ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

The Quantum SK Model: From a Parisi Type Formula to the Phase Diagram

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Chaired by Quirin Thomas Simon Vogel | Department of Statistics

Wednesday, 21 October 2026 | 11:00–12:00

HS 11

ABSTRACT

What becomes of a spin glass when quantum fluctuations compete with disorder? The transverse-field Sherrington–Kirkpatrick model provides a natural setting for this question, but the classical theory does not carry over unchanged: overlaps become operators, and correlations of a spin with itself at different imaginary times become a variational variable in the natural path integral formulation. I will begin with the classical SK model, replica symmetry breaking, the Parisi formula, and the Almeida–Thouless stability criterion. I will then explain a rigorous Parisi formula for quantum mean-field spin glasses and the main ideas behind its derivation from a functional-integral representation and vector-spin approximations.

The second part concerns the phase diagram: persistence of spin-glass order at weak transverse field, an explicit quantum Almeida–Thouless line for a self-overlap-corrected model, and correlation inequalities that exclude replica order at sufficiently strong field in the original model. Together, these results distinguish what is rigorously known about quantum glassiness from what remains to be determined about the exact transition. The talk will emphasize ta few key

proof mechanisms.

Based on joint work with Simone Warzel and, for the low-field result, Hajo Leschke and Rainer Ruder.

We hope to see you there!

