

## REGULARITY FOR THE SUB-LAPACIAN IN THE HEISENBERG GROUP

This talk will be an introduction to the regularity theory for the sub-Laplacian in the Heisenberg group. This is the second order linear operator

$$\mathcal{L} = \sum_{j=1}^{2n} X_j^2$$

where  $X_j$  are the horizontal vector fields. This operator is degenerate-elliptic, nonetheless it exhibits nice properties similar to its euclidean counterpart. In particular weak solutions in the integral sense (which are only assumed to be in the horizontal Sobolev space  $HW^{1,2}$ ) turn out to be smooth. We will investigate how the group structure plays a role in establishing integrability of the vertical derivative and how the interplay between higher integrability of the horizontal and vertical derivatives allows to reach the smoothness result.