MAR07-2006-020046

Abstract for an Invited Paper
for the MAR07 Meeting of
the American Physical Society

Percolation, Schramm-Loewner evolutions, and applications

ILYA GRUZBERG, University of Chicago

The area of two-dimensional (2D) critical phenomena has enjoyed a recent breakthrough. A radically new development (recognized just a few months ago by a Fields medal) termed the Schramm- (or stochastic) Loewner evolution (SLE), has given new tools to study criticality and conformal invariance in 2D. Percolation was a natural common ground for physicists and mathematicians, and played a crucial role in motivating and shaping up the emergence of SLE as a theoretical and computational tool. The new description focuses directly on non-local structures that characterize a given system, be it a boundary of an Ising or percolation cluster, or loops in the O(n) model. This description uses the fact that all these non-local objects become random curves at a critical point, and may be precisely characterized by stochastic dynamics of certain conformal maps. In my talk I will review this recent development in relation to percolation, as well as touch upon its applications to other areas of physics.