From classical to quantum models: the regularising role of integrals, symmetry and probabilities

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The talk focuses on the regularising role of integrals, symmetry and probabilities in building a quantum model from a classical one. This quantisation procedure will be described in simple terms through one of the most basic examples of
Mechanics. Starting from probability distribution(s) on the Euclidean plane viewed as the phase space for the motion of a point particle on the line, i.e. its classical model, I will show how to build corresponding quantum model(s) and associated probabilities (e.g. Husimi) or quasi-probabilities (e.g. Wigner) distributions. The regularizing rôle of such procedures based on Weyl-Heisenberg symmetry will be highlighted, with examples like motions with variable mass, smoothing of classical singular potentials, quantum angle or phase …