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Optical tuning of the scattering length of cold alkaline earth atoms E. TIESINGA, NIST, R. CIURYLO, University of Kopernicus, Poland, P.S. JULIENNE, NIST — It is possible to tune the scattering length for the collision of ultra-cold $^1S_0$ ground state alkaline-earth atoms with a laser far detuned from optical Feshbach resonance with an excited molecular level near the frequency of the atomic intercombination $^1S_0$–$^3P_1$ transition. Simple resonant scattering theory, illustrated by the example of ^{40}Ca, allows an estimate of the magnitude of the effect. Unlike alkali atom species, large changes of the scattering length are possible while atom loss remains small, because of the very narrow line width of the molecular photoassociation transition. This raises prospects for control of atomic interactions for a system without magnetically tunable Feshbach resonance levels.

Eite Tiesinga
NIST

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