Service de Physique Nucléaire

Séminaire

le vendredi 5 novembre 2010 à 11h

CEA Saclay, Orme des Merisiers, Bât. 703, Salle 135

Testing the validity of Born's rule in quantum mechanics

Christophe Couteau

Institut de Nanotechnologie et d'Instrumentation Optique

Université de Technologie de Troyes

Quantum mechanics and gravitation are two pillars of modern physics. Despite their success in describing the physical world around us, they seem to be incompatible theories. There are suggestions that one of these theories must be generalized to achieve unification. For example, Born's rule - one of the axioms of quantum mechanics - could be violated. Born's rule predicts that quantum interference, as shown by a double-slit diffraction experiment, occurs from pairs of paths. A generalized version of quantum mechanics might allow multipath (i.e., higher-order) interference, thus leading to a deviation from the theory. We performed a three-slit experiment with photons and bounded the magnitude of three-path interference to less than 10^{-2} of the expected two-path interference, thus ruling out third- and higher-order interference and providing a bound on the accuracy of Born's rule. Our experiment is consistent with the postulate both in semiclassical and quantum regimes.

Le café sera servi 10 minutes avant

Contact : S.Platchkov@cea.fr Tel : 01 69 08 74 59

http ://irfu-i.cea.fr/Phocea/Vie_des_labos/Seminaires/index.php