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Surprises from single-particle imaging of passive and active diffusion

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The transport of matter and energy is fundamental in nature and biology. It can occur by passive diffusion and can also be active. Predicated on fluorescence imaging at the single-particle level, this talk describes quantitative studies of how this can happen, and presents examples of how nontrivial findings emerge from observing the rare events that underly the overall ensemble-averaged distribution. For example, in living cells, we find that transportation efficiency problems bear a provocative parallel with polymer chain trajectories with their spatial extent, and with jammed matter in their time evolution. A picture emerges in which simple experiments, performed at single-particle and single-molecule resolution, can dissect macroscopic phenomena in ways that surprise.

References

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