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Laboratoire de mathématiques Jean Leray

Unité mixte de recherche 6629

SÉMINAIRE DE PHYSIQUE MATHÉMATIQUE

Jeudi 26 novembre 2015
Salle des séminaires à 16h00

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Triples of Pairwise Canonical Observables and generalized uncertainty relations.

Given a quantum particle on a line, its momentum and position are described by a pair of Hermitean operators (p, q) which satisfy the canonical commutation relation. There is a third observable r, say, contained in the Heisenberg algebra generated by p and q, which simultaneously satisfies canonical commutation relations with both position and momentum. The *Heisenberg triple* of the observables (p, q, r) is not only unique (up to unitary equivalences) but also maximal (no four equi-commutant observables exist). Being invariant under a cyclic permutation, the triple (p, q, r) endows the Heisenberg algebra with an interesting threefold, largely unexplored symmetry. I will briefly sketch why these considerations are important in the context of so-called *mutually unbiased bases*, and that they suggest to rethink Heisenberg's uncertainty relation by first generalizing it to an expression involving the product of three variances, and then to even more general functions thereof.