Research programme for Antal Jevicki/Jean Avan

The research project proposed by Antal Jevicki is twofold, and is articulated around the general thematics of building and studying effective field theories relevant in the description of quantum gravity.

The first aim is to continue the construction of Higher Spin Gravity using Large N Quantum Field Theories. AJ has in the last several years (see references 107-109 sqq in Publication list) addressed the question of developing constructive maps in general for the Gauge/Gravity Correspondence in terms of collective fields. In the light-cone frame (and very recently also in time-like frame) he managed to accomplish such construction in several published papers.This establishes a duality between Higher Spin theories considered as alternative to String Theory and O(N) Field Theories known from 3D Critical Phenomena, proviging a strong incentive to further our investigations of these duality aspects. Duality (of various kinds) seems to play a key role in many recent developments of string theory (see also Avan, Doikou and Sfetsos, Nucl. Phys. B840 [FS], 469-490, 2010) and we therefore aim at clarifying its exact relevance in this context.

The second aspect which we wish to investigate is a continuation of our joint collaboration on the dynamical system of integrable spiky strings in AdS space-time. We have long suspected that the dynamics of these spikes may be described consistently by the higher Poisson structures (in Magri sense) of a Ruijsenaar-Schneider type N-body problem, and we have constructed (Ref 104, J.Phys. A 43: 185201, 2010) Poisson structures and Hamiltonian densities for continuous limit of various related integrable N-body problems (rational and trigonometric Calogero-Moser model, and rational Ruijsenaar Schneider model). It turned out that the trigonometric RS model (relevant to our issue) is much more difficult to handle; in addition its hierarchy of Poisson structures was shown to be (cf Avan and Ragoucy, Letters in Mathematical Physics **101**, 85-? , 2012; SIGMA **8**, 079, 2012) only describable in terms of a yet unknown, dynamical r-matrix formulation itself related to a third type of dynamical quantum reflection algebra (twisted DRA). We plan to revisit the issue at the light of these new developments.