

Soft violation of Bell's inequality

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Walking drops on Faraday waves are one of the rare examples of non-quantum wave-particle duality. A series of striking experiments with one walking drop has led to behaviors that were thought to be peculiar to the quantum scale. I will present a recent numerical and experimental investigation involving the coupling of two walking drops. To our great surprise, we have found that the statistical behavior of this system shares some non-expected features of collective emission of photons in quantum optics, including superradiance [1] and violation of Bell's inequality [2]. This result is very intriguing as the quantum counterpart is the signature of non-separable states which in our case, is the result of a collective wave self-organisation.

Références

1. K. Papatryfonos, M. Ruelle, C. Bourdiol, A. Nachbin, J.W.M. Bush, M. Labousse, *Communication Physics*, **5**, 142, (2022).
2. K. Papatryfonos, L. Vervoort, A. Nachbin, M. Labousse, J.W.M. Bush, *preprint*, arXiv :2208.08940, (2022).