

Photonic implementation of the quantum Morra game

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The Morra game, an age-old non-cooperative game, traditionally played on one's hand, has proved to be a rich setting to study game-theoretic strategies, both classically and within the quantum realm. In this work, we study a faithful translation of a two-player quantum Morra game, which builds on previous work by including the classical game as a special case. We propose a natural deformation of the game in the quantum regime in which Alice has a winning advantage, breaking the balance of the classical game. A Nash equilibrium can be found in some cases by employing a pure strategy, which is impossible in the classical game where a mixed strategy is always required. We prepared our states using photonic qubits on a linear optics setup, with an average deviation $\leq 2\%$ with respect to the measured outcome probabilities. Finally, we discuss potential applications of the quantum Morra game to the study of quantum information and communication.