LOCAL LIMIT THEOREMS FOR THE RANDOM CONDUCTANCE MODEL AND APPLICATIONS TO THE GINZBURG-LANDAU $\nabla\varphi$ MODEL

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The topic of this poster is the Random Conductance Model, a continuous-time random walk on $\mathbb{Z}^d$ in an environment of random conductances taking values in $(0, \infty)$. For a static environment, we extend the quenched local limit theorem to the case of a general speed measure, given suitable ergodicity and moment conditions on the conductances and on the speed measure. Under stronger moment conditions, an annealed local limit theorem is also derived. Furthermore, an annealed local limit theorem is exhibited in the case of time-dependent conductances, under analogous moment and ergodicity assumptions. This dynamic local limit theorem is then applied to prove a scaling limit result for the covariances of random heights in the Ginzburg-Landau $\nabla\varphi$ model. This result applies to convex, polynomial potentials for which the second derivative may be unbounded. All results on the Random Conductance Model are in dimension $d \geq 2$.