Strongly correlated states of rotating two-species Bose gases

In recent years there has been substantial interest in the study of strongly correlated states of cold atoms, analogous to exotic states known from low-dimensional electron systems – one 'holy grail' being experimental realisation of quantum Hall-like states in atomic Bose condensates. In particular there have been many studies on the rotational properties of cold atom systems, as rotation is the conceptually simplest way of simulating a magnetic field for electrically neutral atoms. Even richer physics is expected in the case of *two-species* gases, such as mixtures of two types of bosonic atoms. In this talk I will give an introduction to the field, followed by some recent results on the rotational properties of two-species Bose gases in the lowest Landau level. In particular we show that, contrary to expectations, trial wave functions of the composite fermion (CF) type, known from quantum Hall physics, give a very accurate description of this system. It is also shown how working only with a certain subset of possible CF candidate wave functions constitutes a major computational simplification without much loss of accuracy for the low-lying states. Finally I will briefly discuss some striking mathematical identities between seemingly different CF candidate states, of interest for a better understanding of the CF method in general.