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Title:X-ray detected magnetic resonance at sub-THz frequencies using a high power gyrotron source

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Abstract:X-ray Detected Magnetic Resonance (XD MR) is a novel spectroscopy which makes use of X-ray Magnetic Circular Dichroism (XMCD) to probe the resonant precession of local magnetization components in a strong microwave pump field. In Sections 1 and 2, we briefly review the conceptual bases of XD MR and the potential interest of increasing the pumping frequency up to the THz frequency range. In Sections 3-5, we discuss the feasibility of such challenging experiments. Starting from a comparison of experiments carried out either in the transverse (TRD) or longitudinal (LOD) detection geometries, we show that XD MR measurements at sub-THz frequencies require a substantial increase in pumping power: this is where a gyrotron source looks most appropriate. It is the aim of this paper to discuss how to conduct such experiments, emphasis being laid on feasibility tests recently carried out at the ESRF using a refurbished version of Gyrotron FU-II built at the FIRFU. In this context, we propose a new detection scheme of sub-THz XD MR spectra based on the concept of frequency-mixing in LOD geometry. © Springer Science+Business Media, LLC 2011.

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