



Contribution ID: 168

Type: Oral Presentation

β -NMR on liquid media for biophysical and biological applications

Tuesday, 12 May 2015 14:15 (30 minutes)

Recently β -NMR spectroscopy was successfully applied for the world's first experiments on liquid samples - an achievement which opens new avenues of research in the fields of wet chemistry and biochemistry [1]. This project was motivated by the need for finding a new experimental approach to directly study biologically highly relevant metal ions, such as Mg(II), Cu(I), Ca(II), and Zn(II), that are extremely difficult to study with conventional methods in the field.

The resonance spectrum recorded for ^{31}Mg implanted into a liquid sample shows two clear resonances, which originate from Mg ions occupying two different coordination geometries, illustrating that this technique can in fact discriminate between different structures - the first and the most important step towards the application of β -NMR spectroscopy in chemistry.

A prototype bio- β -NMR spectrometer, designed and constructed explicitly for this purpose using polarized ions at the ISOLDE-COLLAPS setup, allowed for testing different aspects, such as: different liquids, vacua and rest gases, showing that aqueous solutions can as well be investigated by this method. In a future biochemical perspective, this proof-of-principle allows the application of β -NMR for studying metal ions, which are silent in most other spectroscopic techniques in their body-like environments.

In order to exploit the potential of this technique and to satisfy the growing user demand for polarized rare isotope beams new facilities at ISAC (TRIUMF, Canada) are under intense consideration, while a permanent beamline - VITO - for performing bio- β -NMR is already being setup at ISOLDE [2]. VITO stands for Versatile Ion-polarized Techniques On-line and it will allow for laser-induced nuclear spin polarization of ions and atoms, allowing for establishing β -NMR and β -asymmetry studies in a wide range of sample environments.

[1] A. Gottberg et al. *ChemPhysChem* 15 (2014), 3929-32.

[2] R. Garcia Ruiz et al. manuscript accepted for publication.

Primary author: Dr STACHURA, Monika (TRIUMF)

Presenter: Dr STACHURA, Monika (TRIUMF)

Session Classification: Session 8