PURDUE UNIVERSITY

Department of Mathematics Colloquium

Speaker:	Professor Alexander Turbiner, Instituto de Ciencias Nucleares, UNAM, Mexico
Title:	"Solvable Schroedinger Equations and Representation Theory"
Date:	Tuesday, October 27, 2009
Time:	4:30 P.M.
Place:	MATH 175

Abstract

Exact solutions of non-trivial Schroedinger 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 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 $E8-E7-E6-F4-G2$ and H3 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.