Habilitation Board Decision on the Nomination for Appointment to Associate Professor

Masaryk University	
Faculty	Faculty of Science
Procedure field	Mathematics - Geometry
Applicant	Ioannis Chrysikos
Applicant's home unit, institution	Faculty of Science, Masaryk University
Habilitation thesis	G-structures, Dirac operators with torsion and special spinor fields
Board members	
Chair	prof. RNDr. Jan Slovák, DrSc. *Faculty of Science, Masaryk University*
Members	prof. Rikard von Unge, Ph.D. *Faculty of Science, Masaryk University* doc. Mgr. Jaroslav Hrdina, Ph.D. *Faculty of Mechanical Engineering, Brno University of Technology* Prof. Dr. hab. Ilka Agricola *Department of Mathematics and Computer Science, Philipps-Universität Marburg, Germany* Prof. Dr. Vicente Cortés Suarez *Department of Mathematics, University of Hamburg, Germany*

Evaluation of the applicant's scholarly/artistic qualifications

Dr. Ioannis Chrysikos, born 2. 6. 1980 in Lamia, Greece, received his Ph.D. in 2011 at the University of Patras, Greece. Since then, he has had a rich academic career starting with a series of fruitful postdoctoral research positions at the Philipps-University in Marburg (12 months in total), and the Department of Mathematics and Statistics at the Masaryk University in Brno (40 months in total), in the years 2011-2015. Then he continued at an academic position at the University of Hradec Králové, Czech Republic, in the period 2016-2022, including 2 years of INdAM Marie Curie fellowship at the Giuseppe Peano University in Torino, Italy. He was also running his own GACR research grant 19-14466Y, leading an international junior research team in Hradec Kralove in 2019-2021. Finally, before becoming faculty member at the Masaryk University in 2022, he was at a teaching position at the University of Hamburg, Germany. He was also teaching and got his Italian habilitation during his work in Torino in 2017.

The work of Dr. Chrysikos has achieved significant recognition within the scientific community, and secured publications in esteemed journals. It deals with nowadays classical problem of G-structures with important applications in both theoretical and mathematical Physics, as well as in Differential Geometry itself. The tools are based on perfect understanding of the Lie theory and include hard computational aspects, too. Currently, the research on the geometry and topology of manifolds with special holonomy is extremely rich, including manifolds admitting parallel spinors and hence Ricci-flat holonomy reductions, as Calabi-Yau manifolds, parallel G2- and parallel Spin(7)-manifolds, which play a key role in String and M-theory compactifications.

The publications of Dr. Chrysikos mostly appear in top journals in his area, like Annals of Global Analysis and Geometry, Classical and Quantum Gravity, Journal of Geometry and Physics, and similarly the numerous citations of them. His publication list comprises 25 papers in the WOS database and 5 further papers. According to MathSciNet, the most trusted reference database in Mathematics, his 29 papers listed there were cited by 97 unique papers (77 without self-citations, 65 without those from close research groups) by 90 unique authors, including several top world leaders. Since the mathematical papers are typically authored by one or very few authors, this provides evidence that Dr. Chrysikos plays an important role in his area world-wide.

The Habilitation Board is of the opinion that Dr. Ioannis Chrysikos is a mature researcher with wide experience in Mathematics and its links to Mathematical Physics. His research represents an outstanding advance in the study of metric connections with parallel skew-torsion preserving non-integrable G-structures on Riemannian manifolds. This clearly shows that Dr. Chrysikos has established himself as a strong and solid research mathematician. The high level of prestige of most of the journals where he has published his work is impressive. This should also be considered as a strong evidence of the high quality and impact of his research.

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

In his career, Dr. Chrysikos was rather rarely on standard positions including teaching. In particular, the University of Hradec Kralove does not offer regular Bc. or MSc. degrees in pure Mathematics. Thus, Dr. Chrysikos was not exposed to supervising bachelor's or master's theses.

At the same time, he was invited to run several advanced courses at other universities, which all turned into success: "An introduction to Spin Geometry" at the University of Torino in 2016-2017, "An introduction to bundle theory and Dirac operators" at the Masaryk University in 2020, "Symplectic Geometry" at the University of Hamburg in 2022. He was also running numerous tutorials at the University of Patras, and the Philipps-University in Marburg.

Dr. Chrysikos was also acting as consultant for several doctoral students. One of them, Christian O'Cadiz Gustad, graduated at the Masaryk University in 2019 (collaboration resulted in a joint strong paper).

Since 2022, Dr. Chrysikos is the key person in the team preparing the new programme Data Analytics to be launched in September 2024. This includes co-authorship of the brand-new textbook "Brisk Guide to Mathematics" comprising more than 2000 standard pages, plus numerous software and generative AI based worksheets for tutorials in this modern hybrid programme. Dr. Chrysikos is supposed to take care of teaching five big courses and one software-based tutorial (54 ECTS in total) in this programme.

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 board chose very carefully three top experts to evaluate the submitted thesis. Prof. Jorge Lauret, Ph.D. (National University of Córdoba, Argentina) and Prof. Dr. Lorenz Schwachhöfer (Technical University Dortmund, Germany) belong to the most celebrated personalities in the area of special holonomy constructions, while Prof. Aleksy Tralle, Ph.D. (University of Warima and Mazury in Olstyn, Poland) is a top expert in Lie theory, too.

All three reports are strictly positive, and the reviewers support the habilitation of Dr. Chrysikos.

The report by Prof. Schwachhöfer provides detailed description and evaluation of the novelty of ideas in the collection of five papers and he finally states: "… Through this collection of papers, Dr. Chrysikos showcases his significant impact on contemporary research in non-integrable geometries. Papers A and B, authored solely by him, illustrate his adeptness in advancing the study of nonintegrable geometries, a pursuit pioneered by Thomas Friedrich and his academic cohort in various geometrical contexts. Dr. Chrysikos adeptly reveals the parallels in phenomena within geometries featuring parallel torsion and skillfully characterizes their fundamental properties. … Beyond the works highlighted in this habilitation, Dr. Chrysikos possesses a repertoire of noteworthy publications that have garnered significant recognition within the scientific community, securing publication in esteemed journals."

Prof. Lauret characterizes shortly the content of cumulative thesis and then concludes: "… The habilitation thesis is very well written and, in my opinion, it represents an outstanding advance in the study of metric connections with parallel skew-torsion preserving non-integrable G-structures on Riemannian manifolds. This clearly shows that Chrysikos has established himself as a strong and solid research mathematician. On the other hand, the high level of prestige of most of the journals where he has published his work is impressive. This may also be considered as a strong evidence of the high quality and impact of his research."

Prof. Tralle provides a very detailed description of the content of the thesis and finally concludes: "… The contribution of Ioannis Chrysikos to several areas of geometric research are very substantial. … The habilitation thesis of Ioannis Chrysikos fulfils all the requirements and proves that the author is a high-level mathematician who made essential contributions to differential geometry."

The Habilitation Board agrees with the above opinions and advises the Scientific Board to award the habilitation to Dr. Ioannis Chrysikos.

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

Habilitation Board Decision on the Nomination for Appointment to Associate Professor

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 Science of Masaryk University to **appoint the applicant associate professor** of Mathematics - Geometry.

In Brno on 06.05.2024

prof. RNDr. Jan Slovák, DrSc. .....