

# Large deviations and rare excitations of directed polymers in random media

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The one-point distribution of the height for the continuum Kardar-Parisi-Zhang (KPZ) equation is determined numerically using the mapping to the directed polymer in a random potential at high temperature. Using an importance sampling approach, the distribution is obtained over a large range of values, down to a probability density as small as  $10^{-1000}$  in the tails. Both short and long times are investigated and compared with recent analytical predictions for the large-deviation forms of the probability of rare fluctuations. At short times the agreement with the analytical expression is spectacular. We observe that the far left and right tails, with exponents  $5/2$  and  $3/2$  respectively, are preserved until large time. We present some evidence for the predicted non-trivial crossover in the left tail from the  $5/2$  tail exponent to the cubic tail of Tracy-Widom, although the details of the full scaling form remains beyond reach.

† Alex Hartmann, Satya Majumdar, P. le Doussal, A. Rosso, G. Schehr, Europhys. Lett. 121, 67004 (2018)