

## **Exponential mixing by random cellular flows**

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We study a passive scalar equation on the two-dimensional torus, where the advecting velocity field is given by a cellular flow with a randomly moving center. We prove that the passive scalar undergoes mixing at a deterministic exponential rate, independent of any underlying diffusivity. Furthermore, we show that the velocity field enhances dissipation and we establish sharp decay rates that, for large times, are deterministic and remain uniform in the diffusivity constant. Our approach is purely Eulerian and relies on a suitable modification of Villani's hypocoercivity method. This is joint work with Víctor Navarro Fernández (Imperial).