

Sonderforschungsbereich 1060

The Mathematics of Emergent Effects

Einladung zu einem Vortrag im SFB-Seminar

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spricht zum Thema

Convergence of dynamic Ising-Kac model to Φ_2^4

Zeit: Dienstag, den 14. Oktober 2014, 14.15 Uhr

Ort: Lipschitz-Saal 1.016, Endenicher Allee 60

Kaffee/Tee: anschl. im Plückerraum 1.015

gez. **Karl-Theodor Sturm**

Abstract: The Ising-Kac model is a variant of the ferromagnetic Ising model in which each spin variable interacts with all spins in a neighbourhood of radius ga^{-1} for $ga \ll 1$ around its base point. We study the Glauber dynamics for this model on a discrete two-dimensional torus $Z^2(2N+1)Z^2$, for a system size $N \gg ga^{-1}$ and for an inverse temperature close to the critical value of the mean field model. We show that the suitably rescaled coarse-grained spin field converges in distribution to the solution of a non-linear stochastic partial differential equation.

This equation is the dynamic version of the Φ_2^4 quantum field theory, which is formally given by a reaction diffusion equation driven by an additive space-time white noise. It is well-known that in two spatial dimensions, such equations are distribution valued and a Wick renormalisation has to be performed in order to define the non-linear term. Formally, this renormalisation corresponds to adding an infinite mass term to the equation. We show that this need for renormalisation for the limiting equation is reflected in the discrete system by a shift of the critical temperature away from its mean field value. This is a joint work with J.C. Mourrat (Lyon).