Abstract

The Kepler problem is the physics problem about two bodies which attract each other by a force obeying the inverse square law. (Quantum mechanically this is the Coulomb problem for the hydrogen atom.) Two discoveries were made about this problem in the 1960’s: 1) its Hilbert space of bound states is a representation of the conformal group $SO(2,4)$ for the (conformally compactified) Minkowski space; 2) it has magnetized cousins, indexed by discrete magnetic charges. It was realized in the early 1970’s that the Hilbert space of bound states for each of those magnetized cousins is also a Rep of $SO(2,4)$ or its double cover. With hindsight those Reps are precisely the unitary highest weight Reps with the minimal positive Gelfand-Kirillov dimension, moreover the correspondence between magnetic charges and Hilbert spaces resembles Howe’s theta-correspondence for representations.

In recent years it was gradually realized that the above God-given example has a vast generalization in which the Minkowski space is replaced by a simple euclidean Jordan algebra (called a generalized space-time by physicists). This vast generalization actually covers all unitary highest weight Reps, and it provides a new vantage point for the rich mathematics surrounding symmetric domains. Here is a message we wish to convey in this talk: behind the deceiving simplicity of the Kepler problem, there is a rich mathematics.

Wednesday, 1 December 2010
4:00 pm
Smith Hall 204
Tea and refreshments will be served at 3:45pm.
http://math.newark.rutgers.edu/~xiaowwan/Colloquium/