



Agenzia Spaziale Italiana

TRACCIA PROVA COLLOQUIO

Bando n. 17/2023 – Selezione per titoli ed esame colloquio, per il conferimento di n. 1 Assegno di Ricerca, nell’ambito del progetto finanziato dal MUR – Progetto PRIN QUEXO – QUantum imaging for EXOplanet detection

PROVA 1

- Il candidato illustri le proprie competenze ed esperienze professionali in relazione alle tematiche del bando.
- Il candidato esponga il fenomeno dell’interferenza Hong Ou Mandel e sue eventuali applicazioni.
- Il candidato esponga il progetto di ricerca presentato ai fini della partecipazione.

Quantum Theory of Superresolution for Two Incoherent Optical Point Sources

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Rayleigh's criterion for resolving two incoherent point sources has been the most influential measure of optical imaging resolution for over a century. In the context of statistical image processing, violation of the criterion is especially detrimental to the estimation of the separation between the sources, and modern far-field superresolution techniques rely on suppressing the emission of close sources to enhance the localization precision. Using quantum optics, quantum metrology, and statistical analysis, here we show that, even if two close incoherent sources emit simultaneously, measurements with linear optics and photon counting can estimate their separation from the far field almost as precisely as conventional methods do for isolated sources, rendering Rayleigh's criterion irrelevant to the problem. Our results demonstrate that superresolution can be achieved not only for fluorophores but also for stars.

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Subject Areas: Optics, Quantum Information

PROVA 1 – CONOSCENZA INFORMATICA DI BASE

Il candidato, utilizzando Word:

- crei una tabella che riporti tre colonne e tre righe,
- popoli le celle con termini casuali,
- per ciascuna colonna, disponga in ordine alfabetico i termini presenti utilizzando l'apposito tool.