

# Harmonic Analysis on the Heisenberg Group and related topics

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The Heisenberg group  $\mathbb{H}_n$  plays a fundamental rôle in several branches of analysis, especially in non-commutative harmonic analysis, but also in sub-Riemannian geometric analysis. Indeed,  $\mathbb{H}_n$  may be viewed as the simplest example of non-commutative nilpotent Lie group and sub-Riemannian manifold. Moreover, it is related to Euclidean phase-space analysis via the Schrödinger representation.

In this series of lectures, we will discuss the following topics:

- We will start with the definition of the Heisenberg group  $\mathbb{H}_n$ , in particular various equivalent realisations.
- We will then introduce important objects and structures considered on the Heisenberg group coming from sub-Riemannian geometry (e.g. the canonical sub-Laplacian, the horizontal distributions, the CC-distance etc.).
- We will devote more than one lecture to harmonic analysis on the Heisenberg group in relation to representation theory and special functions.
- At the end of the lectures, we will discuss the recent progress on non-commutative phase-space analysis on the Heisenberg group and beyond.