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Adaptive Quadrature Detection for Multicarrier Continuous-Variable Quantum Key Distribution¹ LASZLO GYONGYOSI, Budapest University of Technology, Hungarian Academy of Sciences, SANDOR IMRE, Budapest University of Technology — We propose the adaptive quadrature detection for multicarrier continuous-variable quantum key distribution (CVQKD). A multicarrier CVQKD scheme uses Gaussian subcarrier continuous variables for the information conveying and Gaussian sub-channels for the transmission. The proposed multicarrier detection scheme dynamically adapts to the sub-channel conditions using a corresponding statistics which is provided by our sophisticated sub-channel estimation procedure. The sub-channel estimation phase determines the transmittance coefficients of the sub-channels, which information are used further in the adaptive quadrature decoding process. We define the technique called subcarrier spreading to estimate the transmittance conditions of the sub-channels with a theoretical error-minimum in the presence of a Gaussian noise. We introduce the terms of single and collective adaptive quadrature detection. We also extend the results for a multiuser multicarrier CVQKD scenario. We prove the achievable error probabilities, the signal-to-noise ratios, and quantify the attributes of the framework. The adaptive detection scheme allows to utilize the extra resources of multicarrier CVQKD and to maximize the amount of transmittable information.

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