PREDRAG STOJKOV *Research*

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My current research is centered on the methods of evaluation and approximation of the exact representations of Green's functions $G_c(x, y|A)$ in arbitrary external fields; and, in particular, I have devised an independent counterpart to the recent non-perturbative, eikonal-inspired approximations to $G_c[A]$ of Fried&Gabellini, and have been able to apply these new techniques to triviality of ϕ^4-model (in $D = 4$), and to gauge and gravitational fields; first paper on these methods is submitted to Physical Review D (and is accessible from Lanl bulletin board under the name hep-th/9706135), and subsequent two papers are in the preparation.

My PhD. thesis contains application of these methods in case when external fields are of any tensorial order. These results are compared with the corresponding classical (non-quantum) solutions. Special attention is given to effects of the plane wave external fields, especially electromagnetic lasers and gravitational waves, on particles and fields (such as an electromagnetic laser in the gravitational wave background); a paper on this subject is also in preparation.

Non-linear dynamical systems, in particular the search for the control mechanisms of quantum and classical chaos, are among my main interests. I am exploring along two lines: firstly, exploiting exact Green's functions in external fields (that research is guided by my adviser); and secondly, exploring effective classical systems resulting from suitable truncations of full quantum systems (along the lines recently initiated by Sadov). This second line of research is performed in colaboration with P. Nešković. The report on that research is in preparation.

One research project related to the study of the Green's functions $G_c[A]$ is the derivation of methods to evaluate (path) ordered exponentials, which appear naturally in gauge theories such as QCD. These results will be included in my thesis.

Another research project that I have performed at Brown (under my own direction) is in Weyl-Moyal's approach to quantization. In particular, I have found some simple intriguing results in application to statistical systems. A paper with these results is in preparation.

Finally, I should mention a long-term, research interest in deformed symmetries: preservation (paying price of nonlinearity) of symmetries upon deformations of underlying objects I have set of intriguing results concerning mainly nondynamical systems such as algebraic surfaces and statistical Hamiltonians. My goal is to understand equivalent phenomena arising in case of dynamical systems (ODEs, PDEs, classical field theories), and their change upon quantization. Results I have obtained for such systems are still not transparent, and are not in the form suitable for publication yet.

I should also mention some work accomplished before coming to Brown on BV quantization of constrained (superparticle) systems; symmetry present in non-linear optical systems; and numerical studies in chaotic mappings. References for these studies are in the Publication list, enclosed.