Emsellem & Neumayer

**Fuelling and growth of galaxy nuclei**

Black holes (BHs) are ubiquitous at the centres of galaxies and seem to co-evolve with their hosts, as suggested by a number of scaling relations (e.g., black hole mass vs galaxy properties). Nuclear star clusters (NCs) appear to follow similar scaling relations, but unlike BHs, NCs provide a visible record of the accretion of stars and gas. NCs may be also progenitors of BHs, thus relevant to understand their origin and their relation to galaxy formation. We can constrain the assembly histories of NCs using a unique observational dataset, but we are lacking numerical simulations to test the proposed fuelling and growing mechanisms. We are thus proposing here for a PhD project to simulate disk galaxies at high resolution from large (50kpc) to small (0.5pc) scales and probe the detailed coupling between the dynamics and the formation of new stars in the nucleus. These state-of- the-art simulations are becoming feasible now with the advent of supercomputing facilities such as SuperMUC.