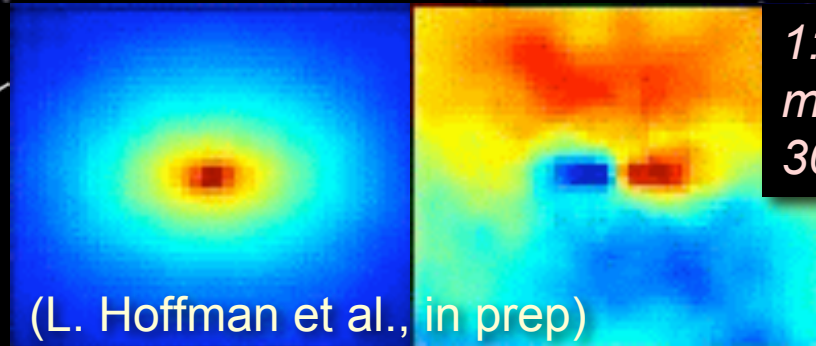
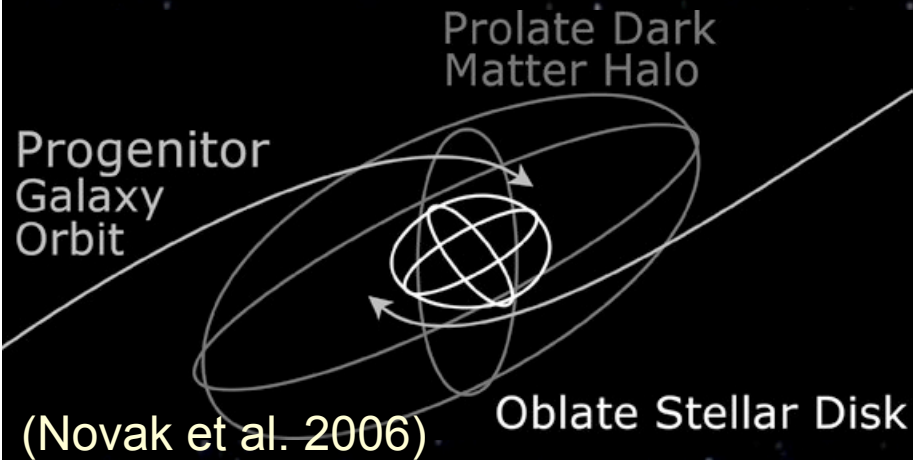
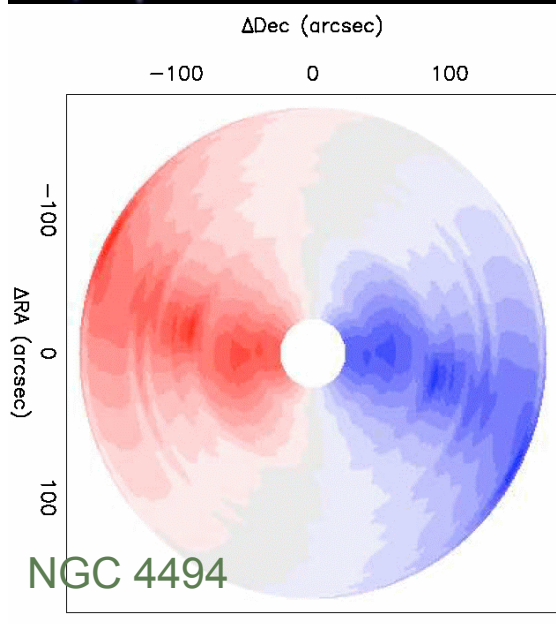


Global dynamical models: data $<, > R_{\text{eff}}$



1:1 spiral
merger,
30% gas

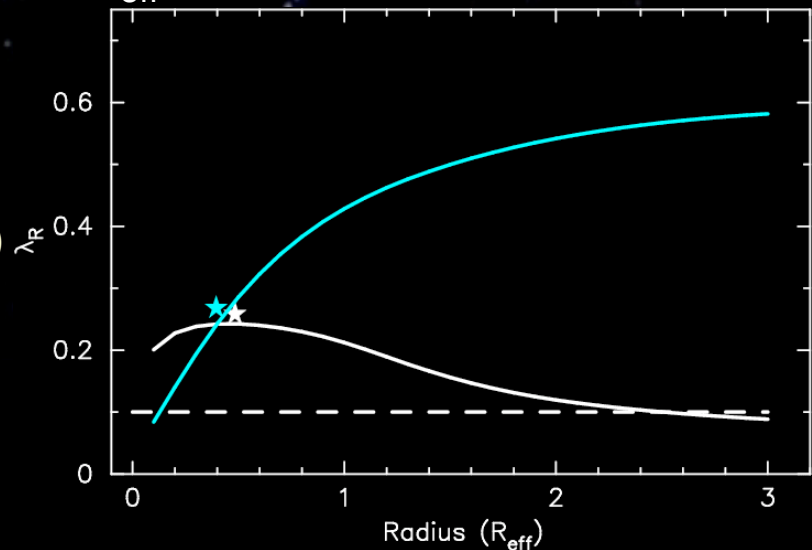
Wet merger: dissipation produces fast-rotator homology in central regions; outer regions reflect triaxial dry merger



New Keck/DEIMOS multi-slit technique, “SKiMS”, for 2D spectroscopy to $3 R_{\text{eff}}$ (Proctor et al. 2009)

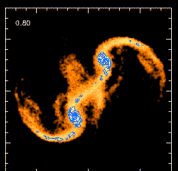
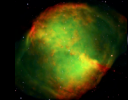
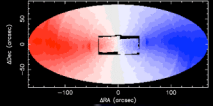
Fast rotator rotational homologies inside R_{eff} broken at larger radii (also Coccato et al. 2009)

Mass and orbit structure with radius constrain formation

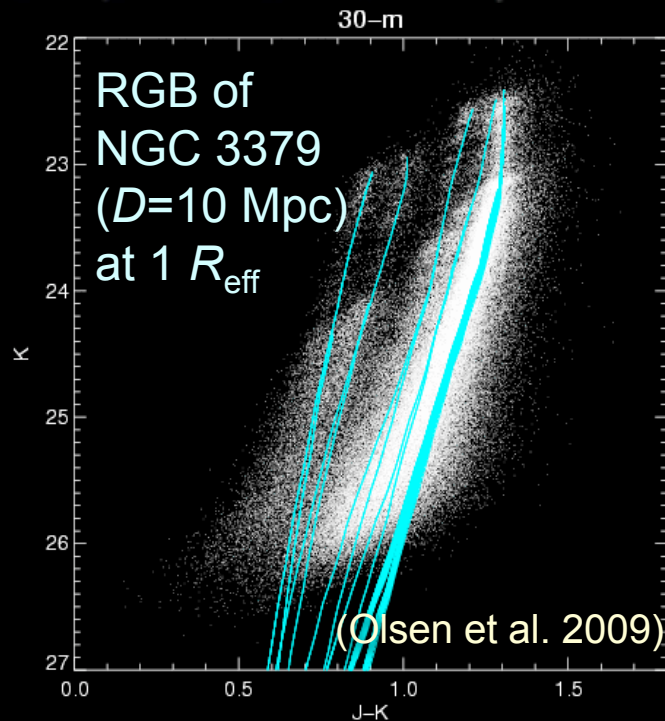


Prospects for dynamics+DM of early-types

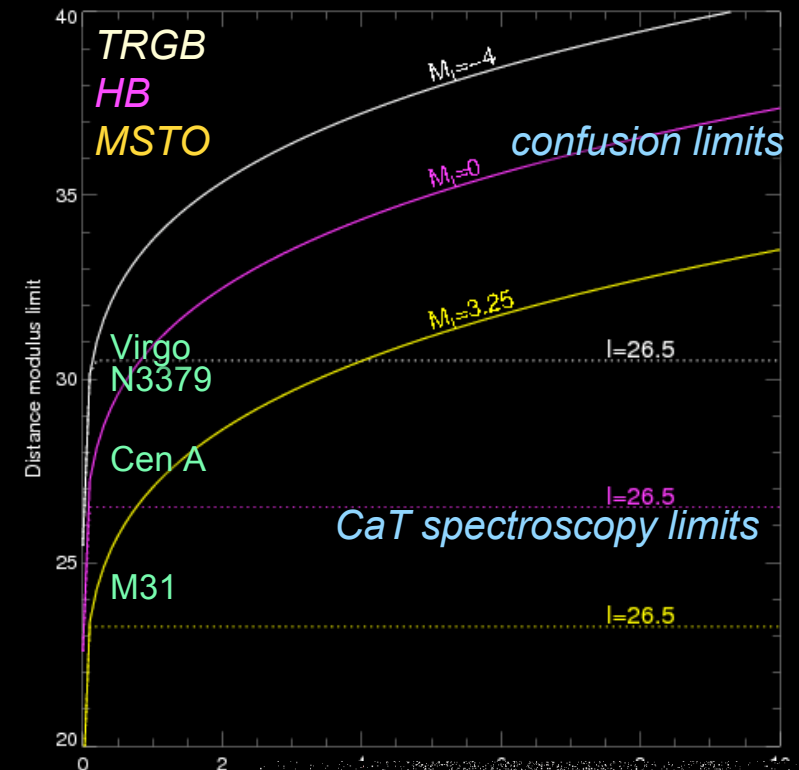
- **field stars (*integrated light*):**
VLT/MUSE (AO \rightarrow SMBHs; larger distances, longer λ baseline than SAURON)
Keck/SKiMS, Keck/CWI, HET/VIRUS (large radii)
- ~~X-ray gas~~: *too much unknown physics for detailed mass profiles*
- **planetary nebulae, globular clusters:**
progress w/intensive observations from existing+new 10-m instrumentation (GTC/OSIRIS, Subaru/Hyper-Suprime-Cam+WFMOS)
 $\sim 10\times$ efficiency breakthrough w/30-m and seeing-limited instruments (ELT/OPTIMOS, ELT/PANORAMICS, TMT/WFOS, GMT/GMACS)
- **systematic (all types+environments), homogeneous survey:**
SAURON/Atlas3D + halo studies (100s of velocities/galaxy) + photometry!
 \rightarrow basic though not definitive DM trends (need breakthrough in stellar M/L)
- **integrated, global dynamical models:** *Schwarzschild/particle, triaxial, optimized for discrete ves, incl. SMBH+DM halo, multiple pops*
- **cross-talk with simulations of galaxy formation:**
explore merger signatures, DM profiles w/baryonic feedback



Ultimate galactic deconstruction: *resolved stellar pops*



30+ meters:
Partial-AO
(.03") in I-band
enables CaT
kinematics +
metallicities to
~10 Mpc !



ELT/EAGLE, ELT/HARMONI, (TMT/IRMS):
IFU for central regions, slit-mask for outer parts -
feasible to obtain $\sim 10^4$ - 10^5 spectra per galaxy:
detailed DF reconstruction, encoding assembly +
star formation history

