Entropy Production of Non-reciprocal Interactions

R. Garcia-Millan[1,2], **Z. Zhang**[3], **and G. Pruessner**[3]

[1]*Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Cambridge, UK*
[2]*St John's College, University of Cambridge, Cambridge, UK*
[3]*Department of Mathematics, Imperial College London, London, UK*

Non-reciprocal interactions are very common in natural systems. They can be used to explain the emergence of certain patterns such as bird flocking [1]. Generally, systems with non-reciprocal interactions are out of equilibrium, although they can obey detailed balance under certain conditions [2]. In this talk, I will present a particle model with non-reciprocal pair interactions between two species of drift-diffusive particles, say dogs and sheep. Following a path integral approach, I will discuss the stationary two-point correlation function and the entropy production. Even in the absence of drift, detailed balance is broken by non-reciprocity except for a particular choice of pair interactions.

[1] M. Durve, A. Saha, A. Sayeed, Eur. Phys. J. E 41, 49 (2018).
[2] S. Loos, S. Klapp, New J. Phys. 22(12), 123051 (2020).