

<b>Masaryk University</b>	
<b>Faculty</b>	Faculty of Science
<b>Procedure field</b>	Mathematics - Geometry
<b>Applicant</b>	Mgr. Lenka Zalabová, Ph.D.
<b>Applicant's home unit, institution</b>	Jihočeská univerzita v Českých Budějovicích
<b>Habilitation thesis</b>	Filtered Manifolds with Distinguished Transformations and Transformation Groups
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### Evaluation of the applicant's scholarly/artistic qualifications

Mgr. Lenka Zalabová, Ph.D., born 15.1.1979 in Třebíč, received her Ph.D. in 2007 in Geometry, topology and global analysis (Faculty of Science, Masaryk University, Brno, supervisor prof. Jan Slovák). Her professional experience include assistant professor at Faculty of Applied Informatics, Tomas Bata University in Zlín (2007-08), postdoc position at the Erwin Schrödinger Institute for Mathematical Physics, Vienna (2008-09), assistant professor at Institute of Mathematics, Faculty of Science, University of South Bohemia in České Budějovice (since 2009), researcher at Department of Mathematics and Statistics, Faculty of Science, Masaryk University in Brno (since 2017).

The primary area of scientific interest of Dr. Zalabová is parabolic geometries, their symmetries, geometric properties, and applications in geometric control theory. Her main results include a complete classification of symmetric filtered manifolds and a description of their geometric properties. These results are evaluated in the opponent report of J. Wolf "... she has been an important developer in the field (parabolic geometries). Many important facts on symmetries of parabolic geometries are her research results. Most of them required new ideas and technical insight, and they show that she has the mathematical strength to continue developments of her work on symmetries of parabolic geometries and related topics".

Dr. Zalabová is author or co-author of 15 original research articles (10 in journals in WoS, 4 in SCOPUS, 1 conference proceedings). The papers have 47 WoS citations (6 without self-citations), her WoS h-index is 4. The Habilitation Commission explains the surprisingly low number of citations without self-citations of the applicant by the fact that she was the first author to introduce the theme of symmetric spaces into the context of parabolic geometries (at the level of individual examples, but certainly as a general theory). It is a technically complicated topic linking classical and modern geometry with Lie representational theories, and at the same time the author tends to write works from the very beginning of her career, which give complete solutions to the problems, including full classifications. Therefore it will probably take quite a long time to receive the appropriate citation response. In order to properly examine this hypothesis, the Commission decided to address applications for expert opinions of extremely knowledgeable personalities in the field concerned. Their assessments fully confirmed this assumption.

Dr. Zalabová cooperates with mathematicians from many Czech and foreign institutions, such as Brno University of Technology (J. Hrdina, P. Vašík), Australian National University in Canberra (M. Eastwood), Politecnico di Torino (G. Manno), Center for Theoretical Physics of the Polish Academy of Sciences (K. Sagerschnig), University of Tromsø (B. Kruglikov), University of Vienna (J. Gregorovič). She has very close cooperation with J. Gregorovič (7 joint publications) with whom he forms a balanced couple, Dr. Zalabová brings geometric insight and technics, while Dr. Gregorovič algebraic point of view. On the high scientific qualities of Dr. Zalabová testify to the willingness of prominent world mathematicians (B. Kruglikov, M. Eastwood) to collaborate with her on joint publications.

She undertook many internships at foreign institutions, for example, the Erwin Schrödinger Institute for Mathematical Physics, Vienna (6 months), the Arctic University of Norway, Tromsø (2 months), Banach Center of Polish Academy of Science, Warsaw (2 months), Aarhus University in Denmark, University of Adelaide in Australia, the Australian National University, Canberra, Politecnico di Torino in Italy and University of Vienna.

Dr. Zalabová was a member of the research teams of 5 GACR projects (once as the principal investigator), two international projects (Norway, in both projects as the principal investigator), and one project of the Ministry of Education, Czech Republic.

She lectured on her results at many international conferences and workshops.

The Habilitation Committee states that Dr. Zalabová is a mature scientific personality with high-quality scientific results, regular publications, and good international response. This fact is well reflected in the assessment contained in the opinion of one of the opponents - J. A. Wolf: "Thus I have every reason to think that she will continue to be an important researcher and a valued member of the mathematical community."



**Conclusion:** The applicant's scholarly/artistic capabilities **meet** the requirements expected of applicants participating in a habilitation appointment procedure in the field of Mathematics - Geometry.

#### **Evaluation of the applicant's pedagogical experience**

Dr. Zalabová's pedagogical qualification include external lecturing (2004-07, Faculty of Military Technology, University of Defense in Brno, Faculty of Forestry and Wood Technology, Mendel University in Brno, Faculty of Science, Masaryk University in Brno), full-semester teaching of lectures and exercises (Faculty of Applied Informatics, Tomas Bata University in Zlín and Faculty of Science, the University of South Bohemia in České Budějovice), supervising of BSc and MSc students (Faculty of Science, the University of South Bohemia in České Budějovice) as well as lecturing at scientific seminars or specialized courses for secondary school students. Here are the names of some of the semester lectures that Dr. Zalabová had at the Faculty of Science, the University of South Bohemia in České Budějovice: Algebra (cz), Linear algebra (en), Geometry I and II (cz), Linear algebra and geometry (cz).

Dr. Zalabová also demonstrated her good teaching skills during the public lecture on „*Symmetric spaces and their filtered generalizations*“ presented on March 11, 2020 (detailed review of the public lecture is attached). All members of the committee evaluated the public lecture. Formatting of the slides as well as the oral presentation was presented in a clear way, which was understandable not only by the experts in the field but all broad audience. During the follow-up discussion after the lecture, Dr. Zalabová responded to all comments and questions.

Dr. Zalabová is the author of one teaching text.

Dr. Zalabová supervised one BSc student, one MSc student (successfully defended theses), and one secondary school student (in the framework of secondary school professional activity).

**Conclusion:** The applicant's pedagogical capabilities **meet** the requirements expected of applicants participating in a habilitation appointment procedure in the field of Mathematics - Geometry.

#### **Habilitation thesis evaluation**

The habilitation thesis of Dr. Zalabová entitled “Filtered manifolds with distinguished transformations and transformation groups” includes five original research papers supplemented by a common introduction. The Habilitation Committee addressed three internationally recognized experts in the field of differential geometry as opponents, who have no connection with the Brno mathematics school. The fact that they accepted the invitations and worked out the assessments is to be seen as a very positive response to the topic of research, both by the candidate and Brno geometrical group in general. They are Peter B. Gilkey (University of Oregon, 166 articles on WoS, 1 673 WoS citations, h-index 20), Peter J. Olver (University of Minnesota, 157 articles on WoS, 6 561 WoS citations, h-index 38) and Joseph A. Wolf (University of California, 82 articles on WoS, 1 287 WoS citations, h-index 18). All opponents highly appreciate the scientific level and novelty of Dr. Zalabová's work and achieved results. All papers included in the thesis are published in the top rate journals - Prof. Gilkey wrote in his report: “So I would rate 4 of the publications in absolutely top rate journals and the remaining in a very good journal. So the overall quality of the work is high”. Prof. Wolf wrote in his report: „Dr. Zalabová has done important research on Cartan geometry, specifically symmetries of filtered manifolds with emphasis on parabolic geometry. While this sounds rather technical, the fact is that it is an area of wide scope and increasing development“. Prof. Olver wrote in his report: “The author has clearly devoted a lot of effort to these complicated and nontrivial issues, and has thereby shed new light on the structures underlying parabolic geometries. For this, she is to be commended”.

Both the quality of the text and formatting the thesis clearly document good pedagogical skills of the candidate, i.e., to present the knowledge to readers in an exact but concise way.

**Conclusion:** The applicant's habilitation thesis **meet** the requirements expected of habilitation theses in the field of Mathematics - Geometry.

**Secret vote results**

Voting took place: electronically

Number of board members		5
Number of votes cast		5
of which	in favour	5
	against	0

**Board decision**

Based on the outcome of the secret vote and following an evaluation of the applicant's scholarly or artistic qualifications, pedagogical experience and habilitation thesis, the board hereby submits a proposal to the scientific board of the Faculty of Faculty of Science of Masaryk University to **appoint the applicant associate professor** of Mathematics - Geometry.

In Brno on 11.03.2020

prof. RNDr. Josef Janyška, DSc.