8.26 Simple Model of Big-Crunch/Big-Bang Transition

by P.Małkiewicz and W.Piechocki

We present classical and quantum dynamics of a test particle in compactified Milne space. The background spacetime includes one compact space dimension undergoing contraction to a point, followed by re-expansion. Quantization consists in finding a self-adjoint representation of the algebra of particle observables. Our model may offer some insight into the nature of the cosmic singularity [1].

[1] P.Małkiewicz and W.Piechocki, gr-qc/0507077

8.27 Winding Strings in Singular Spacetimes

by M.Pawłowski, W.Piechocki and M.Spaliński

The evolution of winding strings in spacetimes with cycles whose proper lengths depend on time is examined. It was established earlier that extended objects wrapping the shrinking dimension in compactified Milne spacetime enjoy classically nonsingular evolution.

Extensions of the observation to other spacetimes are discussed [1].

[1] M.Pawłowski, W.Piechocki and M.Spaliński, hep-th/0507142

8.28 On Three Quantization Methods for Particle on a Hyperboloid

by J-P.Gazeau[1)], M.Lachieze-Rey[2)] and W.Piechocki

We compare the respective efficiencies of three quantization methods (group theoretical, coherent state and geometric) by quantizing the dynamics of a free massive particle in two-dimensional de Sitter space. For each case we consider the realization of the principal series representation of $SO_0(1,2)$ group and its two-fold covering SU(1,1). We demonstrate that the standard technique for finding an irreducible representation within the geometric quantization scheme fails. For consistency we recall our earlier results concerning the other two methods, and make same the improvements and generalizations [1].

[1] J-P.Gazeau, M.Lachieze-Rey and W.Piechocki, gr-qc/0503060

1) Boite 7020, APC, CNRS UMR 7164,Univ.Paris 7 Denis-Diderot, France
2) APC, CNRS UMR 7164, Service d'Astrophysique C.E. Sacley, France

8.29 Some Half-BPS Solutions of M-theory

by M.Spaliński

It was recently shown that half BPS-solutions of M-theory can be expressed in terms of a single function satisfying the 3d continuum Toda equation. In this paper [1] half-BPS solutions corresponding to separable solutions of the Toda equation are examined. There are four types of separable solutions. Most of them have singularities, apart from a one parameter family. The paper gives some examples and identifies them with known cases where the singularities have a physical interpretation in terms of additional degrees of freedom. The paper also briefly mentions a family of non-separable solutions of the Toda equation discussed by Calderbank and Tod.

[1] M.Spaliński, Physics Letters B, *in press*

8.30 One Parameter Family of Additive Energies and Moment in 1+1 Dimensional STR

by M.Pawłowski

The velocity dependence of energy and momentum was studied. It was shown that in the case of STR in the space-time of only one spatial dimension, the standard energy and momentum definitions can be naturally modified without lost of local Lorenz invariance, conservation rules and additivity for