

# CURRICULUM VITAE

## I. General data

### *I.1. Biographical data*

Family name and first name: IORDACHE MARIUS

Date and place of birth: 9.03.1972, Segarcea, Dolj county

### *I.2. High School*

During 1986-1990 I was enrolled at the High School no. 1 from Craiova. In June 1990 I graduated from the same institution by passing the final exam.

### *I.3. Academic studies*

During 1990-1995 I was enrolled at the Faculty of Sciences, Physics section, University of Craiova. I passed the final exam at the same faculty in June 1995.

### *I.4. Mastership studies*

In 1995 I was admitted at the mastership programme “Quantum Field Theory”, organized at the Faculty of Sciences, University of Craiova. I graduated this programme in June 1996, after defending my master thesis.

### *I.5. Ph.D. studies*

Beginning with November 2001 I am a Ph.D. student in Physics at the University of Craiova.

## II. Scientific activity

### *II.1. Approached problems*

The main topic approached is Quantum Field Theory, with emphasis on the Becchi-Rouet-Stora-Tyutin (BRST) quantization of gauge theories. Within this topic, I investigated the following subjects:

- 1) the irreducible BRST analysis of topological Yang-Mills fields;
- 2) the construction of interactions between a BF model and a massless tensor field with the mixed symmetry  $(2, 1)$ ;

- 3) the analysis of couplings between a topological BF model and a massless Rarita-Schwinger field.

## *II.2. Main results*

- Although reducible, topological Yang-Mills models can be approached within the BRST formalism for irreducible gauge theories. This implies the implementation of the following main steps: i) the construction of an irreducible model associated with the original, reducible one; ii) establishing the equivalence between the reducible and irreducible models at the level of the classical observables; iii) the BRST quantization of the irreducible model. The irreducible analysis has been implemented at both Lagrangian and Hamiltonian levels.
- The construction of interactions (in  $D = 5$ ) between a BF model and a massless tensor field with the mixed symmetry  $(2, 1)$  was realized by using the method of deformation of the solution to the classical master equation combined with cohomological techniques. The main working hypotheses employed during the construction of interactions are: spacetime locality, Poincare invariance, analyticity of deformations in the coupling constant, and the preservation of the number of derivatives on each field. In this context, we obtained the following results: a) the resulting Lagrangian action contains only interactions vertices of order one in the deformation parameter that couple the massless tensor field with the mixed symmetry  $(2, 1)$  to one of the two-forms and respectively to the three-form from the BF field sector; b) there appear some selfinteractions within the BF sector at order two in the coupling constant that are precisely generated by the presence of the mixed symmetry tensor field; c) the gauge transformations of all fields are deformed (this is the first case where the gauge transformations of the tensor field with the mixed symmetry  $(2, 1)$  get modified if compared to the free ones); d) the accompanying gauge algebra is non-Abelian (open); e) the reducibility relations are also deformed and only close on the surface of interacting field equations.
- In order to infer the couplings (in  $D = 4$ ) between a BF model and a massless Rarita-Schwinger field we used the same method and hypotheses like in the previous case. The main results obtained can be

synthesized in: u) the emerging Lagrangian action contains only interaction vertices of order one the coupling constant, which couple the Rarita-Schwinger spinors to one of the one-forms from the BF sector in a ‘background potential’ (an arbitrary function depending only on the undifferentiated scalar field); v) the gauge transformations of all fields, excepting the one-form coupled to the Rarita-Schwinger spinors, are deformed; w) the gauge algebra is open; x) the reducibility relations are also deformed and only close on the surface of interacting field equations; y) the interacting model exhibit certain similarities with conformal SUGRA  $N = 1, D = 4$ .

### III. Selected papers

1. C. Bizdadea, M. Iordache, S. O. Saliu, E. N. Timneanu, An Irreducible BRST Approach to Topological Yang-Mills Theory, *Helv. Phys. Acta* **71** (1998) 262
2. C. Bizdadea, E. M. Cioroianu, S. O. Saliu, S. C. Sararu, M. Iordache, Four-dimensional couplings among BF and massless Rarita-Schwinger theories: a BRST cohomological approach, *Eur. Phys. J.* **C58** (2008) 123
3. C. Bizdadea, E. M. Cioroianu, A. Danehkar, M. Iordache, S. O. Saliu, S. C. Sararu, Consistent interactions of dual linearized gravity in  $D = 5$ : couplings with a topological BF model, *Eur. Phys. J.* **C** (2009) DOI [10.1140/epjc/s10052-009-1105-0](https://doi.org/10.1140/epjc/s10052-009-1105-0), <http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1140/epjc/s10052-009-1105-0>

### IV. Teaching experience

Beginning with Octombrie 1996 I teach Physics in elementary (non-academic) school. At present, I am hired at the School no. 188, Bucharest.

12.09.2009

Marius IORDACHE