Interactions between ultracold atoms lead to a broad range of interesting phases, bound states and dynamics, where often two-body, three-body and four-body physics is involved. I will give an overview over some of our experiments in Ulm where we investigate bound states and their dynamics. For example, I will discuss three-body recombination of bosonic Rb atoms where we are able to measure the product distribution of the produced $Rb_2$ molecules on the quantum level. For this, we detect the vibrational, rotational, electronic, hyperfine and magnetic quantum numbers of individual $Rb_2$ molecules. I will then switch to discussing bound states in a spin-balanced, quantum degenerate gas of fermionic Lithium atoms in the vicinity of the BEC-BCS cross over. While in the BEC regime the gas essentially only consists of $Li_2$ molecules at low enough temperatures, towards the cross over many-body aspects come into play turning the molecule gradually into a Cooper pair. We have recently probed the two-body bound state components in this Fermi gas and measured the pair fraction as a function of temperature and coupling strength. Furthermore, we have investigated the dynamics of the reactive collisions of two $Li_2$ bound pairs. We extract scaling laws for these dynamics as a function of scattering length and temperature and compare them to theoretical predictions.