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3d Matter Coupled to Chern-Simons Field, Spontaneous Breaking of Scale Invariance and Fermion-Boson Mapping

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The singlet sector of vector, large N , 3d field theory corresponds to Vasiliev higher spin theory on AdS_4 . Will discuss three dimensional $U(N)$ symmetric field theory with fermion and boson matter coupled to a topological Chern-Simons field. In the presence of a marginal deformation will determine the conditions for the existence of a phase with spontaneous breaking of scale invariance. In this phase the ground state contains massive $U(N)$ quanta and a massless $U(N)$ singlet bound state goldstone boson - the Dilaton. Will show that such a phase appears only in the presence of a marginal deformation. The massless Dilaton appears in the spectrum provided certain relations between coupling constants are satisfied. Will discuss the fermion-boson mapping and show that the conditions for spontaneous breaking of scale invariance in the boson and fermion theories are copies of each other.

Will present recent progress on the older papers:

M M and J. Zinn-Justin JHEP 1501 (2015) 054 arXiv:1410.0558 [hep-th]

W. A. Bardeen and M M JHEP 1406 (2014) 113 arXiv:1402.4196 [hep-th]

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