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# The shape of three-body interactions near narrow Feshbach resonances

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When s-wave scattering length diverges in the vicinity of Feshbach resonances the system of three particles exhibits bound states characterized by universal properties [1,2]. A well-known fact is that near a narrow Feshbach resonance the existence range of these states shrinks down as a function of the narrowness of the resonance. Empirically, however, this is not the case for bosonic lithium. An unexpected behavior is observed experimentally when the three-body bound state is shown to resist dissociation into atom-dimer continuum at the threshold [3]. Simplified theoretical analysis pointed out that asymptotic behavior of the three-body potential fails to explain this peculiarity [4,5]. Only a more involved theory which includes the van-der Waals tail of the two-body interaction potential shows unusual reshaping of the three-body interactions due to repulsive interactions in the atom-dimer channel [6]. We thus identify the reason for quasi-stationary property of the three-body bound state embedded into atom-dimer continuum.

In addition, I will describe our effort toward the study of lithium BEC at different scattering length zero crossings. A new experimental apparatus is being built for this purpose where we demonstrate a novel design of Zeeman slower based on standard permanent magnets.

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