Oberseminar Geometrie
Department of Mathematics
University of Fribourg
Physics 2.52
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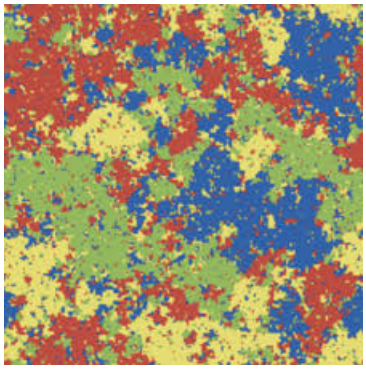

Ulrik Hansen (UniFR)

Conformal geometry & 2D statistical mechanics

Since the seminal work of Polyakov, Zamolochikov and Belavin in the 80s, the holy grail of 2D statistical mechanics has been to prove that critical models exhibit two things:

– Large scale conformal invariance or, equivalently, that any scaling limit of the model is invariant under push-forward by a conformal map

– Universality, meaning that the large scale behaviour of the model is independent of its microscopic behaviour.

More precisely, we consider probability measures on functions on embedded planar lattices and ask about the behaviour of certain natural statistics depending on the state of the (random) function on a subset of the lattice sites increasing towards the full lattice. The above conjecture shall then be taken precisely to mean that these statistics converge towards conformally invariant objects and that the limits do not depend on the exact choice of lattice.

Our goal of the talk will be to give a brief overview of the state of the conjecture, its contents, some of the natural models that it concerns, general strategies for proving it, and the (sadly, somewhat brief) list of cases in which the conjecture is known. This will include a discussion of joint work with Ioan Manolescu.