Q 9 Gruppenberichte Ultrakalte Moleküle

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Gruppenbericht Q 9.1 Sa 08:30 HU Kinosaal

Dissociation of Ultracold Molecules using Feshbach Resonances — •Thomas Volz[1], Stephan Dürr[1], Niels Syassen[1], Gerhard Rempe[1], Eric van Kempen[2] und Servaas Kokkelmans[2] — [1]Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Strasse 1, 85748 Garching — [2]Eindhoven University of Technology, P.O. Box 513, 5600MB Eindhoven, The Netherlands

Ultracold molecules are associated from an atomic Bose-Einstein condensate by ramping the magnetic field across a Feshbach resonance. The reverse ramp dissociates the molecules back into free atoms. This dissociation process is investigated for Feshbach resonances in ^{87}Rb. The kinetic energy released in the dissociation process is used to determine the widths of four Feshbach resonances [1]. This method works remarkably well for narrow (mG wide) resonances, even in the presence of magnetic field noise. When the magnetic field is jumped (not ramped) across the Feshbach resonance, the dissociation creates a quasi-mono-energetic atomic wave. One of the resonances investigated involves a d-wave bound state. As a consequence, the dissociation populates the atomic s and d partial wave, thus creating a spatial interference pattern. The d wave exhibits a shape resonance which is studied by tuning the Feshbach resonance through it [2]. A theory for the molecule dissociation is developed and agrees well with the experiment.

[1] S. Dürr, T. Volz, and G. Rempe, Phys. Rev. A **70**, 031601(R) (2004).
[2] T. Volz et al., cond-mat/0410083.