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## VITO Laser Polarisation setup and bio Beta-NMR

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The VITO (Versatile Ion-polarized Techniques Online) is a new beamline at ISOLDE that was initiated in 2014 due to the high demand for polarized beams in different areas of research, such as atomic physics, nuclear physics, solid state physics and biophysics [1].

In 2016, intensive designing and off line testing of the laser polarization  $\beta$ -asymmetry setup took place. The first on-line tests with a radioactive laser polarized  $^{26}\text{Na}$  ( $I=3$ ) ion beam were carried out in autumn. The hyperfine structure of  $^{26}\text{Na}$  was successfully observed through the  $\beta$ -decay asymmetry in a NaF crystal.

The present talk will focus on the spin polarized beams of atomic  $^{26}\text{Na}$  and ionic  $^{31}\text{Mg}$  ( $I=1/2$ ) towards biological applications [2]. The beamline configuration for these cases will be shown and the challenges and possible solutions for liquid  $\beta$ -NMR experiments will be addressed. The talk will then focus on the search of the best liquid target candidate based on a series of conventional NMR experiments performed at 11.7 T using  $^{25}\text{Mg}$  ( $I=5/2$ ) and  $^{23}\text{Na}$  ( $I=3/2$ ) NMR on Mg and Na salts in different ionic liquids. The chemical shifts of the different samples and the relaxation times of selected samples, using the inversion recovery technique were determined and will be used as the reference for the upcoming  $\beta$ -NMR experiments. In this context it should be noted that similar chemical shifts for different isotopes are anticipated, whereas the relaxation times will be strongly dependent on the nuclear spin of the particular isotope. That is, whether it is a quadrupolar nucleus ( $I > 1/2$ ) or not ( $I=1/2$ ).

[1] R. F. Garcia Ruiz, M. L. Bissell, A. Gottberg, M. Stachura, L. Hemmingsen, G. Neyens, N. Severijns, and the VITO collaboration, "Perspectives for the VITO beamline at ISOLDE, CERN", EPJ Web of conferences, 93 (2015) 07004

[2] Gottberg A, Stachura M, Kowalska M, Bissell ML, Arcisauskaite V, Blaum K, Helmke A, Johnston K, Kreim K, Larsen FH, Neugart R, Neyens G, Garcia Ruiz RF, Szunyogh D, Thulstrup PW, Yordanov DT, Hemmingsen L., "Billion-fold enhancement in sensitivity of nuclear magnetic resonance spectroscopy for magnesium ions in solution" *Chemphyschem*, 18 (2014) 3929-32

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