CONDENSED MATTER THEORY SEMINAR

Subject: **From Parisi to Boltzmann**

Speaker: **Prof. Nicola Kistler (Fachbereich Mathematik, Goethe-Universität Frankfurt)**

Date & time: **Friday, May 15th, 2020 at 3:15 p.m.**

Venue: **Seminar room 1.114**

To these days, two approaches to mean field spin glasses have been developed. On the one hand is the enormously efficient Parisi treatment within the baffling replica symmetry breaking scheme. Although a number of predictions have been meanwhile rigorously settled, one can arguably claim that the Parisi solution still remains shrouded in mystery:

 * what is the physical content of the theory?
 * why are the variational principles reversed, when compared to
   classical (ordered) systems?
 * what does the order parameter capture?

I will present a novel framework for the analysis of (mean field) disordered systems, variational in nature and abiding to the principles of thermodynamics, which provides neat answers to these questions. Time permitting, I will also briefly discuss the second approach to spin glasses, namely the one pioneered by Thouless, Anderson, Palmer [TAP] and Plefka. In particular, I will make the case that the TAP-Plefka treatment, at first sight natural and physically convincing, is upon closer inspection even more puzzling than the Parisi approach, and in fact hardly compatible, as it stands, with the very principles of thermodynamics.

/Joint with Goetz Kersting, Adrien Schertzer (Frankfurt) and Marius A. Schmidt (Basel). /