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Three-body recombination at vanishing scattering length in ultracold atoms

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In my talk I shall overview our experimental studies of the three-body recombination process in a gas of ultracold lithium atoms. In the regime of resonant interatomic interactions we identify the characteristic features of Efimov trimers [1]. In the opposite regime of vanishingly weak interactions, where no universal bound states are expected, we discover a surprisingly simple behavior. We show that going only to the second term in the effective range expansion is sufficient to describe the rate of recombination processes [2]. We, thus, predict the behavior of the dominant mechanism of the atom loss from traps, caused by the three-body recombination, in the whole range of interatomic interactions. This knowledge, apart from being of fundamental interest, can be used in optimization of evaporative cooling to reach a Bose-Einstein condensate phase and in optimization of its lifetime.

[1] N. Gross, Z. Shotan, S. Kokkelmans and L. Khaykovich, Phys. Rev. Lett. 103, 163202 (2009)& Phys. Rev. Lett. 105, 103203 (2010); O. Machtey, Z. Shotan, N. Gross and L. Khaykovich, Phys. Rev. Lett. 108, 210406 (2012).
[2] Z. Shotan, O. Machtey, S. Kokkelmans, L. Khaykovich, Phys. Rev. Lett. 113, 053202 (2014).

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