

The abstract quantization problem is to assign to a classical system, often represented by a Hamiltonian group action on a symplectic manifold an irreducible unitary representation. The converse problem is to recover a “classical” picture from a given unitary representation. In this talk we discuss the idea to consider for a unitary representation  $\pi: G \rightarrow U(H)$  of a real Lie group  $G$  complex orbits in the projective space  $P(H)$  of  $H$ . This leads to the concept of a coherent state (CS) representation. For most finite-dimensional groups CS representations are essentially the same as highest weight representations and this leads to a very nice interplay between convexity properties of coadjoint orbits and complex geometry. We shall also discuss generalizations to certain infinite-dimensional groups where the coadjoint orbits are manifolds are restricted manifolds of finite flags in Hilbert spaces.