

Setup for a two component quantum gas

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We are currently setting up an experiment, dealing with a two component quantum gas, consisting of ultracold Ytterbium and Rubidium atoms. This system of diamagnetic (Yb) and paramagnetic (Rb) species will allow studies of mixtures of two bosonic species as well as of fermions and bosons.

Using Zeeman slower and magneto optical traps both Ytterbium and Rubidium will be cooled separately. Consecutively, a ^{87}Rb Bose-Einstein condensate will be generated by evaporative cooling in a clover-leaf magnetic trap. Ytterbium will be trapped in a bichromatic optical dipole trap spatially overlapping the magnetic trap for Rubidium. It is planned to cool Ytterbium sympathetically down to quantum degeneracy by thermalization with Rubidium. Since the interspecies collisional properties are not yet known, the interaction between ^{87}Rb and the seven stable Yb isotopes has to be studied carefully before quantum degeneracy in the mixed system can be achieved.

Once the mixed quantum degenerate gas is produced, we plan to perform experiments on superfluidity and miscibility. Furthermore, the independent traps for Rubidium and Ytterbium promise to be a good starting point to reach very far into the quantum degenerate regime for the fermionic Ytterbium isotopes.

We report about the status of our experiment.