

BENEMÉRITA UNIVERSIDAD AUTÓNOMA DE PUEBLA



**INSTITUTO DE FÍSICA
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**SEMINARIO
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**EQUIVALENT HAMILTONIAN SYSTEMS: NEW
PHYSICS AT LAGRANGIAN LEVEL?**

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In this work we use the Hamilton-Jacobi theory to show that locally all the hamiltonian systems with n degrees of freedom are equivalent. That is, there is a canonical transformation connecting two arbitrary hamiltonian systems with the same number of degrees of freedom. This result in particular implies that *locally all the hamiltonian systems are equivalent to that of a free particle*. We illustrate our result with two particular examples; first we show that the one-dimensional free particle is equivalent to the one-dimensional harmonic oscillator and second that the two-dimensional free particle is equivalent to the two-dimensional Kepler problem.

These simple examples show that the *Hamiltonian formulation, via Canonical transformations which are not point transformations, allows to introduce new physics at Lagrangian level*.

**Auditorio-IFUAP
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