor based on single fluorescence photon detection for electrons and ions

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On behalf of the consortium CERN, Cockcroft Institute, GSI and University of Liverpool (full author list on the slides)

The spatial-resolved detection of single fluorescence photons delivers an image of the transverse beam profile. A supersonic gas jet transverses the beam to enhance the gas density (up to $1\text{E}11/\text{cm}^3$). A set of narrow skimmers creates a curtain-like gas sheet, allowing one camera to observe both transverse beam directions. The fluorescence in the visible wavelength range is caused by atomic transition either in nitrogen molecules or neon atoms and is observed by an image-intensified camera. A consortium from CERN, Cockcroft Institute, GSI and the University of Liverpool developed this monitor, which is now in operation at CERN LHC. The entire acceleration and storage cycle is observed with a typical time resolution of several seconds. Moreover, the transverse profile is monitored at a 10 keV electron beam at a test stand for a hollow electron lens. The talk presents the physics of the monitor, general technical design and some recent results.

Summary

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