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Machine learning assisted quantum super-resolution microscopy

Machine learning speeds quantum emitter classification for faster, sharper imaging in quantum tech.

Researchers at Purdue University have developed a new method for rapid classification of quantum scores allowing a computer can retrieve quantum super-resolution imaging using machine learning. Several algorithms for image optimization have been integrated in this machine learning method to reduce time delays in imaging and achieve exceptional image quality, allowing image collection to be completed on average within one second and consistently in less than two minutes. Purdue researchers can quickly determine "good" and "bad" emitters with 92% accuracy are obtained in this experiment. This technology can be used in myriad applications including quantum computation, quantum communication, cryptography, quantum simulations, quantum random number generation, low-light sensing, magnetic-field sensing, quantum-enhanced measurements, and quantum standards.

Advantages:

-Rapid Classification

-Highly Accurate

-High-Resolution Imaging

-Reliable

Potential Applications:

-Quantum Computing

-Quantum Communication

-Cryptography

-Quantum Simulations

Technology ID
2021-BOLT-69214

Category
Computing/Quantum Technologies
Semiconductors/Devices & Components

Further information
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-Low-Light Sensing

-Quantum Random Number Generation

-Magnetic-Field Sensing

-Quantum Measurements and Standards

Technology Validation:

In a series of 41 potential emitters, 15 were found to be single emitters and 26 were found not to be single emitters, allowing researchers to sift through large volumes of data and classify emitters as "good" or "bad" with 92% accuracy in less than two minutes, often less than 1 second.

Recent Publication:

"Rapid Classification of Quantum Sources Enabled by Machine Learning"

Journal of Advanced Quantum Technology

DOI: 10.1002/qute.202000067 â€‹

TRL: 3

Intellectual Property:

Provisional-Patent, 2020-11-15, United States

Provisional-Gov. Funding, 2021-12-02, United States

Utility-Gov. Funding, 2022-07-06, United States

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