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Development and first results of the laser polarization and beta-asymmetry setups at the VITO beamline

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The VITO beamline (Versatile Ion-polarized Techniques Online) is the result of a recent initiative to combine several hyperfine interaction techniques requiring both spin-polarized and unpolarized nuclei for experiments relevant to material and life sciences, as well as nuclear physics and fundamental interactions studies. The first online experiment at VITO was performed at the end of 2014 and used the PAC technique on unpolarized ^{68m}Cu [1]. In 2016 extensive design and simulation effort was devoted to the laser polarization and β-NMR setups. As a result, starting this summer, the beamline has been modified significantly and the atomic and ionic laser polarization and β-detection setups have been added. These setups have been commissioned at the end of September with a radioactive ^{26}Na beam, whose atomic hyperfine structure has been successfully observed via its β-decay. This commissioning beamtime has pointed to possible improvements which are integrated into the beamline.

In this presentation the developments towards a dedicated beam line for laser-polarization of atoms and ions will be presented, along with the results from the first commissioning tests using a polarized ^{26}Na atom beam. An outlook towards the measurement of the β-asymmetry parameter in ^{35}Ar, relevant for the determination of the V_{ud} matrix element of the CKM matrix using a polarized ^{35}Ar beam [2], will be presented.

[1] Fenta A. S. et al., accepted in EPL (2016)

[2] IS601, Measurement of the Beta asymmetry parameter in Ar decay with a laser polarized beam, Velten, Ph. and Bissell, M. L.

Author: Mr GINS, Wouter Anton M (KU Leuven (BE))

Presenter: Mr GINS, Wouter Anton M (KU Leuven (BE))

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