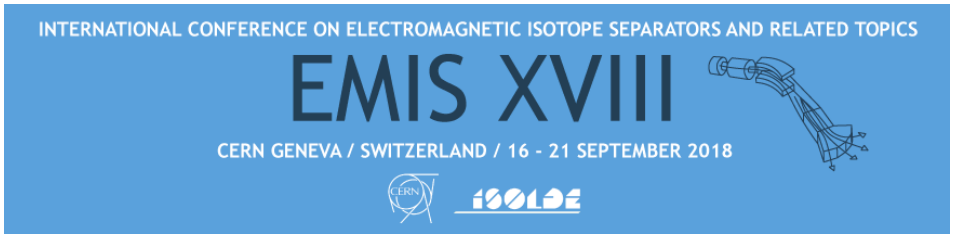

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First tests of a stabilised cw Ti:sapphire laser and new charge-exchange cell for collinear laser spectroscopy at IGISOL

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Collinear laser spectroscopy is a powerful tool for the study of fundamental properties of exotic nuclei via the measurement of the hyperfine structure and isotope shift of electronic transitions. This technique has been in use at the IGISOL facility, University of Jyväskylä, for over 20 years [1]. During this time, spectroscopic studies where primarily focused on singly-charged ions and laser radiation was generated using a continuous wave (cw) dye laser. To expand the region of elements that can be accessed, a new charge-exchange cell and cw Ti:sapphire Matisse laser have recently been taken into use. This will allow access to atomic transitions, and wavelengths not easily accessible to the cw dye laser.

To find the best way for long-term frequency stabilisation of the cw Matisse laser, a saturated absorption spectroscopy setup using Rb or Cs as a reference frequency standard, a scanning Fabry-Perot interferometer (FPI) and a new WSU10 wavemeter (precision of 10 MHz) have been used. The setup was originally built to precisely determine the Free Spectral Range (FSR) of several FPIs [2]. This was motivated by the need to address systematic uncertainties in wavelength determination, initially identified in earlier resonance ionization spectroscopy studies of stable copper isotopes [3]. Stabilisation of the cw laser to a Rb hyperfine component and, separately, to the wavemeter have been done and will be presented in this contribution. The results from saturated absorption spectroscopy on Rb and Cs will also be compared to the first collinear laser spectroscopy tests using the charge-exchange cell on these alkali elements.

[1] D.H. Forest and B. Cheal, Hyp. Int. 223 (2014) 207.
[2] S. Geldhof et al., Hyp. Int. 238 (2017) 7.
[3] V. Sonnenschein et al., Hyp. Int. 227 (2014) 113.

Primary author: GELDHOF, Sarina (University of Jyvaskyla (FI))

Co-authors: DE GROOTE, Ruben Pieter (University of Jyvaskyla (FI)); MOORE, Iain (University of Jyväskylä); POHJALAINEN, Ilkka (University of Jyväskylä); REPONEN, Mikael (University of Jyväskylä); TERABAYASHI, Ryohei (Nagoya University)

Presenter: GELDHOF, Sarina (University of Jyvaskyla (FI))

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