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The World Where Every Photon Counts

QuMETA

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and
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Abstract

Photon counting opens a door into a new world. Quantum effects emerge. Beyond fundamental interest, those effects lead to unprecedented accuracy of measuring light, often surpassing capabilities of classical sensors. Quantum-enabled photonic techniques can enhance nearly every traditional application in optics: from astronomy to biology and from communications to imaging. Quantum networks rely on entangled states distributed by single photons and require other functionality, including classical signaling to be done with faint states of light. I will talk about our recent experiments with faint light that enable practical quantum advantage by demonstrating below-the-shot-noise sensitivity and super-resolution. Let me show you a new world that connects fundamental laws of nature with everyday optical technologies.

Bio

Dr. Sergey V. Polyakov is the project leader in Quantum Measurement division, Physical Measurement Laboratory at NIST. His projects aim at developing quantum methods of characterization of faint light. Sergey contributed to early research efforts in quantum repeaters. He developed innovative methods of single photon source characterization that leads to in-situ, non-invasive measurement of underlying physics of single-photon emitters. He holds the world record in verification of the accuracy of single photon detector calibration. Recently, he invented and developed a new class of optical receivers for classical communications that use quantum measurement. Sergey is a Fellow of the Optical Society of America and has served as a General Chair of CLEO (2021), and Nonlinear Photonics topical meeting (2022).

Host Professor Vladimir Shalev, Professor Alexandra Boltasseva

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