Colloquium

"The concept of Fisher information in wave scattering"

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Host: Maksym Serbyn and Johannes Fink

In my talk, I will discuss recent progress in applying the concept of classical and quantum Fisher information to the problem of estimating system parameters in complex environments, such as inside or behind a disordered medium. In particular, I will demonstrate how Fisher Information can be maximised through wavefront shaping and quantum state engineering \[1,2\]. Quite interestingly, the density and flux of Fisher information satisfy a fundamental continuity equation - in analogy to the Poynting theorem for the density and flux of energy in a radiation field \[3\]. If time permits, I will also say a few words about how such concepts can be generalised to the flow of Fisher Information through Artificial Neural Networks.\[1\] Maximum information states for coherent scattering measurements, D. Bouchet, S. Rotter, and A. P. Mosk, Nature Physics 17, 564 (2021).\[2\] How to find optimal quantum states for optical micromanipulation and metrology in complex scattering problems, L. M. Rachbauer, D. Bouchet, U. Leonhardt, and S. Rotter, J. Opt. Soc. Am. B 41, 2122 (2024)\[3\] Continuity equation for the flow of Fisher information in wave scattering, J. Hüpfl, F. Russo, L. M. Rachbauer, D. Bouchet, J. Lu, U. Kuhl, and S. Rotter, Nature Physics 20, 1294 (2024)

Tuesday, October 15, 2024 11:00am - 12:00pm
Moonstone Building/Ground Floor/ Seminar Room F

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