

Sheffield Awarded 2011 Loève Prize

The 2011 Line and Michel Loève International Prize in Probability is awarded to Scott Sheffield of M.I.T. The prize, which carries a monetary award of \$30,000, will be presented at a ceremony in Berkeley to be held Friday March 23, 2012.

Sheffield received his Ph.D. in 2003, advised by Amir Dembo at Stanford University. Much of his research has been devoted to development of the theory of the *Schramm-Loewner evolution* ($SLE(\kappa)$) and its connections with other processes. His early result that the *harmonic explorer* rescales to $SLE(4)$ as the grid gets finer remains one of the most intuitive ways to see how SLE arises as a limit of discrete processes. His work *Gaussian free fields (GFF) for mathematicians* explained how GFFs arise as the limit of many incrementally varying random functions on d -dimensional grids, and started development of connections between the GFF and SLE. This theme was continued in subsequent works, in particular proving (with Oded Schramm) that the chordal level lines of the GFF have scaling limits that are variants of $SLE(4)$.

He introduced the topic of *conformal loop ensembles* $CLE(\kappa)$, using branching variants of $SLE(\kappa)$ called exploration trees. CLEs are random collections of loops in a planar domain, characterized by certain conformal invariance and Markov properties, and conjectured to be scaling limits of various random loop models from statistical physics. Subsequent work with Wendelin Werner produced a deep analysis of CLEs and their relation to two-dimensional Brownian loop-soup. In particular they showed that the simple CLEs constructed above for $8/3 < \kappa \leq 4$ coincide with the outer-cluster-boundary ensembles of Brownian loop-soups, and are the only random loop ensembles satisfying certain conformal restriction axioms.

Another line of work, in part with Bertrand Duplantier, shows that certain interfaces between Liouville quantum gravity random surfaces have SLE descriptions. This work makes rigorous in this setting the KPZ relation between scaling exponents in a Euclidean planar domain and in Liouville quantum gravity.

He has also made substantial contributions in two quite separate fields. The first involves dimer models, spanning trees, and tilings; the second involves game theory, PDEs, and Lipschitz extension theory.

About the Prize. The Prize commemorates Michel Loève, Professor at the University of California, Berkeley, from 1948 until his untimely death in 1979. The Prize was established by his widow, Line, shortly before her death in 1992. Awarded every two years, it is intended to recognize outstanding contributions by researchers in probability who are under 45 years old.