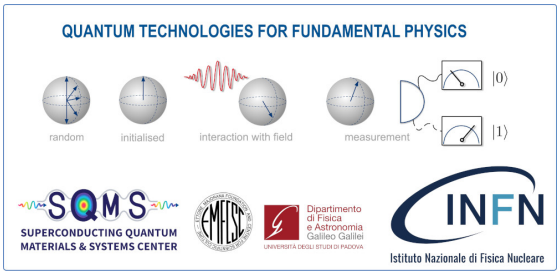

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An invitation to quantum estimation theory

Wednesday, 6 September 2023 15:25 (25 minutes)

Several quantities of interest in physics are non-linear functions of the density matrix and cannot, even in principle, correspond to proper quantum observables. Any method aimed to determine the value of these quantities should resort to indirect measurements and thus corresponds to a parameter estimation problem whose solution, i.e. the determination of the most precise estimator, unavoidably involves an optimization procedure. In this talk, I review local quantum estimation theory, which provides tools to address the above issue and characterize signals and devices in quantum technology. In particular, I will try to address the following points
- Why estimation theory is relevant?
- Classical and quantum Cramer-Rao bound
- Application: quantum probing
- Application: is that theory not even wrong?
- Current problems: multiparameter estimation and going beyond the Cramer-Rao.

Presenter: PARIS, Matteo (Istituto Nazionale di Fisica Nucleare)

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