Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Resonant Hawking radiation in Bose-Einstein condensates[1] FERNANDO SOLS, IVAR ZAPATA, Universidad Complutense de Madrid (Spain), MATHIAS ALBERT, Universite de Geneve (Switzerland), RENAUD PARENTANI, Universite Paris-Sud, Orsay (France) — We study double-barrier interfaces separating regions of asymptotically subsonic and supersonic flow of Bose-condensed atoms [1]. These setups contain at least one black hole sonic horizon from which the analogue of Hawking radiation should be generated and emitted against the flow in the subsonic region. Multiple coherent scattering by the double-barrier structure strongly modulates the transmission probability of phonons, rendering it very sensitive to their frequency. As a result, resonant tunneling occurs with high probability within a few narrow frequency intervals. This gives rise to highly non-thermal spectra with sharp peaks. We find that these peaks are mostly associated with decaying resonances and only occasionally with dynamical instabilities. Even at achievable non-zero temperatures, the radiation peaks can be dominated by spontaneous emission, i.e. enhanced zero-point fluctuations, and not, as is often the case in analogue models, by stimulated emission.

[1] I. Zapata, M. Albert, R. Parentani, F. Sols, New J. Phys. 13, 063048 (2011).

[1]Supported by MICINN, FIS2010-21372, and Comunidad de Madrid, MICROSERES-CM

Fernando Sols
Universidad Complutense de Madrid

Date submitted: 20 Dec 2011 Electronic form version 1.4