



Contribution ID: 67

Type: **Oral**

Super-resolution Optical Fluctuation Imaging— fundamental estimation theory perspective

Monday, 28 September 2020 15:30 (8 minutes)

We provide a rigorous quantitative analysis of super-resolution imaging techniques which exploit temporal fluctuations of luminosity of the sources in order to beat the Rayleigh limit. We define an operationally justified resolution gain figure of merit, that allows us to connect the estimation theory concepts with the ones typically used in the imaging community, and derive fundamental resolution bounds that scale at most as the fourth-root of the mean luminosity of the sources. We fine-tune and benchmark the performance of state-of-the-art methods, focusing on the cumulant based image processing techniques, taking into account the impact of limited photon number and sampling time.

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Session Classification: Contributed