Research Progress and Perspective of Quantum Networking and Sensing

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The National Quantum Initiative (NQI) Act calls for coordinated efforts to accelerate quantum information science (QIS) and technology research in the United States. The National Science and Technology Council Subcommittee on Quantum Information Science identified a need for deliberate collaborations to combine fundamental and applied research on quantum sensors toward bringing quantum sensors to fruition.

Quantum sensing is broadly defined as fundamental sensing and imaging science based on quantum phenomena. Due to the unique and peculiar properties of various quantum states, quantum sensors have the potential to exhibit sensing and imaging capabilities beyond current classical limitations. Such highly sensitive quantum sensors are greatly needed in various applications, including but not limited to national security, communication, and defense. This talk will provide an overview of recent progress in quantum sensing, highlight current challenges, and outline future research directions—particularly at the intersection of quantum sensing and quantum networking—aimed at realizing practical and deployable quantum sensor technologies.