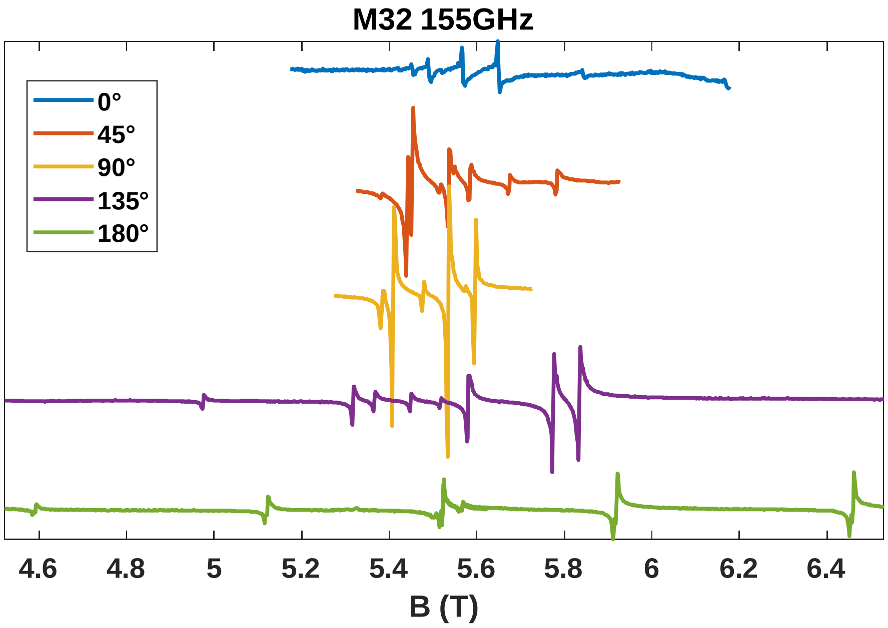

Fig.1.: Müller matrix element M_{32} for EPR ellipsometry scans of β-Ga_2O_3 at 155GHz at different azimuthal sample orientation. The (-201) oriented sample was measured at 45° angle of incidence with the magnetic field B parallel to the incident light. The sample was rotated about its surface normal starting from B being parallel to the monoclinic plane close to the *c** direction of the crystal (0°). The signature of Fe^{3+} (s=5/2) incorporated at different lattice sites is recognized as two quintuplets in each scan.

$$H = \mu_B \vec{B} g \vec{s} + \sum_{\substack{k=2 \\ k\ even}}^{4} \sum_{\substack{q=-k \\ q\ even}}^{k} B_k^q \, O_k^q$$

Eq.1: Spin Hamiltonian for a monoclinic s=5/2 electronic system (without nuclear spin) with high-symmetry direction parallel to *z* in terms of Stevens (equivalent) operators O_k^q and coefficients B_k^q. The first term is the normal Zeeman splitting with Bohr magneton μ_B, magnetic field $\vec{B}$, g-factor tensor g, and spin $\vec{s}$. Terms with $k = 4$ would vanish for s=3/2, terms with negative indices q would vanish for orthorhombic systems under appropriate choice of the coordinate system. For a truly monoclinic s=3/2 systems, B_2^{-2} would be zero in a coordinate system where g would not be diagonal. For Fe^{3+} in Ga_2O_3 (Fig.1), $B_4^{\pm 2,4}$ turn out to be nonnegligible.