Abstract

Exact solutions of non-trivial Schrödinger equations are crucially important for both theory and applications. In fact, the unique source of these solutions is the Olshanetsky-Perelomov quantum integrable Hamiltonians (rational and trigonometric) emerging in the Harish-Chandra theory (the Hamiltonian Reduction Method). A Lie-algebraic theory of these solutions can be developed. It can be shown that all $A - B - C - D$ Olshanetsky-Perelomov Hamiltonians (both rational and trigonometric) come from a single quadratic polynomial in generators of the maximal affine subalgebra of the $\text{gl}(n)$-algebra but unusually realized. The memory about the $A - B - C - D$ origin is kept in coefficients of the polynomial. For the case of exceptional $E_8 - E_7 - E_6 - F_4 - G_2$ and $H_3$ Olshanetsky-Perelomov Hamiltonians unknown infinite-dimensional algebras admitting finite-dimensional irreps appear. Their eigenfunctions are polynomials. They span a linear space which is invariant wrt specific (weighted)-projective transformations.

Lie-algebraic theory allows to construct the 'quasi-exactly-solvable' generalizations of the above Hamiltonians where a finite number of eigenstates is known algebraically. A general notion of (quasi)-exactly-solvable spectral problem is introduced.

Refreshments will be served in the Math Library Lounge at 4:00 p.m.