



SPP 1929 – Seminar

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Universität Ulm

Raum 45.2.304

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A Rydberg optical Feshbach resonance

We present a novel optical scheme to tune the scattering length of two colliding ground-state atoms. The scheme is based on off-resonantly coupling the scattering-state of the atomic pair to an excited Rydberg-molecular state using laser light.

The efficiency of the process can be described by the effective optical length and pole strength of this Rydberg optical Feshbach resonance. I demonstrate for the s-wave scattering of two colliding ^{87}Rb atoms, that these quantities can be tuned over several orders of magnitude, while incoherent processes and losses are minimised.

Given the ubiquity of Rydberg molecular states, this technique should be generally applicable to homonuclear atomic pairs as well as to atomic mixtures with s-wave (or even p-wave) scattering, although the details of the calculation are different.