Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Trimer formation in ultracold gases of bosonic and fermionic molecules[1] BOUT MARCELIS, 1) Eindhoven University of Technology, The Netherlands 2) LPTMS, Universite Paris Sud, France, DMITRY PETROV, 2), SERVAAS KOKKELMANS, 1), GORA SHLYAPNIKOV, 2) — We consider weakly bound bosonic and fermionic heteronuclear molecules (dimers) in ultracold atomic gases, where the interspecies interaction is characterized by a large positive scattering length. We develop a new theoretical approach to solve the four-body scattering problem, which is valid when the mass ratio between the constituent atoms is sufficiently large. This approach is then used to study elastic and inelastic dimer- dimer scattering processes in the case that the light constituent atoms are fermions, while the heavy atoms can be either fermions or bosons. Due to the Fermi statistics of the light atoms, the heavy atoms experience a strong repulsion at large intermolecular distances. This leads to suppression of the collisional relaxation to universal trimer (Efimov) states and/or deeply bound molecular states. We present the formation rate of Efimov trimers as a function of the three-body parameter for several experimentally interesting systems. The competition between the formation of trimers and relaxation to deeply bound molecules is analyzed, and prospects for future studies of these systems are discussed.

[1]This work is by supported CNRS and NWO.

Bout Marcelis
Eindhoven University of Technology, The Netherlands and
LPTMS, Universite Paris Sud, France

Date submitted: 02 Feb 2007 Electronic form version 1.4