

Local Realistic Theory for PDC Experiments

Based on the Wigner Formalism

Alberto Casado, Ramón Risco-Delgado, and Emilio Santos^a

Escuela Superior de Ingenieros, Universidad de Sevilla, 41092 Sevilla, Spain

^a Departamento de Física Moderna, Universidad de Cantabria, 39005 Santander, Spain.

Reprint requests to A. C.; Fax: 34 954 486003; E-mail: acasado@cica.es

Z. Naturforsch. **56 a**, 178–181 (2001); received February 11, 2001

Presented at the 3rd Workshop on Mysteries, Puzzles and Paradoxes in Quantum Mechanics, Gargnano, Italy, September 17 - 23, 2000.

In this article we present a local hidden variables model for all experiments involving photon pairs produced in parametric down conversion, based on the Wigner representation of the radiation field. A modification of the standard quantum theory of detection is made in order to give a local realistic explanation of the counting rates in photodetectors. This model involves the existence of a real zeropoint field, such that the vacuum level of radiation lies below the threshold of the detectors.

Key words: Parametric Down Conversion; Wigner Representation; Zeropoint Field; Local Realism; Bell's Inequalities.