TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Zoom meeting

Monday November 2, 2020, 2:30 p.m.

Pseudo-H-type nilmanifolds and analysis of associated operators

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Abstract: We give a short introduction to subriemannian geometry. Based on the Popp measure construction for an equiregular distribution an intrinsic sub-Laplacian can be defined. Generalizing the tangent space, nilpotent Lie groups G serve as local models for a subriemannian manifold and themselves are equipped with a left-invariant subriemannian structure. We introduce pseudo-H-type groups G which form a class of step-2-nilpotent Lie groups and consider their quotients by a lattice $\Gamma \subset G$ (pseudo-H-type nilmanifolds). Based on a well-known expression of the heat kernel of the sub-Laplacian on the compact left-coset space $\Gamma \backslash G$ we can perform an explicit spectral analysis. In a natural way a pseudo-H-type group also carries a pseudo-subriemannian structure which from an analytic viewpoint induces an ultra-hyperbolic operator Δ_{UH}. We aim to discuss the following questions:

- Can we explicitely construct and classify isospectral (in the subriemannian sense) non-homeomorphic nilmanifolds $\Gamma \backslash G$?
- Is the operator Δ_{UH} locally solvable? Can we explicitly construct its inverse in the case of existence?

The talk is based on the (joint) papers:

[1] W. Bauer, A. Froehly, I. Markina, *Fundamental solutions of a class of ultra-hyperbolic operators on pseudo-H-type groups*, Adv. Math. 369, (2020), 1-46.
[2] W. Bauer, K. Furutani, C. Iwasaki, A. Laaroussi, *Spectral theory of a class of nilmanifolds attached to Clifford modules*, Math. Z. (2020)