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Geometry of semi-direct extensions of the Heisenberg group

Abstract: The four-dimensional oscillator group is a well known model of homogeneous spacetime, which has been extensively studied under several different points of view. We describe several results concerning the properties of the oscillator group. We then consider the much more general case of semi-direct extensions of the Heisenberg group induced by any element of the symplectic group $Sp(1, \mathbb{R})$ and analyze some relevant geometric properties of these semi-direct extensions.

BIBLIOGRAPHY:

[1] R.F. Streater, *The representations of the oscillator group*, Commun. Math. Phys. **4** (1967), 217–236.

[2] D. Müller and F. Ricci, *Analysis of second order differential operators on Heisenberg groups. I*, Inventiones Math. **101** (1990), 545–582.

[3] G. Calvaruso and J. Van der Veken, *Totally geodesic and parallel hypersurfaces of four-dimensional oscillator groups*, Results Math. 64 (2013), 135–153.

[4] G. Calvaruso and A. Zaeim, *On the symmetries of the Lorentzian oscillator group*, Collectanea Math. **68** (2017), 51–67.

[5] G. Calvaruso, *Oscillator spacetimes are Ricci solitons*, Nonlinear Anal. **140** (2016), 254–269.

[6] G. Calvaruso, *On semi-direct extensions of the Hesineberg group*, Collectanea Math. **72** (2021), 1–23.