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## **(G\*) (POS-6) Active Phase Compensation of Polarization Encoded Photons in Quantum Key Distribution**

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As the demand for secure communication has grown in recent years, so has the need for robust implementations of quantum key distribution (QKD). Polarization encoding schemes suffer from phase drifts when encoded pulses pass through optical fibres, making the use of active phase compensation essential. These drifts arise due to ambient temperature changes and mechanical stresses on the fibre, which are unavoidable, especially in applications where part of the source is exposed to outdoor temperatures or is connected to moving platforms. We propose a method of active phase monitoring that can be used with a phase compensation system for the quantum optical ground station which is aimed to do free-space polarization-based QKD with quantum satellites, as a part of the Quantum Encryption and Science Satellite (QEYSSat) mission. Rather than performing a complete tomography of the polarization states, we propose monitoring the polarization encoded pulses using only one basis. Active phase corrections are applied using a PID control loop that takes as input the results of the measurement results of the characterization system. Not only does this approach ensure accurate transmission of the polarization encoded qubits, the approach also simplifies the requirements on optical equipment which results in reducing the net cost while maintaining the high performance.

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