

## Preliminaries to the study of Radon-type transforms in a symplectic framework

Michel Cahen<sup>1</sup>, Thibaut Grouy<sup>1</sup>, Simone Gutt<sup>1</sup>

The aim of the project is to define and study Radon-type transforms in a symplectic framework. The chosen framework consists of symplectic symmetric spaces whose canonical connection is of Ricci-type. They can be considered as a symplectic analogue of the Riemannian symmetric spaces with constant sectional curvature on which many Radon transforms have been widely investigated. A broad range of examples can be found in S. Helgason's book [1]. These transforms associate to a compactly supported continuous function on such a space, another function on a class of subspaces by mean of the integration with respect to invariant measures. In our cases, the subspaces for integration are the symplectic totally geodesic submanifolds. They can be endowed with an invariant measure. The same holds for the orbits of those submanifolds under the action of a natural group.

First of all, we describe all the spaces involved. On the one hand, we pursue the study of symplectic symmetric spaces with Ricci-type curvature, initiated by M. Cahen, S. Gutt and J. Rawnsley [2]. On the other hand, we prove that the orbits of the selected submanifolds are also symmetric spaces. Then, we define the associated Radon-type transforms thanks to the existence of invariant measures. The next step is to study these Radon transforms through the exponential mapping and to understand the obstructions of getting an inversion formula with the same method as used in the Riemannian cases (cf. S. Helgason [1]). For some of our chosen spaces, we know that the exponential mapping is a diffeomorphism from an open subset of their tangent space at a base-point onto a dense open subset of themselves.

### References

- [1] S. HELGASON, *Integral geometry and Radon transforms*. Springer-Verlag, New York, 2011.
- [2] M. CAHEN, S. GUTT AND J. RAWNSLEY, Symmetric symplectic spaces with Ricci-type curvature, *Conférence Moshé Flato 1999* **2** (2000), 81–91.

<sup>1</sup>Département de Mathématiques, Université Libre de Bruxelles, CP 218  
Boulevard du Triomphe, 1050 Bruxelles, Belgium.  
mcahen@ulb.ac.be,  
tgrouy@ulb.ac.be,  
sgutt@ulb.ac.be.