ABSTRACT

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In this effort, we present progress toward demonstrating a Decoy-State Quantum Key Distribution (QKD) source based on a polarization-modulator and a wavelength-stable attenuated pulsed laser. A three-state QKD protocol is achieved by preparing the quantum state polarization. The polarization-modulator-based QKD source improves security by removing several sources of side-channel attacks that exist when multiple sources are used to generate different QKD states. Here we present a QKD source design and an evaluation of critical subsystems characterized by the Quantum Bit Error Rate (QBER), Quantum State Tomography and achievable Key Rates. The QKD source is intended to operate within compact Size, Weight, and Power (SWaP) constraints. The Polarization-Modulator QKD source has applications in future mobile quantum networks such as Unmanned-Aerial Vehicles (UAV) and autonomous vehicles, as well as fixed fiber- based quantum networks.

Quantum mechanics can produce correlations that are stronger than classically allowed. This stronger– than-the classical correlation is the "fuel" for quantum computing. In 1991 Schumacher forwarded a beautiful geometric approach, analogous to the well-known result of Bell, to capture the non- classicality of this correlation for