PAUL SCHERRER INSTITUT

Invitation

LMU-Seminar

Title: **Ultrafast signature of the interplay between orbital and lattice in iron-based superconductors**

Speaker: **Dr. Chennan Wang**
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Time: **Monday, March 11th 2019, 14:00**

Place: **WHGA/121**

Abstract:

In iron-based superconductors (FeSC), the origin of the electronic symmetry breaking above the structural transition temperature (T_s) has been long argued as due to the nematic instability [1], although among which the suggested spin or orbital fluctuation is more responsible for such instability remains to be verified. In general, the lattice dynamics is disregard as the cause for such instability, due to the restored in-plane C_4 symmetry above T_s. However, an intriguing experiment very recent reveals that the coupling between the carriers in the Fe plane and the deformation potential of the A_{1g} mode from the anions moving out of the Fe plane is unexpectedly large, and may interfere with other electronic channels [2]. Hence it triggers the question concerning the interplay between the A_{1g} mode and the breaking of the in-plane electronic symmetry. As this issue is only vaguely discussed so far [3-5], further inspection is therefore highly desired. In this talk, I will present the latest results from the optical pump-probe polarimetry study on (Sr,Na)Fe_2As_2 single crystals. By correlating the coherence time of the A_{1g} mode with the measured transient optical transition between the As-*p* and Fe-*d* states, new insights on the aforementioned issue will be discussed.

References:
[1]. R. M. Fernandes, et. al., Nat. Phys. 10, 97 (2014).
[2]. S. Gerber, et al., Science 357, 71−75 (2017)
[3]. E. Thewalt, et. al., Phys. Rev. Lett. 121, 027001 (2018)
[4]. C. W. Luo, et. al., npj Quantum Mater. 2, 32 (2017).
[5]. S. H. Liu, et. al., Phys. Rev. B 97, 020505 (2018).