

# Modelling of the Dynamical Fluorescent Micro-Thermal Imaging Experiment on the Heat Diffusion in the La<sub>5</sub>Ca<sub>9</sub>Cu<sub>24</sub>O<sub>41</sub> Spin Ladder Compound

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## Abstract

The crystalline structure of the 1D Heisenberg antiferromagnet La<sub>5</sub>Ca<sub>9</sub>Cu<sub>24</sub>O<sub>41</sub> constitutes the spin ladders with strong antiferromagnetic interaction between the spins of the copper ions along the ladders. The magnetic excitation is created by flipping one of the spins by phonon-magnon interaction leads to the increasing of the thermal diffusivity [1]. Suchwise, the time dependent measurement of the heat diffusion enables to investigate time dynamics of the phonon-magnon interaction.

This work deals with the modelling of the dynamical fluorescent micro-thermal imaging experiment in order to exclude the contribution of the fluorescent europium thenoyltrifluoroacetate (EuTTA)/ deuterated Poly-methyl methacrylate (PMMA) layer from the temperature profile of heat diffusion in the investigated compound. The simulations are carried out by the finite element method using the COMSOL Multiphysics® with the Heat Transfer Module. The results of the numerical calculations are expected to be used for the data analysis of the experimental studies.

## Reference

1. C. Hess et al., Magnon heat transport in (Sr, Ca, La)<sub>14</sub>Cu<sub>24</sub>O<sub>41</sub>, Physical Review B, vol. 64, 184305 (2001)