Ultracold bosons in one dimension

In recent years, one-dimensional systems have attracted great interest in several fields of research, from condensed-matter physics to material science to chemistry, and more recently in the field of ultracold quantum gases. In our experiments, we produce one-dimensional chains of ultracold atomic gases by means of laser-light induced periodic potentials, modifying interactions in order to realize correlated states, and studying the effect of controlled disorder added on top of the periodic potential. We investigate the dynamical properties of the many-body correlated states with different techniques. In particular, we use inelastic light scattering to study the dynamical structure factor of the collective excitations, or particle-hole spectrum, and the momentum distribution of the system.