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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Theoriekolloquium

May 19, 2016 at 2 p.m. c.t.
Seminarraum D (Bau 2/413, 01-227)

Note: Sondertermin

Frau Dr. Gemma De las Cuevas
Max-Planck-Institut für Quantenoptik, Garching

Simple universal models capture all classical spin physics

Joint work with T. S. Cubitt , Science 351, 1180 (2016)

Spin models are used in many studies of complex systems because they exhibit rich macroscopic behavior despite their microscopic simplicity. Here, we prove that all the physics of every classical spin model is reproduced in the low-energy sector of certain "universal models," with at most polynomial overhead. This holds for classical models with discrete or continuous degrees of freedom. We prove necessary and sufficient conditions for a spin model to be universal and show that one of the simplest and most widely studied spin models, the two-dimensional Ising model with fields, is universal. Our results may facilitate physical simulations of Hamiltonians with complex interactions.

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