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## **$\mu$ SR study of the multiferroic BiFeO<sub>3</sub> at high temperatures**

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Critical phenomena at phase transitions in multiferroic materials remain not fully understood, and quantum beams drive the elucidation of the phenomena from the viewpoint of microscopic dynamical properties. BiFeO<sub>3</sub> is one of the most promising multiferroic materials with high antiferromagnetic ( $T_N \sim 650$  K) and ferroelectric ( $T_C \sim 1100$  K) transition temperatures [1]. We aim to investigate local spin fluctuations in BiFeO<sub>3</sub> to study dynamics near the phase transition in systems with coexisting ferroelectric orderings.

The temperature dependence of initial asymmetry  $A_0$  and longitudinal relaxation rate  $\lambda$  was obtained by the simple exponential-decay fit in the late time window between 2 and 15  $\mu$ s. A sharp increase in  $A_0$  and a sudden drop in  $\lambda$  are observed at 650 K, indicating the Néel temperature of BiFeO<sub>3</sub>.  $\lambda$  is a parameter related to the fluctuations of the Fe<sup>3+</sup> electron spins. At the high temperature side above  $T_N$ ,  $\lambda$  shows a temperature dependence of  $T^{-1.24}$ . On the other hand, at the lower temperature side of  $T_N$ , corresponding to the ferroelectric-antiferromagnetic ordered phase,  $\lambda$  exhibits a non-power-law temperature dependence. This behavior is likely related to underlying electromagnetic coupling in the multiferroic dynamics and/or muon diffusion at elevated temperatures.

[1] P. Fischer et. al., J. Phys. C: Sol. Sta. Phys. 13, 1931 (1980).

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Yes

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