Contribution ID: **283** Contribution code: **S09-TMCP-202** Type: **Poster presentation**

Steering witnesses for Gaussian quantum states

Monday, 29 August 2022 18:00 (1h 30m)

We define and fully characterize the witnesses based on second moments detecting steering in Gaussian states by means of Gaussian measurements. All such tests, which arise from linear combination of variances or second moments of canonical operators, are easily implemented in experiments. We propose also a set of linear constraints characterizing steering witnesses. Given an unknown quantum state we implement a semidefinite program providing the optimal steering test with respect to the number of random measurements performed. We study the efficiency of steering detection for squeezed vacuum states and for general unknown covariance matrices. In addition, we discuss the robustness of this method to statistical errors.

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Session Classification: Poster session

Track Classification: Scientific Sections: S09 Theoretical, Mathematical and Computational Physics