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New End-Station For In-Beam Laser-RF Double-Resonance Spectroscopy at the VITO Beamline

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One of the upcoming upgrades of VITO beamline is a creation of a new end station for laser-rf double resonance spectroscopy to provide a strongly improved precision in determining the hyperfine structure (HFS) of unstable nuclei. Combined with high-precision measurements of nuclear magnetic moments using liquid beta-NMR at VITO, the new technique will allow determining the hyperfine anomaly in different isotopic chains, starting with potassium.

The apparatus will require a new RF transmission line for direct in-beam excitations within HFS multiplets, in addition to optical pumping. We present here results of an optimised design of microwave excitation region, which will allow efficient coupling and power transmission in L- and S-band, as well as the magnetic shielding of laser/rf interaction region, and a general integration of this end station into VITO.

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