

Muon Spin Relaxation Study on triangular lattice antiferromagnetic quantum spin liquid candidate $\text{Yb}(\text{BaBO}_3)_3$



C. Y. Jiang¹, Y. X. Yang¹, Y. X. Gao², Z. T. Wan², Z. H. Zhu¹, Toni Shiroka³, C. S. Chen¹, Q. Wu¹, J. C. Jiao¹, K. W. Chen¹, Z. M. Tian², L. Shu^{1,*}

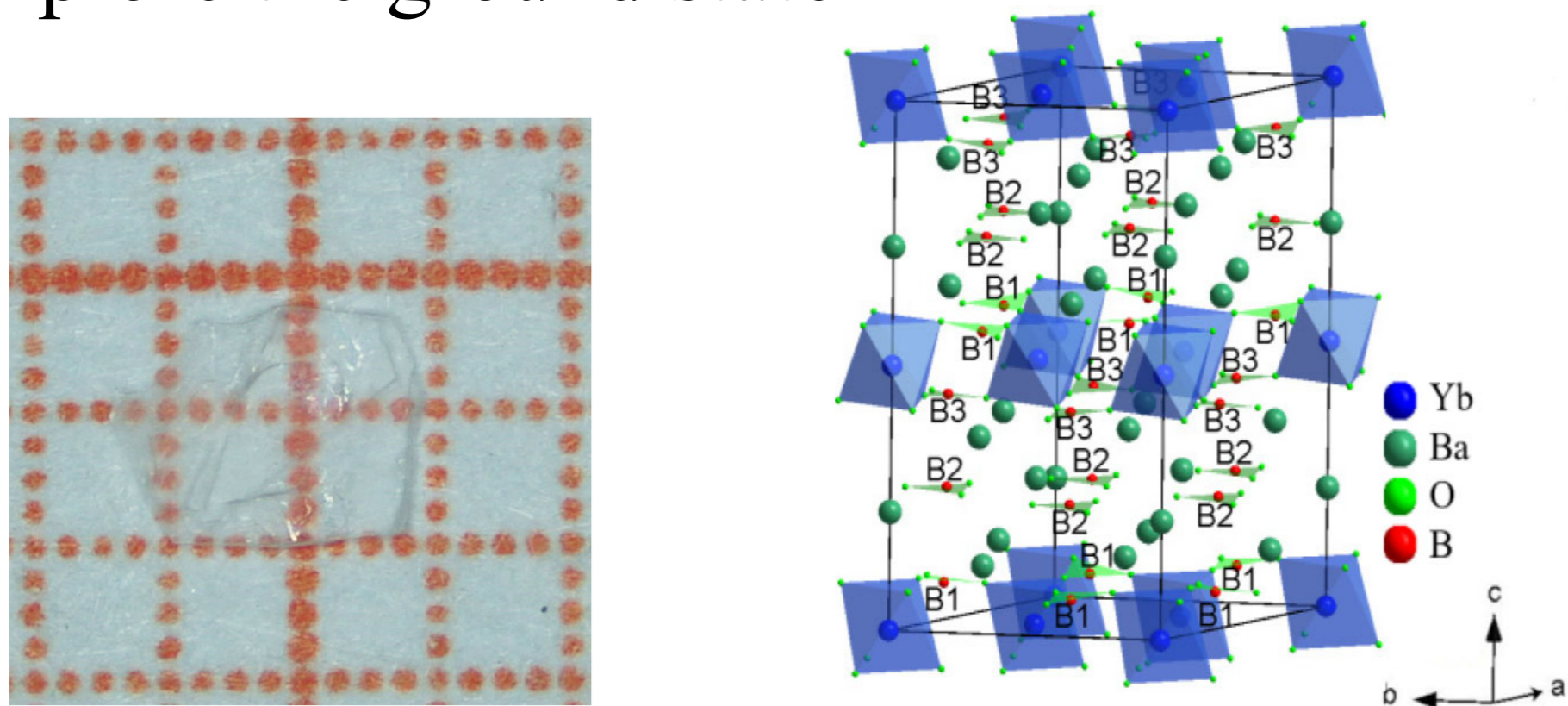
¹State Key Laboratory of Surface Physics, Department of Physics, Fudan University, Shanghai 200433, China

²School of Physics and Wuhan National High Magnetic Field Center, Huazhong University of Science and Technology, Wuhan 430074, People's Republic of China

³Laboratory for Muon Spin Spectroscopy, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland

Motivations

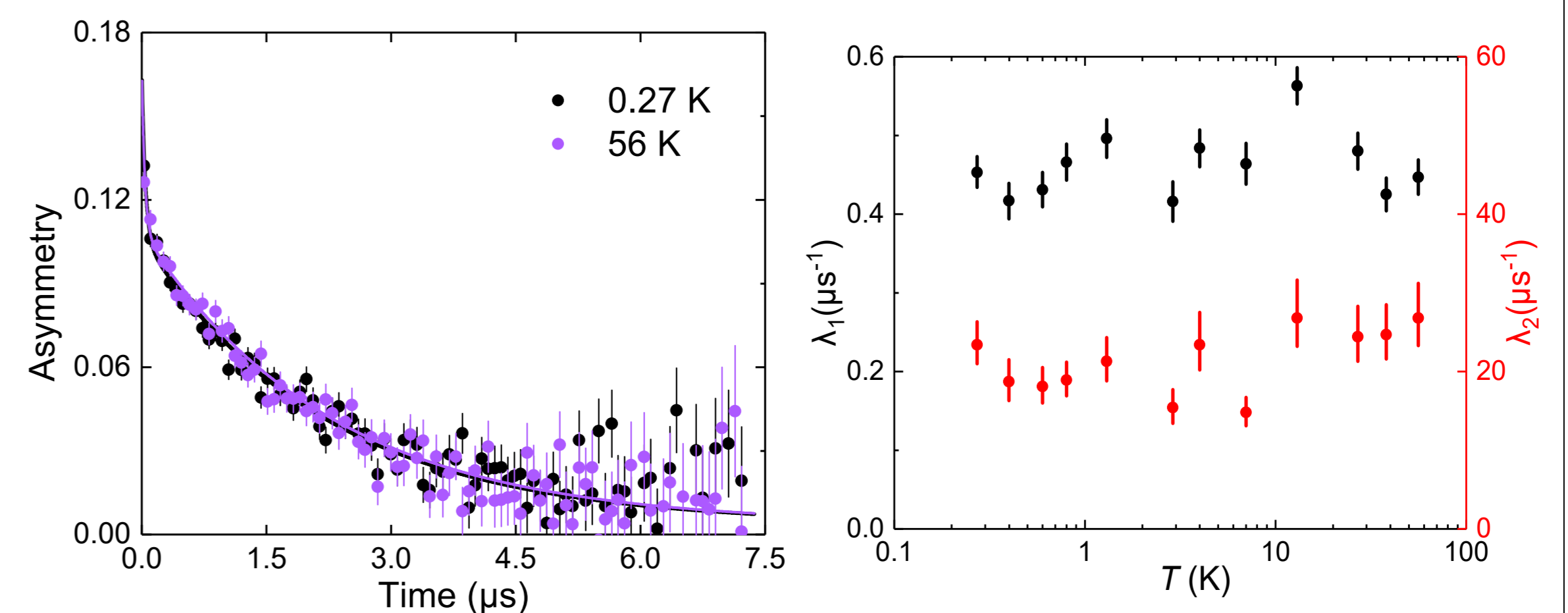
- A new Yb^{3+} triangular lattice with $S = 1/2$ [1]
- Single crystal without site-mixing order [2]
- Explore the ground state



Zero field μSR

Fitting function:

$$A(t) = A_{bg} + A_S(f_1 \cdot e^{-\lambda_1 t} + f_2 \cdot e^{-\lambda_2 t})$$

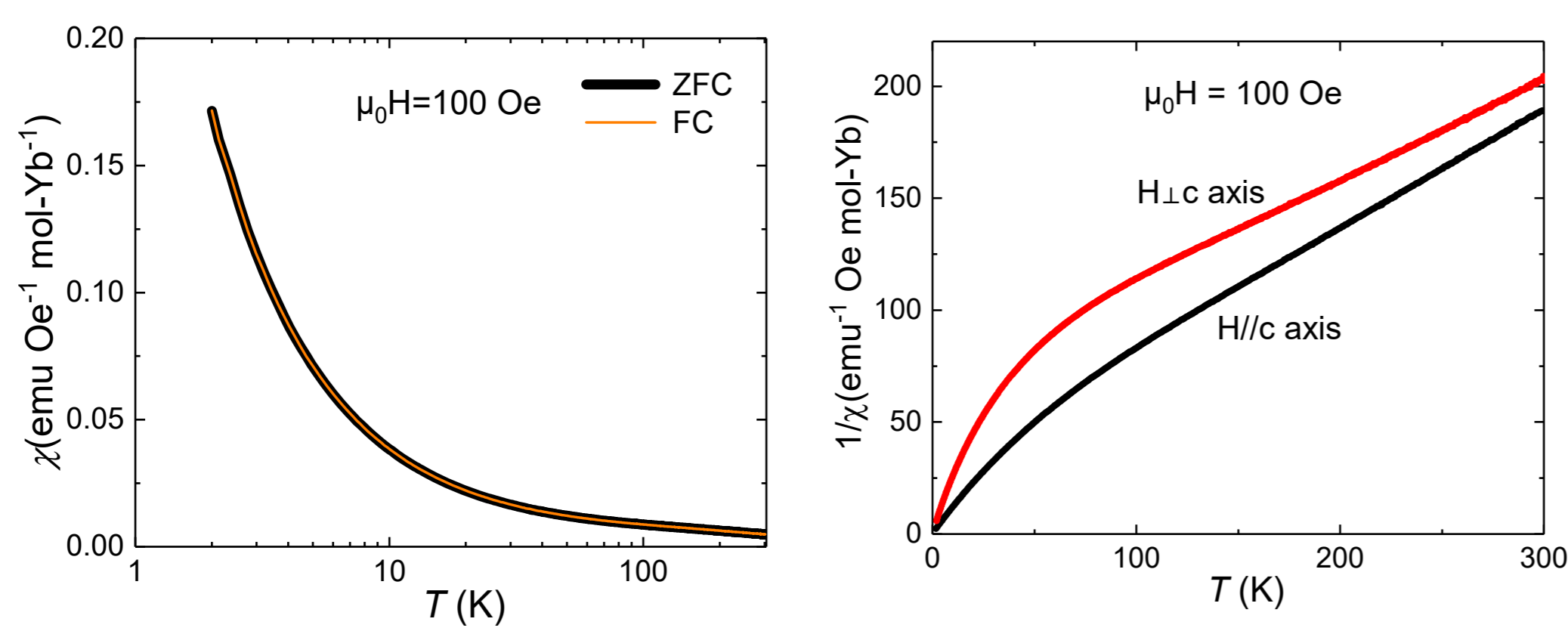


- A fast term and a slow term of relaxation
- No notable temperature dependence in relaxation rates λ_1 and λ_2 up to 56 K

Magnetic susceptibility

DC susceptibility (down to 2 K)

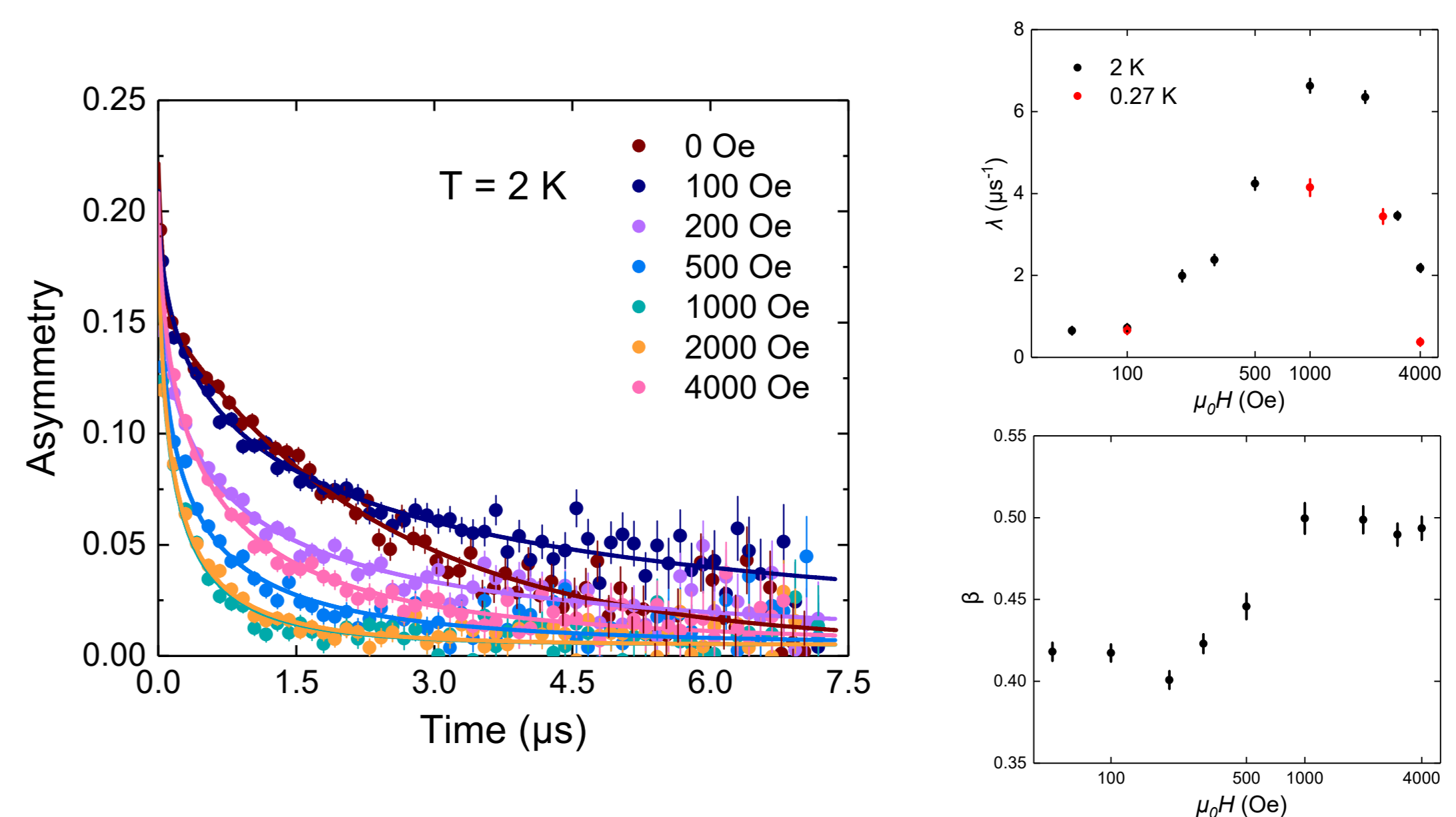
- No separation (spin freezing behavior)
- Significant anisotropy



Longitudinal field μSR

Fitting function:

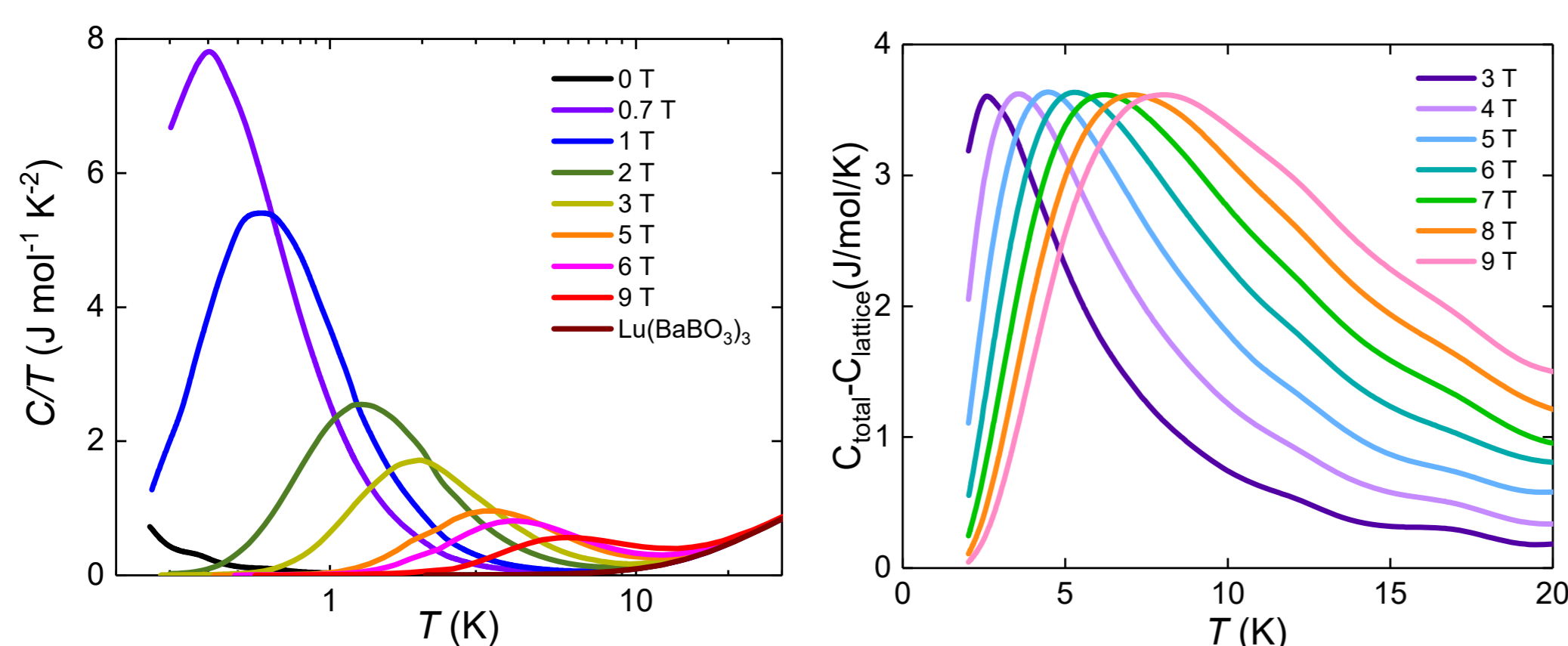
$$A(t) = A_{bg} + A_S \cdot \exp[-(\lambda t)^\beta]$$



- Similar λ behavior at 0.27 K and 2 K
- Field dependence of λ is not understood yet

Specific heat

- $C_{\text{total}} = C_{\text{lattice}} + C_{\text{Schottky}}$ below 30 K

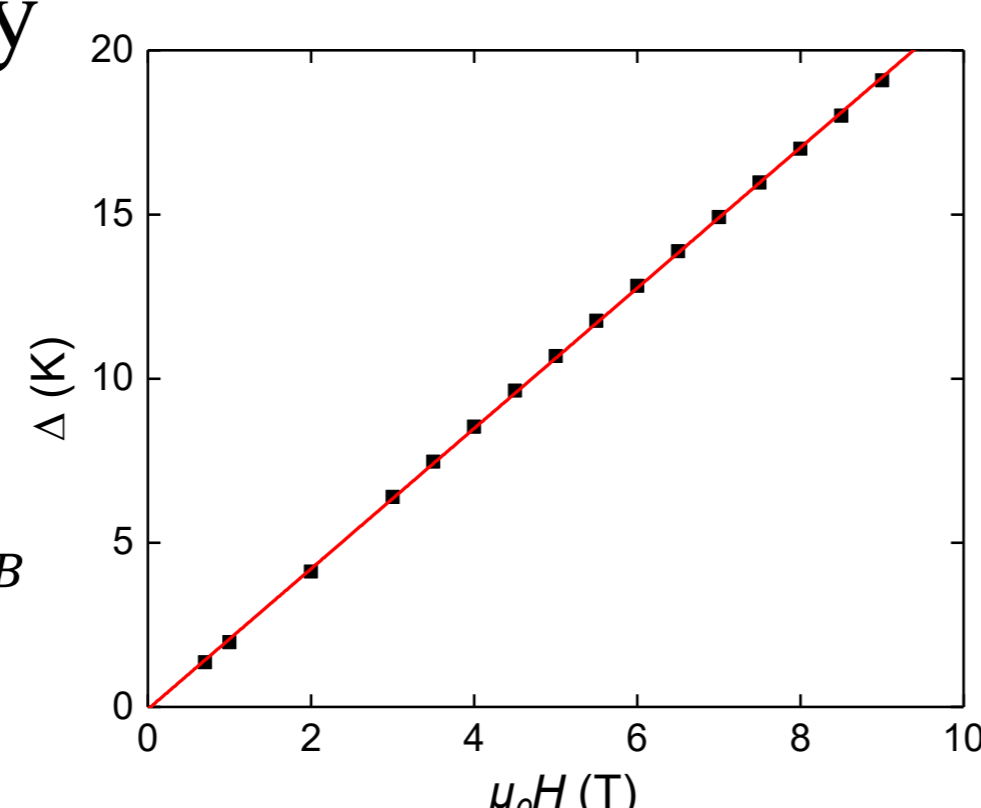


- CEF Schottky anomaly

$$C_{\text{Schottky}} = nR \left(\frac{\Delta}{T}\right)^2 \frac{e^{-\frac{\Delta}{T}}}{(1 + e^{-\frac{\Delta}{T}})^2}$$

$$\Delta = 2\mu_{\text{sat}}B \rightarrow \mu_{\text{sat}} = 1.59\mu_B$$

$$\mu_{\text{sat}} = gS\mu_B \rightarrow g = 3.18$$



Conclusions

- Absence of magnetic order down to 0.27 K
- Only Schottky anomaly in specific heat at low T.

Reference

- [1] Y. X. Gao *et al.*, J. Alloys Compd. 745, 396 (2018)
 [2] K. Y. Zeng *et al.*, Phys. Rev. B 102, 045149 (2020)

