Experimental measurement of n-time correlation functions in a trapped ion

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— We implement an algorithm to measure n-time correlation functions of the motional degree of freedom of a trapped 171Yb+ ion by following the proposal in Ref. [1]. The algorithm requires a system undergoing a time evolution and an ancillary qubit on which we perform conditional gates. We measure bosonic field correlations such as $g^{(1)}$ and $g^{(2)}$ functions. For the case of an electromagnetic field, $g^{(1)}$ and $g^{(2)}$ are well known in quantum optics as electric field and intensity correlation functions, respectively. This scheme can be extended to a system including also spins and used to characterize relevant physical magnitudes, such as linear response functions.


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