THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

Moser Regularization Map and Symmetry Group of the Kepler Problem

By

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Abstract (*)

The n-dimensional classical Kepler problem has energy, angular momentum, Laplace-Runge-Lenz (LRL) vector as its integral of motions. Among which, the symmetry group SO(n) generated by angular momentum is explicit in the phase space, while that generated by LRL vector is implicit. Moser regularization map \( \iota_E: \Sigma_E \rightarrow (TM_E)_1 \) is a canonical transformation from the energy surface \( \Sigma_E \) of the Kepler problem onto a dense open subset of \( (TM_E)_1 \), the tangent bundle \( TM_E \) restricted to the cross sections with tangent vector magnitude = 1, where \( M_E \) is a sphere if \( E<0 \), a Euclidean space if \( E=0 \), and a pseudosphere if \( E>0 \). This map respects the symmetry group, so that the implicit symmetry in the phase space pushforwards to the explicit symmetry in the regularized space, which is SO(n+1) if \( E<0 \), ISO(n) if \( E=0 \), and SO_0(1,n) if \( E>0 \).

Date : 10 May 2024 (Friday)
Time : 4:30pm
Venue : Room 4475 (Lifts 25/26)

All are Welcome!