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Towards the Nuclear Magnetization Distribution with Laser-rf Double-Resonance Spectroscopy

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Over the past few decades, laser spectroscopy has provided a wealth of information on the nuclear charge distribution and how it evolves away from the valley of nuclear stability. Conversely, very little information is available for the distribution of nuclear magnetization. The study of this nuclear property for the exotic isotopes produced at ISOLDE, could provide significant new insight into the evolution of nuclear structure.
In order to perform these measurements, two ingredients are required: Nuclear magnetic moments with extremely high precision and atomic hyperfine splitting with two orders of magnitude better precision than obtained with collinear laser spectroscopy. The first of these requirements has already been achieved using liquid state β-NMR at the VITO beamline[1].
Here, the ongoing development of a new setup which employs radio frequency excitation of the atomic hyperfine structure will be presented. The laser-rf double resonance technique will be introduced and our progress towards the study of the nuclear magnetization distribution will be reviewed.

[1] Gins, W. & Harding, R et al., NIM A: 24, 925 (2019)

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