Scaling limits of Fortuin-Kasteleyn planar maps at q=4

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Abstract

Fortuin-Kasteleyn (FK) maps are a classical model of planar maps decorated with a percolation-like configuration, depending on a weight $q > 0$. For $q < 4$, Sheffield established that, in some appropriate sense, these maps converge after rescaling to a (decorated) Liouville quantum gravity surface with parameter depending on q. This scaling limit result builds on his celebrated *hamburger-cheeseburger* bijection, which provides a one-to-one correspondence between FK maps and a queueing model in a kitchen selling burgers. A striking feature of the result is a phase transition at the critical value q=4, where the limit degenerates. In this talk, we resolve this problem by showing that the walks can in fact be renormalised at criticality (q=4) provided we introduce a logarithmic correction that we identify exactly. The proof uses a novel strategy that reveals and makes use of the integrability of the model. Based on joint work with X. Hu, E. Powell and M. D. Wong.

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