

Abstract Submitted  
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**Cubic interactions in superfluid  $^4\text{He}$**  BJORN FÅK, CEA, Grenoble, THOMAS KELLER, MPI, Stuttgart, MICHAEL ZHITOMIRSKY, CEA, Grenoble, ALEXANDER CHERNYSHEV, University of California, Irvine — High-resolution neutron resonance spin-echo measurements of superfluid  $^4\text{He}$  show that the roton energy does not have the same temperature dependence as the inverse lifetime, in contrast to the Landau-Khalatnikov theory. We present a diagrammatic analysis that attributes this effect to the interaction of rotons with thermally excited phonons via both four- and three-particle processes, the latter being allowed by the broken gauge symmetry of the Bose condensate.

Alexander Chernyshev  
University of California, Irvine

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