

# The universe as a quantum fluid: quantum gravity, hydrodynamics and cosmology

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The hydrodynamics of quantum fluids can be mapped to relativistic cosmological dynamics, and both share the same conformal symmetries, which can be unravelled via geometric methods in superspace. This suggests a more general correspondence between hydrodynamics and cosmology, and a picture of the universe as a quantum gravity condensate. This picture is in fact realized also in some quantum gravity formalisms, like group field theory and lattice gravity, in which an emergent cosmological dynamics can be extracted from the quantum dynamics of fundamental quantum simplices in a condensate phase.

A key ingredient is the relational understanding of space and time, which makes superspace the natural arena for gravitational dynamics, as opposed to the “spacetime” manifold. These results suggest an exciting dialogue between quantum gravity, the theory of quantum fluids and cosmology, as well as a new direction for analogue gravity simulations in the lab.

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