Institutul Național de Fizică și Inginerie Nucleară
Horia Hulubei

IFIN-HH

Seminar general

Curved Space, Covariance, Motion and Quantization

Marian Apostol

IFIN-HH, DFT

Weak forces and non-inertial motion are equivalent with the free motion in curved spaces. The "principle of equivalence" is applied to non-inertial motion. It may lead to a new stream of investigation in the field theory. Examples are given for translations and rotations and the Hamilton-Jacobi equation of classical free motion in curved spaces is reviewed. Motion depends on observer, and covariance may ensure a "universal subjectivity" (or "inter-subjectivity"). Motion as a coordinate transform, following Einstein's views, is analyzed. Its limits are emphasized. Classical motion is solved, with curved-space corrections arising from forces and non-inertial motion. The analogy with gravitation is everywhere discussed, but a larger vision is emphasized, regarding the equivalence of the non-inertial motion and curved spaces. It is shown that quantization introduces a deep change. The quantum motion in curved space consists essentially of quantum transitions. The fields theory provides the suitable framework. Examples are given of such transitions for a scalar field and for photons.

1 Weak forces and non-inertial motion; 2 Curved space, free motion;
3 Translations and rotations; 4 Hamilton-Jacobi in curved space;
5 Quantization, Klein-Gordon, Dirac, etc;
6 Quantum transitions; 7 Scalar fields and photons

Miercuri 12.12.2007, ora 11^{00}
Sala de seminar DFN - TANDEM