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An n-Bit adder realized via coherent optical parallel computing (Conference Paper)

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Abstract

The quantum properties of nanosystems present a new opportunity to enhance the power of classical computers, both for the parallelism of the computation and the speed of the optical operations. In this paper we present the COPAC project aiming at development of a ground-breaking nonlinear coherent spectroscopy combining optical addressing and spatially macroscopically resolved optical readout. The discrete structure of transitions between quantum levels provides a basis for implementation of logic functions even at room temperature. Exploiting the superposition of quantum states gives rise to the possibility of parallel computation by encoding different input values into transition frequencies. As an example of parallel single instruction multiple data calculation by a device developed during the COPAC project, we present a n-bit adder, showing that due to the properties of the system, the delay of this fundamental circuit can be reduced.