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14.5 Visible tomography diagnostic in NIO1 negative ion source: development and preliminary results

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A tomographic diagnostic based on measurements of the $H\alpha$ line emitted after interaction of an H beam with the background gas is under development on the NIO1 test facility. NIO1 is a flexible small ion source producing 9 beamlets at up to 130 mA of H⁻ ions accelerated at 60 KeV. Aim of this device is to investigate the physics of negative ion production, extraction and acceleration as well as to test and optimise the diagnostics for SPIDER and MITICA, the prototypes, respectively, of the negative ion sources and of the whole neutral beam injectors for ITER experiment. The tomographic diagnostic is used mainly to measure the beam uniformity with sufficient contrast and spatial resolution, and of its evolution throughout the pulse duration, by resolving the local emission of visible light in the beam from line-integrated measurements in one cross-section. In NIO1 a reduced setup comprising two 2D cameras has been installed and operated. The beam uniformity can be estimated with a resolution down to 5 mm if suitable regularization is applied in the tomographic inversion. The contribution describes the layout of the diagnostic and the first measurements of the beam in different experimental conditions, including the techniques adopted for data analysis in the case of two CCDs.

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