

# Guessing the direction of Time's Arrow: theory and experiment

*Friday, 8 September 2017 11:00 (30 minutes)*

As famously articulated by Sir Arthur Eddington, the second law of thermodynamics implies a directionality to the flow of time: the arrow of time points in the direction of increasing entropy. This deep fact of Nature is something that we intuitively grasp in our everyday lives, which is why we typically find it easy to distinguish between a movie played forward in time, and one played backward. With nanoscale systems the situation becomes more subtle due to the prominence of statistical fluctuations. At sufficiently small length and time scales, a system may behave in a manner that appears contrary to the second law. Surprisingly, our ability to distinguish the direction of the arrow of time can be quantified and shown to obey a universal law. I will show how this law emerges from non-equilibrium fluctuation relations, and I will present experimental results that have verified its validity, using a driven quantum dot.

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