TRR 80 Sonderseminar

Am Donnerstag, den 30. Januar um 16:00 Uhr

spricht

Prof. Dr. Vladimir Mazurenko

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über das Thema

New tools to explore skyrmions: Neural networks and quantum computers

Amazing progress in the development of machine-learning techniques changes our everyday life and can also facilitate the solution of challenging problems in material science and related fields in physics. In my talk, I will discuss neural network approaches that our group has developed for the recognition and classification of topological non-collinear magnetic structures, skyrmions formed in two- and three-dimensional materials at finite temperatures and magnetic fields [1,2]. In contrast to standard methods of machine learning, such approaches facilitate the analysis of critical transitional areas between different magnetic phases. A special focus lies on the recurrent neural network classifier of skyrmionic processes driven by ultrafast magnetic pulses [3].

The second part of my talk will be devoted to a quantum skyrmion state formed in systems with predominant Dzyaloshinskii-Moriya interactions [4]. Such a state differs from classical skyrmions and cannot be detected with magnetization profile by using a spin-polarized scanning tunneling and Lorenz microscopy. To perform a complete characterization of this quantum state, we use the calculated spin structure factors and topological skyrmion numbers. Experimentally, the quantum skyrmion state can be realized with state-of-the-art quantum computers.

1. I.A. Iakovlev, O.M. Sotnikov, V.V. Mazurenko, PRB 98, 174411 (2018).
2. I.A. Iakovlev, O.M. Sotnikov, V.V. Mazurenko, PRB 99, 024430 (2019).
3. A.Y. Deviatov, I.A. Iakovlev, and V.V. Mazurenko, PRApplied 12, 054026 (2019).
4. O. M. Sotnikov, V. V. Mazurenko, J. Colbois, F. Mila, M. I. Katsnelson, E. A. Stepanov, arXiv: 1811.10823.

Gäste sind herzlich willkommen.
Der Vortrag findet im Seminarraum S-403, Institut für Physik, Universität Augsburg statt.

Gastgeber: Dr. Alexander A. Tsirlin
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