Coined quantum walk in quasimagnon phase space of Nitrogen-vacancy centers coupled to a flux qubit

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We examine the discrete time, coined-quantum walk in a hybrid system where an ensemble of nitrogen-vacancy centers in diamond is coupled to a superconducting flux qubit. Such hybrid systems are promising architectures for modern quantum protocols such as distributed quantum networking [1]. The qubit plays the role of the coin and the walker is realized as the phase degree of freedom for a quasi-magnon field. As being free of varying drive-pulse durations, the proposed model improves the existing models for implementing quantum walks in cavity and circuit quantum electrodynamics schemes [2,3] and it can be realized under realistic conditions.

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