SIMONS RESEARCH FELLOWSHIP

Non-symmetrical Gravitational Theory (NGT) and its applications, Serbia, Bulgaria

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Host Professor: **Prof. D.Sc. Stefan Ivanov**, Sofia University, and Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (IMI-BAS), Bulgaria

CONTEXT

Serbia and Bulgaria has a strong tradition in differential geometry, with active research groups at the University of Niš, Sofia University, and the Bulgarian Academy of Sciences. In particular, the host institution Faculty of Mathematics and Informatics (FMI, Sofia) represents one of the leading centers in the region for differential geometry. Funding for research mobility and exchange is still limited, but the potential is very strong.

CDC SUPPORTED ACTIVITY

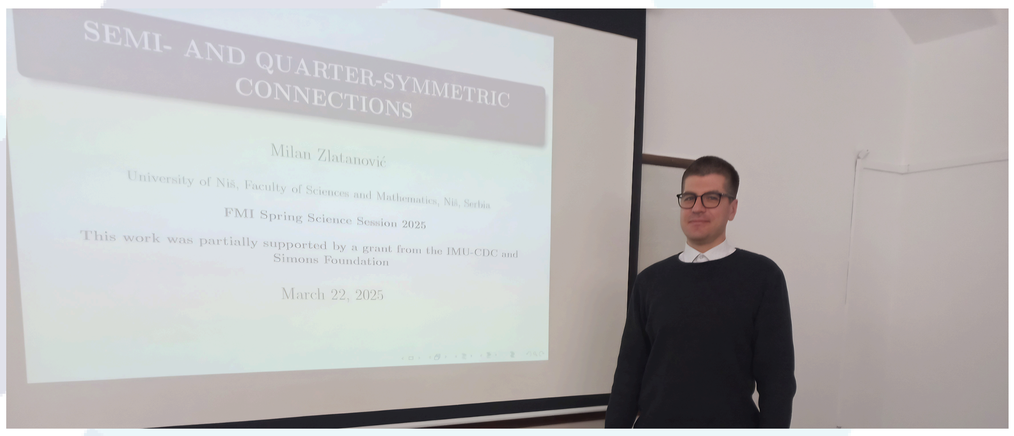
The activity was a research visit carried out from March 1, 2025 to June 1, 2025 (3 months) at FMI, Sofia. The visit was supported by the Simons grant, covering travel, accommodation, and daily allowance.
Participants: Prof. Milan Zlatanovic, Prof. Stefan Ivanov, and members of the research groups in differential geometry at FMI and IMI-BAS Sofia.

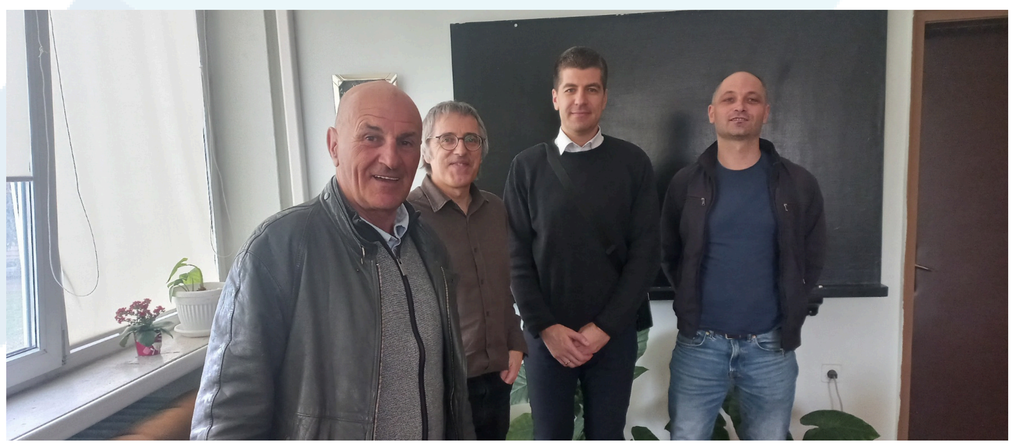
IMPACT

The collaboration was focused on advanced research in NGT and Lorentzian geometry. During the visit, we developed new results related to connections with torsion, geometric structures of NGT, and their applications. The visit had a strong impact on the development of NGT and geometric structures. Regular meetings with Prof. Stefan Ivanov, as a leading expert in differential geometry, were very intensive and productive. Many new ideas were discussed and several open problems were clarified.
We connected Lorentzian geometry with non-symmetric structures in a more systematic way. The results are important for further development of NGT and its applications in differential geometry and mathematical physics. My stay at FMI was recognized by IMI-BAS, and I was invited to continue (for another period of 3 months) as a research professor at IMI-BAS, supported by the Bulgarian Ministry of Education and Science. During this period, I continued working on NGT and also worked on topics that supported the postdoctoral position of Miroslav Maksimovic at IMI-BAS for one year. I take this opportunity to thank Prof. Stefan Ivanov and Prof. Velichka Milousheva for their time and effort, which contributed to the success of this visit.

OUTCOMES AND ACHIEVEMENTS

During the visit, one PhD student from FMI was directly involved in research activities, while other PhD, postdoctoral students and researchers attended lectures and discussions. I gave two lectures at FMI and IMI-BAS, and actively participated in seminars (at IMI-BAS and the spring session at FMI) and in the promotion of mathematics in Sofia during the whole stay.
The visit strengthened the existing collaboration between the University of Niš, FMI Sofia and IMI-BAS, and contributed to building a research network in the field of differential geometry and NGT. As a result, one paper was published (at JGP, https://doi.org/10.1016/j.geomphys.2025.105633), one is in final preparation, and a joint research project (Horizon-SE) has been submitted.
In addition, the collaboration opened possibilities for future exchange visits and supervision of young researchers. The interaction with the research group in Bulgaria also led to new ideas and directions for further development of NGT and its applications.





REFLECTIONS

The research visit had a strong impact on building research capacity, especially through direct collaboration with Prof. Ivanov and researchers from FMI and IMI-BAS. It contributed to transfer of knowledge in NGT, and helped to introduce new research topics. The interaction between institutions strengthened regional cooperation and created conditions for long-term development of research in differential geometry and mathematics in South-Eastern Europe. I am very grateful to the IMU CDC and the Simons Foundation for the support, which made this activity possible, and I strongly encourage other researchers to apply for these programs, as they provide very good opportunities for collaboration and research development.

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