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Probing spin fluctuations in the paramagnetic phase of EuTiO_3 by muon spin rotation techniques[1] ZURAB GUGUCHIA, HUGO KELLER, Physik-Institut der Universität Zürich, ALEXANDER SHENGELAYA, Department of Physics, Tbilisi State University, JURGEN KOHLER, ANNETTE BUSSMANN-HOLDER, Max-Planck-Institut für Festkörperforschung, SUPERCONDUCTIVITY AND MAGNETISM GROUP, PHYSIK-INSTITUT DER UNIVERSITÄT ZÜRICH TEAM, MAX-PLANCK-INSTITUT FÜR FESTKÖRPERFORSCHUNG COLLABORATION, DEPARTMENT OF PHYSICS, TBILISI STATE UNIVERSITY COLLABORATION, PAUL-SCHERRER INSTITUTE, SWITZERLAND COLLABORATION — The muon spin rotation (μSR) technique was used to search for theoretically predicted spin fluctuations in EuTiO_3 (ETO) deep in the paramagnetic phase. ETO is a perovskite with cubic structure above T_S=282 K, followed by a tetragonal phase below T_S and shows antiferromagnetic (AFM) ordering at T_N=5.7 K. A strong spin-lattice coupling exists at low temperatures. Even though it is not apparent that this spin-lattice coupling continues to high temperatures, model calculations predict a strong paramagnon-phonon coupling at elevated temperatures. In order to test these predictions, μSR studies on ETO have been performed at temperatures above and below T_S. While the AFM phase is clearly observed in the μSR signal, a finite signal remains also in the paramagnetic phase, following closely the temperature dependence of the zone boundary soft mode. This unusual finding demonstrates that spin fluctuations are present deep in the paramagnetic phase and are tied to the soft zone boundary mode.

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