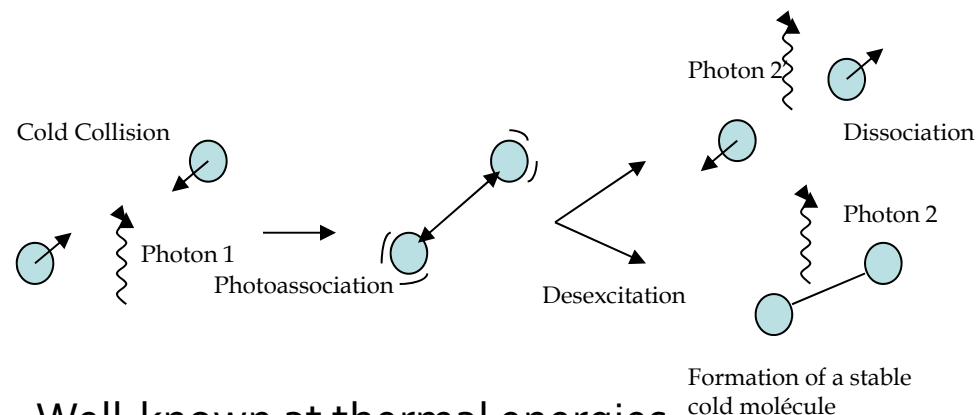
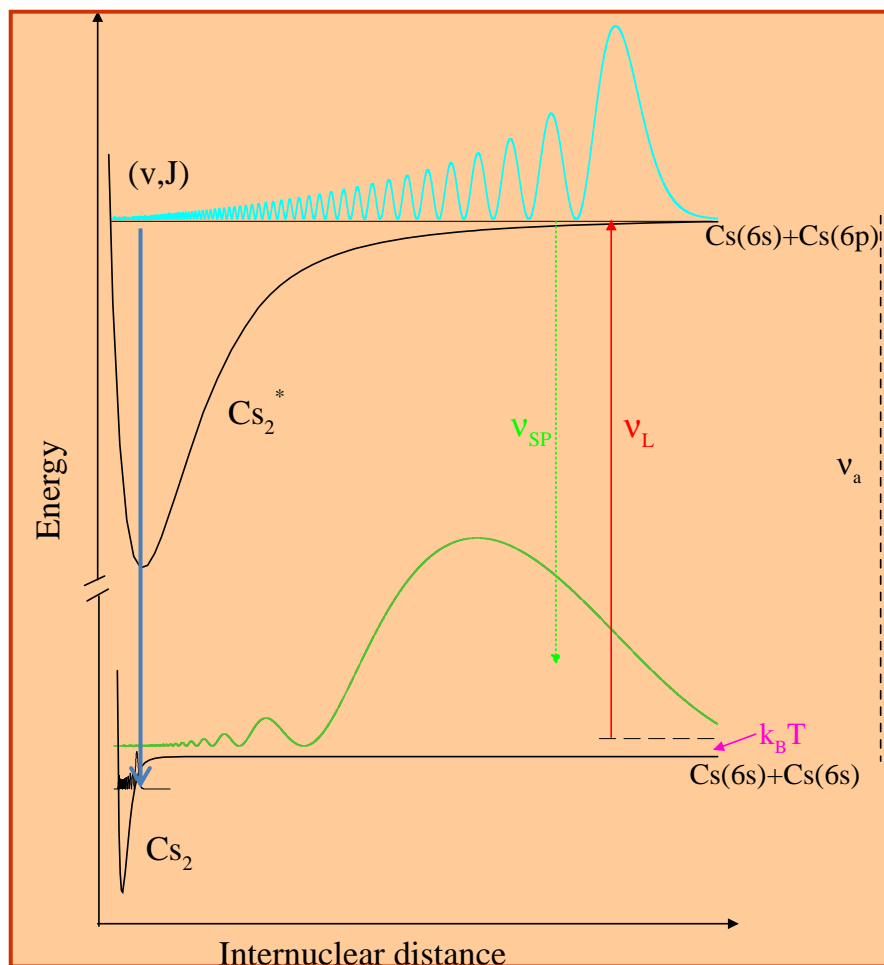




...associate a pair of ultracold atoms, to form an ultracold molecule

PhotoAssociation



Well-known at thermal energies

Marvet&Dantus, Chem. Phys. Lett. 245, 393 (1995)

Cold atoms: "quasibound"-bound transition

Thorsheim et al, PRL, 58, 2420 (1987)

Creates a giant ultracold excited molecule, or a "long-range molecule"

Stwalley&Wang, J. Mol. Spectrosc. 195, 194, (1999)

Jones et al, Rev. Mod. Phys., 78 (2006)

• $\text{Li}_2, \text{Na}_2, \text{K}_2, \text{Rb}_2, \text{Cs}_2; \text{H}_2; \text{Ca}_2, \text{He}_2, \text{Sr}_2, \text{Yb}_2, \dots$

• $\text{NaCs}, \text{RbCs}, \text{KRb}, \text{LiCs}, \text{LiK}, \text{YbRb}, \text{NaK}, \text{RbSr}, \dots$

Short-lived ultracold molecules, stabilized at short distances

Cs_2 : *Orsay, PRL, 80, 4402 (1998); PRL 86, 2253 (2001)*, Rb_2 : *Pisa, PRL, 84, 2814 (2000); and many others....*