ULTRACOLD PHOTOASSOCIATIVE SPECTROSCOPY OF HETERONUCLEAR ALKALI-METAL DIATOMIC MOLECULES

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The powerful photoassociative spectroscopy of ultracold atoms used in homonuclear cold collisions can also be applied to the mixed heteronuclear systems. We have examined and identified the excited long-range Hund's case (c) molecular states of the ten heteronuclear alkali metal diatomic molecules which support bound states and can be probed by ultracold photoassociative spectroscopy. Analytical expressions for the heteronuclear long-range free-bound Franck-Condon factors as a function of the internuclear distance R and the vibrational quantum number v are derived and discussed. The heteronuclear photoassociative spectroscopy will provide spectroscopic measurements of the binary elastic scattering lengths of heteronuclear cold collisions which are the crucial parameters for sympathetic cooling of mixed atomic gases.