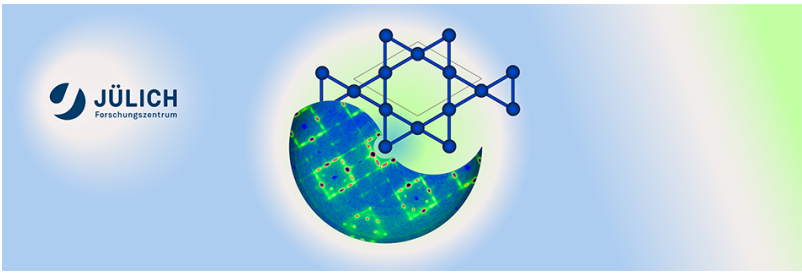

Beitrag ID: **75** Typ: **Invited talk**

Hidden Magnetic Texture in the Pseudogap Phase of the High-Tc Superconducting YBa2Cu3O6+x

Dienstag, 7. Oktober 2025 14:00 (30 Minuten)

The origin of the enigmatic pseudogap phase of high-Tc superconducting cuprates remains an unsolved mystery. Over the last decades, polarized neutron diffraction (PND) revealed that the pseudogap state hosts an intra-unit cell (or q=0) magnetism preserving the lattice translational (LT) symmetry and breaking the time-reversal and parity symmetries [1]. This q=0 magnetism is interpreted in terms of loop current (LC) patterns accompanied by anapoles [1].
Our PND measurements in YBa2Cu3O6+x with different hole doping levels [2-4] uncover a novel hidden magnetism that may be crucial to elucidate the pseudogap puzzle. This short-range magnetism is carried by the CuO2 layers and settles in at T*, the pseudogap onset temperature. Distinct from the q=0 magnetism, the related magnetic signal appears at the planar wavevectors q=(0.5,0) and (0,0.5), yielding a (2x2) quadrupling of the magnetic unit cell within the [a,b] plane (q=½ magnetism). The associated magnetic moment is predominantly pointing perpendicular to the CuO2 planes, consistent with the LC picture. Finally, the q=½ magnetism vanishes in the overdoped regime, following the doping dependence of the pseudogap [3].
The q=0 and q=½ magnetisms could be embedded within a single spread-out magnetic texture of LCs. Such a magnetic texture could be consistent with the theoretical proposal of LC supercells, breaking the LT and able to reconstruct the Fermi surface [5]. The existence of such broad entities reveals an unexpected aspect of the pseudogap physics, bringing new pieces to the puzzle of this enigmatic state of matter.

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[4] W. Liège, D. Bounoua et al., (in preparation)
[5] C.M. Varma, Phys.Rev.B, 99 (2019) 2245.

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