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Report on the visit in March 2023 as TFS guest professor at UiT

The principal objective of this research visit was to work together with professor Kruglikov on the project "Quadratic integrals of geodesic flow on three-dimensional Riemannian manifolds and geodesic webs". We were searching for generalizations of the visitor results for geodesic webs on surfaces. It turned out that the existence of geodesic webs with special geometric properties are equivalent to existence of first integrals of geodesic flow of degree two and three.

Numerous discussions with Boris Kruglikov were very helpful for establishing corresponding conjecture for the three-dimensional case. The found properties of geodesic webs, constructible in a way similar to 2D case from a pair of commuting quadratic integrals, were shown to be necessary. We hope that they are also sufficient for existing of quadratic integrals.

Moreover, this discussions clarified important results, including those obtained by Kruglikov himself, on integrability of geodesic flows by quadratic integrals in any dimensions, which we aim to address in a forthcoming collaboration within the framework of our recently approved CIMPA grant.

The visitor delivered a mini-course "Hexagonal webs, geodesic flows on surfaces, and integrable billiards", designed for doctoral students, postdoctoral and faculty researches. The lectures covered recent results, obtained by the visitor and relevant classical topics.

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