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Two-Photon Coherent Atomic Absorption of Multiple Laser Beams MING-CHIANG LI, Liceimer — Physical processes on two-photon coherent atomic absorption of multiple laser beams were discussed about thirty years ago [M. C. Li, Bull. Am. Phys. Soc. 20, 654 (1975)]. These processes can be divided into two distinct groups. In the first group, laser beams are from a single source, and in the second group laser beams are from two different sources [M. C. Li, *Phys. Rev. A* **22** (1980) 1323]. Several experiments in the first group were carried out and have led to the 2005 Nobel Prize in physics. The second group is more interesting. Beside atoms are in random motion, two photons are from different sources. Classically, it is impossible for atoms to transit coherently in the absorption process, but quantum mechanically, such a transition is possible and that is one of the spooky phenomena in quantum mechanic. To assure the coherent transition, each photon as absorbed by the atom must have two possible paths of choices. If one photon has the choice and other one is not, then the atomic transitions cannot be coherent. Around1990, there were very active experimental pursuits on such a spooky phenomenon of two photons emitted from crystal parametric down conversion. The present talk will review various spooky phenomena associated with two-photon coherent atomic absorption. Hope that the talk will stimulate the interest on the long neglected experimental front on two-photon coherent atomic absorption from two different laser sources.

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