

Gelfand Triplets, Lie Algebras and Quantum Mechanics

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After the definition of Gelfand Triplets (or Rigged Hilbert Space), we give some examples thereof. Then, we claim that Gelfand triplets are an interesting structure for the foundations of quantum mechanics. In fact, it contains four basic ingredients used in textbooks: Special Functions, Symmetry groups and their Lie algebras and discrete and continuous basis. We have developed several examples. We here present the two more elaborated: Zernike functions, $su(1,1) \oplus su(1,1)$, bases on the Hilbert space $L^2(\mathcal{D}, r dr d\theta)$, where \mathcal{D} is the unit disk in the plane. The other one includes the Normalized algebraic Jacobi functions and $su(2,2)$.