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Quantum Spread Spectrum Communication TRAVIS HUMBLE, Oak Ridge National Laboratory — Spread spectrum techniques are widely used in classical contexts, including sensing and communication, for establishing low probability of intercept, resistance to narrowband jamming, and multiuser access protocols. In SS, the spectrum of the signal is spread much larger than the minimal information bandwidth to yield a boost in channel capacity. In this contribution, we apply SS modulation to the transmission and detection of the single-photon spectral probability amplitude (as opposed to SS of the field). We draw upon previous methods for coherently dilating single-photon spectral states to motivate our ideas. Techniques for direct modulation of the spectral amplitude, modulation via pumped single-photon up-conversion, and modulation via spread spectral teleportation are developed as particular modulation schemes for quantum spread spectrum communication. We quantify QSSC performance using the channel capacity and process gain expressed in terms of the spread bandwidth, and we investigate its behavior for a frequency-selective fading model. We conclude by discussing the potential for QSSC to underlie a QKD multiuser access control (MAC) protocol.

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