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CHARLES UNIVERSITY
To whom it may concern

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Report on the habilitation thesis by Dr. Tomás Novotný "Noise and Full Counting Statistics of electronic transport through interacting nanosystems"

The thesis is based on 18 original papers by Dr. Tomás Novotný published in high-level research journals and aimed at analysis of fluctuations and noises in electrical transport through nanoscopic electronic and electromechanical devices. The topic is definitely important, especially for novel devices for quantum technologies since noises both inside the device and in its environment can destroy coherent operation. I feel confident in the research by Dr. Novotný because it overlaps with my own interests and therefore I followed his research during many years. It is explicitly stated in the thesis that only the papers where the contribution of Dr. Novotný is essential are included.

An important and interesting feature of quantum transport in nanodevices is that statistics of the noises can be essentially non-Gaussian. Therefore, studies of higher (than the second-order) correlation functions allows for additional information about basic physics of the quantum transport. This is the task of the research direction, which is now called the full counting statistics. This is a difficult field for both theory and experiment. From pure theoretical point of view, one needs significant development of the methodology to account for non-Markovian evolution of the density matrix of the system. In this direction, one should mention the seminal paper P.6 (144 citations in the Web-of-knowledge) where a proper methodology has been worked out. From experimental point of view, measurement of higher correlation functions is a hard task since it requires very cold detectors and linear amplifiers. Still, it is worth the efforts since novel information on quantum transport can be extracted.

In many nanodevices, in particular in those containing carbon nanotubes and graphene sheets, electrical and mechanical degrees of freedom can be strongly coupled resulting in non-trivial kinetics of fluctuations and unusual higher correlations. Nano-electromechanical devices were addressed in several papers included in the present thesis (P.1-P.5). Among these papers, I would like to mention specially the paper P.3, which has collected 108 citations.

In the thesis, the author properly comments the submitted original papers and explains main accomplishments. I would like to stress that writing such an introduction is not an easy task since all

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the papers contain rather complicated and non-trivial `theoretical machinery'. I think that the author has accomplished this task – the text is consistent and clear.

To summarize, I am convinced that Dr. Tomás Novotný is a highly qualified specialist in the theory of DC and AC quantum transport through nanostructures including physics of fluctuations and noises. He has produced a noticeable research output; many of his papers have collected impressive number of citations. He is also successful in training students and supervising postdocs, as it follows from joint publications.

I cannot evaluate Dr. Novotný as a class teacher. However, his conference talks, which I attended, were comprehensive and clear. Therefore, I expect that his is also good as a class teacher.

In conclusion, based on the habilitation thesis and on my personal impressions, I am convinced that Dr. Tomás Novotný possesses qualifications at a professor level. His habilitation thesis, in my opinion, meets all the international requirements. Hence, I enthusiastically support his work.

Sincerely yours,

[redacted]

Yuri Galperin,

Professor emeritus,
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