FEZA GÜRSEY INSTITUTE

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Projective Structure in Differential Geometry and Physics

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Time: 14.00

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Abstract: This talk asks the following question. Suppose M is a manifold and g and g' are Lorentz metrics on M with Levi-Civita connections D and D', respectively. Suppose that the unparametrised geodesic paths on M for D and D' are the same. How are g and g' (and D and D') related? [By an "unparametrised" geodesic path is meant the actual geodesic path in M, ignoring the parameter of the path.]

This talk is of interest as a mathematical question in pure differential geometry and also in general relativity theory because of the Newton-Einstein principle of equivalence. The idea is to show that for many situations, D and D' are tightly related as also are g and g' and in many cases, the "best possible" result, D=D', follows.

The plan of the talk is to discuss, firstly, some general techniques for approaching this problem and second, to introduce holonomy theory as a convenient and powerful tool for solving it. In many cases holonomy theory can resolve the problem for the relationship between g and g' if D=D'.