TECHNISCHE UNIVERSITÄT WIEN

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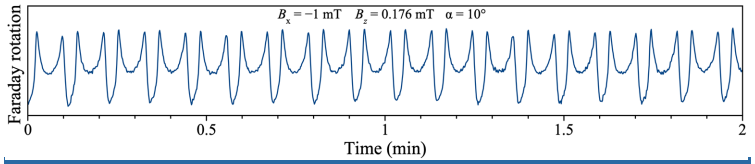
Physics Colloquium TU Wien

27. Mai 2024
17:00
Freihaus, Hörsaal 5
Wiedner Hauptstraße 8-10



Robust time crystals in semiconductors

Manfred Bayer
TU Dortmund

Crystals spontaneously break the continuous translation symmetry of free space. Analogously, time crystals (TC) lift translational invariance in time. Continuous time crystals are a result of time-independent external driving, which compensates exactly for the system's energy losses. As a specific example, we describe a time crystal implemented in the coupled electron-nuclei spin system of a tailored semiconductor, featuring spontaneous breaking of the translational symmetry of time. An extremely robust TC across a wide range of its control parameters can thus be demonstrated experimentally. The coherence time of the crystal is limited only by the measurement time and can extend up to several hours. Leaving this island of stability, chaotic motion can be demonstrated, signaling melting of the TC. Varying the protocol of the optical pumping, both the continuous and discrete crystal regimes can be achieved, whereby in the latter case of modulated pumping a rich phenomenology of non-linear dynamics is observed.

A. Greilich, N. E. Kopteva, A. N. Kamenskii, P. S. Sokolov, V. L. Korenev, and M. Bayer, Nat. Phys. **20**, 631 (2024).

Date: 27.05.2024
Time: 17:00
Place: TU Wien, Freihaus, Hörsaal 5

A buffet will be offered at around 16:30

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Prof. Manfred Bayer received his PhD 1997 in Würzburg. In 2002, he was appointed to the professorship on Experimental Physics at the TU Dortmund. There he was chairman of the Senate and since 2020 he is the president of the TU Dortmund.

In 2001 Prof. Bayer received the Walter Schottky Prize from the German Physical Society. He is a Fellow of the American Physical Society (2012) and Member of the Russian Academy of Sciences (2017). In 2024 he was named "Rector of the Year" by the German University Association.

The main scientific interest of Prof. Bayer is the Laser Spectroscopy of Condensed Matter with the focus on such topics of semiconductor physics like spin dynamics, non-linear optics, quantum optics, and ultrafast spectroscopy.