Tomas Jungwirth
Head of the Department of Spintronics
and Nanoelectronics
Institute of Physics AS CR, v.v.i.
Cukrovarnicka 10
CZ-162 53 Praha 6, Czech Republic
Telephone +420 220 318 457
Fax +420 233 343 184

Professor
School of Physics and Astronomy
University of Nottingham
University Park
Nottingham NG7 2RD, UK
Tel: (+44) (0) 115 951 5169
Fax: (+44) (0) 115 951 5180

Reference letter for Lukáš Nádvorník's Ph.D thesis.

It is my pleasure to write this reference letter for Lukáš Nádvorník's Ph.D thesis. Lukáš has been an outstanding graduate student at the Faculty of Mathematics and Physics of the Charles University in Prague. His Ph.D. research has been carried out in the Institute of Physics of the Academy of Sciences of the Czech Republic under my supervision.

Lukáš has made remarkable achievements in his Ph.D research. He has performed an extensive experimental study of spin related phenomena in non-magnetic semiconductor heterostructures. His results provide a new picture of the basic physics limitations on spin life-times and diffusion-lengths in these systems and a prospect for future applications in electrically controllable solid-state polarimeters. Lukáš performed his work using materials development, device nano-fabrication, magneto-transport, and magneto-optical experimental facilities of the Joint Laboratory of Opto-spintronics of the Faculty of Mathematics and Physics of the Charles University and the Institute of Physics of the Academy of Sciences of the Czech Republic. For performing selected optical measurements, Lukáš also visited Cavendish and Hitachi Laboratories in Cambridge. Lukáš took the leading role in all these diverse experimental tasks, as well as in the theoretical interpretation of the measured data, which illustrates his talent and remarkable work ethic. As a result, Lukáš has not only generated high quality results during his Ph.D. research but has also become a scientist with exceptionally deep and broad research skills.

Lukáš has published his results in two Physical Review B papers and in an article in Scientific Reports (Nature Publishing Group). He has presented his results at numerous international conferences, winning the best oral presentation, best poster presentation, or best student paper prizes. In 2016 he received the Milan Odehnal Award for Young Physicists of the Czech Physical Society.

His Ph.D thesis contains the original published results, as well as a number of additional details providing an introduction into the field of spin-dependent phenomena in

semiconductor heterostructures, describing the employed techniques, and presenting further data. The thesis is very comprehensive, well organised, and of exceptional scientific value.

Sincerely,
Tomas Jungwirth, Prague, September 4, 2016