Prasanta K. Panigrahi
Indian Institute of Science Education and Research Kolkata, India

Title: The broken and unbroken phases of PT-symmetry and supersymmetry in quantum mechanics

Abstract: We consider PT-symmetric quantum mechanical potentials, having an underlying supersymmetry (SUSY). The eigenspectra of both the broken and unbroken phases of PT-symmetry are analytically obtained through SUSY and shape invariance (SI). The SI is characterized by real and imaginary parametric shifting for unbroken and broken phases of PT, respectively. The use of SUSY and PT is shown to yield several complex potential systems, originating from Coulomb, Pöschl-Teller, and other solvable problems. In PT-symmetric phase, spontaneous breaking of SUSY is observed in some parametric domains, which lead to non-trivial shape invariances to obtain the energy spectra. A conserved non-local correlation in PT-symmetric problems is shown to explain observed transmission and reflection behavior in optical systems, possessing PT-symmetry. Interestingly, the stationary states with real energy emerge in the PT-symmetric phase. The correlation also plays a crucial role in the broken PT case, having the complex conjugate energy eigenvalues and the corresponding states related.