

In these lectures, I am planning to develop the theory of Gelfand pairs  $(G, K)$ , with emphasis in the case that  $G = K \ltimes N$ , (semidirect product), where  $N$  is a nilpotent Lie group and  $K$  is a compact subgroup of automorphisms of  $N$ . Moreover we will consider generalized Gelfand pair, that is, when  $K$  is not compact.

Then, we will study the spherical analysis associated: the set of spherical functions or distributions, and properties of the spherical transform.

Enlighting examples are given when  $N$  is the Heisenberg group ( or a group of Heisenberg type ). We will see some of them in detail.