

Abstract Submitted
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Study of superfluid Bose-Fermi mixture SEBASTIEN LAURENT, MARION DELEHAYE, SHUWEI JIN, MATTHIEU PIERCE, TARIK YEFSAH, FREDERIC CHEVY, CHRISTOPHE SALOMON, Laboratoire Kastler Brossel — Using fermionic and bosonic isotopes of lithium we produce and study ultracold Bose-Fermi mixtures ¹². First in a low temperature counterflow experiment, we measure the critical velocity of the system in the BEC-BCS crossover. Around unitarity, we observe a remarkably high superfluid critical velocity which reaches the sound velocity of the strongly interacting Fermi gas. Second, when we increase the temperature of the system slightly above the superfluid transitions we observe an unexpected phase locking of the oscillations of the clouds induced by dissipation. Finally, as suggested in ³, we explore the nature of the superfluid phase when we impose a spin polarization in the situation where the mean field potential created by the bosons on the fermions tends to cancel out the trapping potential of the latter.

¹M. Delehaye, S. Laurent, I. Ferrier-Barbut, S. Jin, F. Chevy, C. Salomon *Physical Review Letters* **115** 265303 (2015)

²I. Ferrier-Barbut, M. Delehaye, S. Laurent, A. Grier, M. Pierce, B. Rem, F. Chevy, C. Salomon *Science* **345** 1035 (2014).

³T. Ozawa, A. Recati, M. Delehaye, F. Chevy, S. Stringari *Physical Review A* **90**, 043608 (2014)

Sebastien Laurent
Laboratoire Kastler Brossel

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