**Department of Physics**
Condensed Matter Physics
Clarendon Laboratory, Parks Road, Oxford OX1 3PU

UNIVERSITY OF OXFORD

# CONDENSED MATTER PHYSICS SEMINAR

Thursday 19 February at 14:30
Simpkins Lee Seminar Room, Department of Physics
(https://maps.app.goo.gl/WjG71uLF2D48n85B6)

## When Pokrovsky and Talapov substitute Kosterlitz and Thouless: A commensurate-incommensurate transition without magnetic field

Professor Natalia Chepiga
University of Oxford

I will present results of numerical study of quantum phase transitions out of spin-density-wave phases in a spin-1/2 chain with competing nearest- and next-nearest-neighbor interactions. I will demonstrate that, when the magnetization is fixed to one-third, the well-established Kosterlitz-Thouless transition between the period-three phase and the Luttinger liquid turns into a Pokrovsky-Talapov transition once the next-nearest-neighbor interactions dominate over the nearest-neighbor ones. This exotic transition is an example of a commensurate-incommensurate transition, which typically occurs at the end of magnetization plateau when the magnetization starts to deviate from its commensurate value. In the present case, however, an incommensurate liquid appears without violating the one-third magnetization constraint. Even more striking is the occurrence of a Pokrovsky-Talapov transition out of the period-four phase at zero magnetization. I will argue that the appearance of this transition is associated with the condensation of magnon pairs and the emergence of a two-component Luttinger liquid. Remarkably, this transition remains in place even when the magnetization constraint is released. To the best of our knowledge, this is the first reported example of a commensurate-incommensurate transition realized without an external magnetic field or doping.

https://arxiv.org/abs/2510.05988
https://journals.aps.org/prresearch/abstract/10.1103/PhysRevResearch.4.043225

*Host: Professor Amalia Coldea*