

MAR11-2010-004127

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

Isotropic States in Discrete Phase Space

WILLIAM WOOTTERS, Williams College

An energy eigenstate of a harmonic oscillator is isotropic in phase space, in the sense that the state looks the same along any ray emanating from the origin. It is possible to extend this notion of “isotropic” to quantum systems with finite-dimensional state spaces—the rays are then rays in discrete phase space. In this talk I present examples of discrete isotropic states and discuss their properties. One can show that every isotropic state minimizes a specific information-theoretic measure of uncertainty with respect to a complete set of mutually unbiased bases. Numerical results on a certain class of isotropic state vectors suggest that their components, in any of those same mutually unbiased bases, exhibit a semicircular distribution when the dimension of the state space is large.