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# The Cu-68m isotope: A new PAC probe for hyperfine studies at CERN-ISOLDE

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A series of Perturbed Angular Correlation of γ-rays (PAC) experiments with Cu-68m as probe nuclei implanted in several solid-state samples were performed in November 2015 at VITO-ISOLDE at CERN. The decay scheme of Cu-68m/Cu-68 was selected in order to test the feasibility of studying the hyperfine interactions of the Cu isotope with the electromagnetic fields of the host material. Due to the relatively short half-life of the 6- isomeric state (T1/2= 3.75 min) the PAC measurements were performed online in the middle end station of the VITO beamline, dedicated for traveling setups. The experimental setup was consisted of four LaBr3 scintillator detectors in perpendicular plane with respect to the ion beam and consequently to the implantation point, with a geometry of ±90° and ±180° between each other. The measurements were performed at room temperature.

From the experimental PAC spectra of the perturbation function R(t) and the respective Fourier Transforms (FFT) of Cobalt and Nickel single crystals the magnetic dipole moment (μ) of Cu was extracted. Furthermore, from the spectrum of a host Cu2O crystal, the electrical quadrupole moment (Q) of the probe nuclei was clearly identified. As a result, a good characterization of the Cu isotope was succeeded and Cu can now be considered as the new probe nuclei for PAC experiments in Solid State Physics (SSP) and chemistry.

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