Zoology of Homogeneous and Isotropic Systems: From Ordinary Matter, to "Framids" and Beyond

In this talk, Dr. Penco will discuss systems whose ground state breaks boosts and possibly other internal symmetries while retaining some notion of homogeneity and isotropy. This class of systems not only includes the most common states of condensed matter (solids, fluids, superfluids), but is also an invaluable toolbox for model building in cosmology. Dr. Penco’s focus will be on the low-energy spectrum of these systems, which always features some Goldstone excitations — the phonons. After briefly reviewing the effective field theory of phonons in solids, fluids and superfluids, he will propose a general classification scheme for homogeneous and isotropic media based on their symmetry breaking pattern. This will lead us to consider what should arguably be the simplest condensed matter system — the framid — as well as other more exotic possibilities, and to explore whether all these systems could possibly be realized in Nature.