

TRR Guest Scientist Lecture / Seminar

Date/Time: 16.11.2017 / 11:00 Uhr
Location: Paderborn, P8.4.09



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Superresolution as a multiparameter quantum estimation

Abstract:

I will establish the multiparameter quantum Cramer-Rao bound for simultaneously estimating the centroid, the separation, and the relative intensities of two incoherent optical point sources using a linear imaging system. For equally bright sources, the Cramer-Rao bound is independent of the source separation, which confirms that the Rayleigh resolution limit is just an artifact of the conventional direct imaging and can be overcome with an adequate strategy.

For the general case of unequally bright sources, the amount of information one can gain about the separation falls to zero, but I will show that there is always a quadratic improvement in an optimal detection in comparison with the intensity measurements. This advantage can be of utmost importance in realistic scenarios, such as observational astronomy. I will also explore how to extend these results into the spectral domain.

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