

# Range Characterization of the attenuated Radon transform of compactly supported tensor fields in the plane

Alexandru Tamasan

University of Central Florida

tamasan@math.ucf.edu

Characterization of the range of the (non-attenuated) Radon transform of zero-tensors has been known since the works of Gelfand-Graev, Helgason, and Ludwig since 1960's. In the case of the attenuated Radon transform, some range conditions (also for sufficiently smooth functions) have been established by Novikov in 2012. These constraints, known as the moment conditions, are in terms of the angular variable. I will present new range conditions for non/attenuated Radon data of tensors of an arbitrary order. They are in terms of a Hilbert transform associated with A-analytic maps à la Bukhgeim. As an application I will explain how the attenuation allows for the Doppler data to be mistaken for some X-ray data. These results are joint work with Kamran Sadiq.

## References

- [1] A. L. Bukhgeim, Inversion Formulas in Inverse Problems, in *Linear Operators and Ill-Posed Problems* by M. M. Lavrentev and L. Ya. Savalev, Plenum, New York, 1995.
- [2] I. M. Gelfand and M.I. Graev, Integrals over hyperplanes of basic and generalized functions, *Dokl. Akad. Nauk SSSR* 135 (1960), no.6, 1307-1310; English transl., *Soviet Math. Dokl.* 1 (1960), 1369-1372.
- [3] S. Helgason, An analogue of the Paley-Wiener theorem for the Fourier transform on certain symmetric spaces, *Math. Ann.* 165 (1966), 297308.
- [4] D. Ludwig, The Radon transform on euclidean space, *Comm. Pure Appl. Math.* 19 (1966), 4981.
- [5] R. G. Novikov, On the range characterization for the two-dimensional attenuated x-ray transformation, *Inverse Problems* 18 (2002), no. 3, 677700.
- [6] L. Pestov and G. Uhlmann, On characterization of the range and inversion formulas for the geodesic X-ray transform, *Int. Math. Res. Not.* 80 (2004), 43314347.
- [7] K. Sadiq and A. Tamasan, On the range of the attenuated Radon transform in strictly convex sets, *Trans. Amer. Math. Soc.*, to appear.