

OPTICAL FESHBACH RESONANCES NEAR THE INTERCOMBINATION TRANSITION

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The photoassociation process, which can be described as an optically induced Feshbach resonance, is investigated near the intercombination atomic transition 1S_0 - 3P_1 . The small natural width of such an atomic transition makes the properties of the optical Feshbach resonances qualitatively different from those observed near strongly allowed transitions. In particular the optical Feshbach resonances near an intercombination line could be used for the low-loss optical tuning of the scattering length of the two colliding ground state atoms. To describe these resonances the close-coupled multi-channel model is used. The simple single-channel models are discussed and their applicability is verified. The approximate analytical expression for the width of the resonance can be given in the framework of the stationary phase approximation. The properties of the investigated resonances are discussed using Ca, Sr and Yb as examples. The comparison of the theory and recent photoassociation experiments for Sr and Yb is presented. Results obtained from different isotopes are useful to construct consistent analysis of all of the data.

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