

Opponent's report on the habilitation thesis by Dr. Evgeni Kolomeitsev

Many-body aspects on neutron star physics

My first impressions from the dissertation were very positive and that continued with reading it. For me, the dissertation is a well written introduction to neutron stars with a lot of helpful references (Chapter 2) which continues with chapters dedicated to specific topics where the author made his contributions. I appreciate the structure of the dissertation where the topic is firstly exposed with proper references and then the author's contribution is explicitly explained with reference to the paper reprinted in the dissertation. All the papers show a clear scientific professionalism and are published in traditional and appreciated journals of the community, like the most frequent Phys. Rev. C. (that may fluctuate in "fashionable" evaluation by WOS etc.). I highly appreciate author's invention to apply different methods of the theoretical nuclear physics to move our understanding of such exotic objects as neutron stars. I do observe for several decades the difficulty of the nuclear theory, where many relatively basic questions like the details of nucleon interactions or hadron behavior in nuclear environment remain not satisfactorily explained and described. The underlying theory exists (QCD), but it is extremely difficult to make calculations in non-perturbative regime. I don't want to comment the particular papers reprinted, but a nice example of the effort and also of the collaboration within the community is the paper A3: "Constraints on the high-density EOS ...". The author list of this paper also confirms, that Dr. Kolomeitsev is respected member of the nuclear theory community.

The citation report shows a very good response of the community to author's work, by far exceeding the requirements. Author describes very well fruits of his scientific activity and papers appreciated by himself, I can only applaud. The conference talks are listed by means of published conference proceedings, invited talks and lectures are not frequent and took place only at JINR Dubna in last years. This is probably related to the career evolution where positions at Rossendorf, Darmstadt, Trento, Copenhagen, Minneapolis and Darmstadt again led finally to finding home at Banská Bystrica. Does it mean that Dr. Kolomeitsev became a hermit in Slovakia? I hope not – his scientific productivity continues, he was able to find new collaborators, he led several grant projects, he takes care for international project promising new perspectives (like "The multi-messenger physics and astrophysics of neutron stars"). All that convinces me that he fulfills the requirements for habilitation: to be the respected scientific personality.

Criteria for the habilitation require also some experience with teaching: The pedagogical activity of the candidate is strongly influenced by the orientation of his department at Matej Bel University to prepare the future teachers of physics. The list of his lectures and seminars covers almost all the advanced subjects of future-teacher's studies – from higher mathematics to quantum mechanics and "modern physics". I will be very interested to learn the manner in which he as the professional physicist transforms his knowledge, orientation in physics, international experience and curiosity to education of future teachers, and what is the student's response to his efforts, but there is no information on that in the materials.

There is also a clearly missing part of the standard academic activity in his CV – the supervision of qualification thesis, especially PhD's. I do understand that it might be almost impossible to bridge the gap between the standard teacher's studies and his scientific interests, but in my opinion this is

both a challenge and a duty for his academic career at given place. I don't see this deficiency to be an obstacle for habilitation, but rather a strong requirement for the future.

In summary, I support with confidence the habilitation (vymenovanie za docenta) of Dr. Evgeni Kolomeitsev .

Prague, August 17th, 2022

Assoc/ Prof. RNDr. Jiří Dolejší, CSc.
Institute of Particle and Nuclear Physics
Faculty of Mathematics and Physics, Charles University, Prague