INTERACTION-FREE IMAGING

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We consider imaging of atoms - i.e.. their states - without transferring a single quantum of energy to the photons that serve as a carriers of the imaging. The process of imaging is carried out by atoms taking over the control of photon states depending on the states they are themselves in. In the quantum computation terminology, we obtain a nondestructive interaction-free atom-photon CNOT gate, i.e., a single atom device for manipulation of photon qubits without transferring any energy to them. The gate can also be used "in reverse" for controlling superposition of atom states, i.e., for a preparation of atom states in an interaction-free way.

Reference:

M. Pavicic, Quantum Computation and Quantum Communication: Theory and Experiments, Springer, New York, 2005.

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