The project is concerned with conjugation invariant norms on groups and applications to geometric group theory, finite groups, symplectic geometry, group actions and Riemannian geometry. Conjugation invariant norms appear naturally in many branches of mathematics. Examples are word norms associated with geometrically defined generating sets (autonomous norm, fragmentation norm), as well as nondiscrete norms (the Hofer norm in symplectic geometry). In group theory, examples include verbal norms (e.g., commutator length) and covering numbers (finite groups). The overarching strategy of the project is to combine methods from different fields to obtain results on groups and their applications across the boundaries of subjects. Our research will result in major advances in the understanding of a wide class of groups. The group–theoretic techniques that we develop will lead to the solution of problems in other areas of mathematics where current methods are insufficient.

One of the aims of the project is to study properties of discrete lattices in Lie groups. Informally speaking, we are going to compare properties of such lattices with properties of $\mathbf{Z}^n$ embedded into $\mathbf{R}^n$ (or, to be precise of invertible integral matrices in all matrices). This topic has many connections to other parts of mathematics, including combinatorics and probability.

Other objects that emerge in the study of invariant norms on groups are geodesics on manifolds, Hamiltonian diffemorphisms and quasimorphisms.

We plan to work on vanishing of drift in some random walks on Liouville groups and relative Liouville pairs. The drift is a kind of constant hidden effect on a random walk. It is known that for certain walks on Liouville groups, such effect is zero. We plan to generalize this to relative situation.

We intend to use a wide range of mathematical techniques from various parts of mathematics. We are going to use e.g. tools from group theory and dynamical systems, model-theoretical methods, number-theoretical methods and techniques from probability.

We expect that our results will have an impact on other mathematicians, by establishing new research directions, and mathematical areas.