

To whom it may concern

Reference letter on the Dissertation

of Dr. Nikolay Minkov Petrov

by Prof. DSc. Dr. Pavel P. Petkov

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I did examine the Dissertation of Dr. Minkov for acquiring the degree of Doctor of sciences, and I have been impressed by both the deepness and wideness of his contributions to Nuclear structure physics. Excluding the worldwide recognition of his achievements, my statement has also to be viewed in the context of the atmosphere and conditions for innovating work at the Institute for Nuclear Research and Nuclear Energy in Sofia. This means without saying too much that I am quite aware what the latter represent by themselves, based on about 30 years of working at the INRNE.

Let me start with the scientific deepness of the works included in the Dissertation of Dr. Minkov. Everybody will agree that Physics is a precise empirical science trying to explain Nature in terms of a more or less complex mathematical apparatus. That means every attempt for explanation, accompanied by claims for originality by a theoretician, should be accompanied by a well defined in technological sense way to calculate/extract observable quantities and confront them with experimental data. Therefore concise and allowing repetition/checks by other theory groups models have to be presented in peer-reviewed publications proving the advances made in the understanding of the correspondingly treated subject. In the case of Dr. Minkov, the subject is Nuclear Structure, and his main contributions may be enumerated as follows mentioning only the general lines in his studies:

- Description of the ground band-gamma band mixing which goes beyond the approach presented the fundamental works of Bohr and Mottelsson.

- Detailed theoretical investigation of the X(5) and E(5) shape/phase transitions

- Description of phenomena related to the coupling of quadrupole and octupole collective degrees of freedom in even-even nuclei

- These quantitative studies were extended to odd-mass nuclei where a particle couples to a core undergoing quadrupole/octupole excitation.

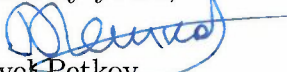
Concerning the wideness of the studies of Dr. Minkov, the most striking feature is the accommodation within one scientific program of approaches as different as applications of group theory and geometrical viewing of the nucleus which is closer to the traditional treatment in collective excitation terms by Bohr and Mottelsson.

The interconnections between these approaches is originally revealed by the author, adding his contribution to this interesting field, by the investigation of the X(5) and E(5) critical point symmetries.

The personal contribution of Dr. Minkov to the publications included in the Dissertation cannot be subject for any doubt, due to his leading place in the authors list in the overwhelming number of cases and the relatively small number of co-authors. Thus, I counted 18 cases where Dr. Minkov is the first author in papers published in physical journals with impact factor. Especially promising is the last publication of that type: Physical Review Letters 118 (2017) 212501, dedicated to a very famous isomerism in ^{229}Th .

Without being fully exhaustive, but highly convinced, I consider that Dr. Minkov, with the studies he performed and the perspective he has for the future, deserves an immediate recognition of his Doctor of Sciences degree.

Sincerely yours,



Pavel Petkov

20.10.2017, Morel, Romania