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Effective field theory of Analogue Gravity

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In this talk, we introduce a novel method for building an analog model with a Bose-Einstein condensate, in which the analogue metric is obtained using an effective field theory and a microscopic Lagrangian with a quartic interaction. The microscopic Lagrangian that we introduce is obtained first assuming that our system is described by a complex massive scalar field, and and then requiring that there must be a spontaneously broken global U(1) symmetry. Using the developed method, we obtain two main original results. The first original result is the calculation of the next-to-leading order Lagrangian in terms of the microscopic Lagrangian's parameters and of the dispersion law for phonon pairs in the presence of an acoustic horizon generated by the BEC's flow. We will study, in addition, a particular case. The second relevant result is the design of an original procedure to calculate the density-density correlation function through the field theory tools.

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