

Formation of cold ground-state Cs₂ molecules through stimulated Raman photoassociation

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Photoassociation of cold Cs atoms leads to the formation of translationally cold Cs₂ molecules at temperatures in the 20-200 μ K range. These cold ground-state molecules are obtained after spontaneous de-excitation of the photoassociated molecules. The cold molecular sample is in a statistical mixture of ro-vibrational levels. We have demonstrated the possibility to stimulate the emission and to prepare all the molecules in a well defined rovibrational level. This stimulated Raman process opens the way to prepare cold molecules in all the degrees of freedom (translation, vibration and rotation). The experiment also allows us to do the molecular spectroscopy of the ro-vibrational levels close to the ground-state dissociation limit and to estimate the scattering lengths of the Cs atom. These results are compared to the determination of scattering lengths obtained by analyzing the modulations of the intensities of the resonance lines in the photoassociative spectroscopy with polarized Cs atoms

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