From luminosity functions to colour distributions: tackling the next challenge in cosmological simulations

Matías Bravo, Claudia del P. Lagos,

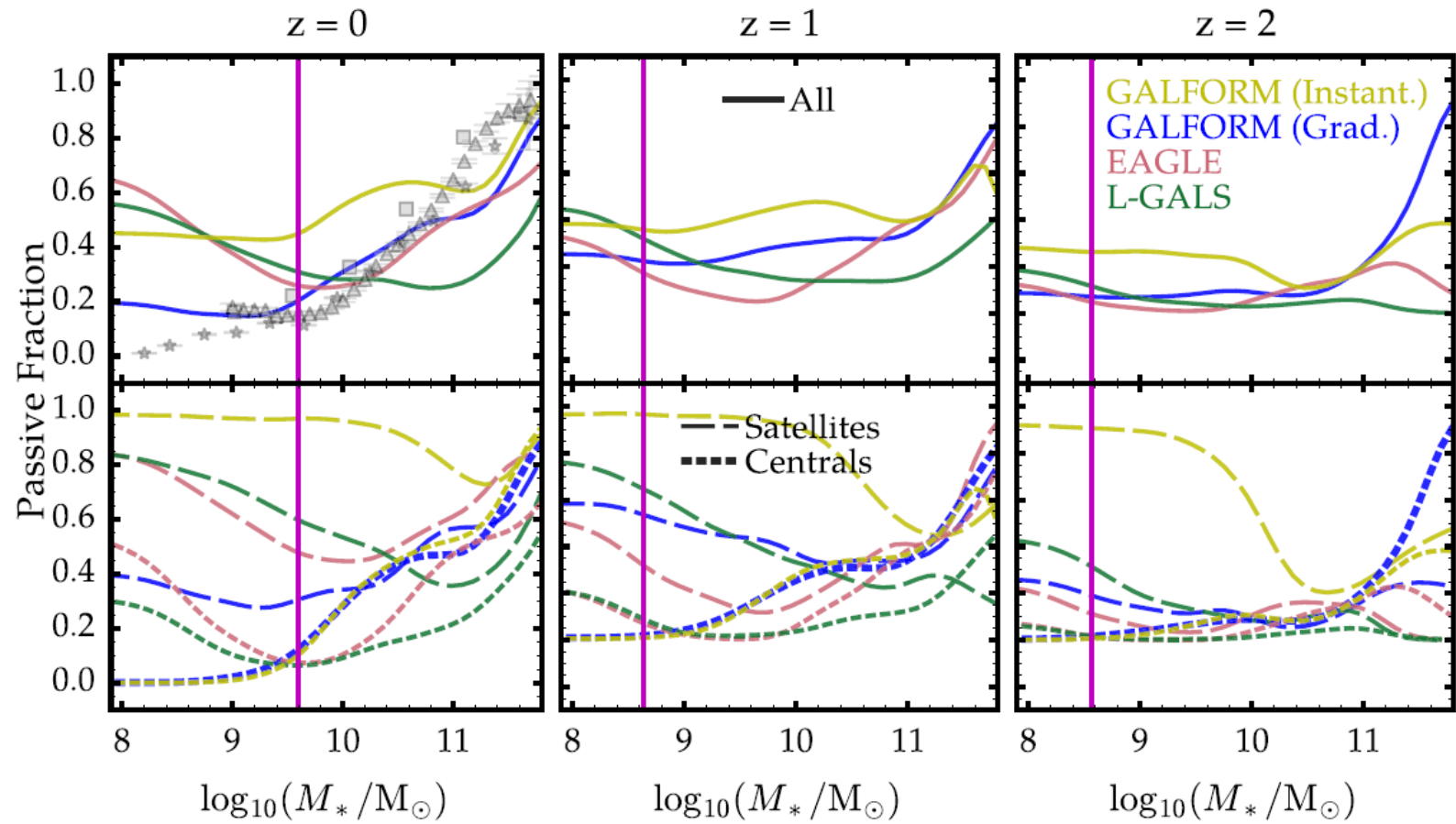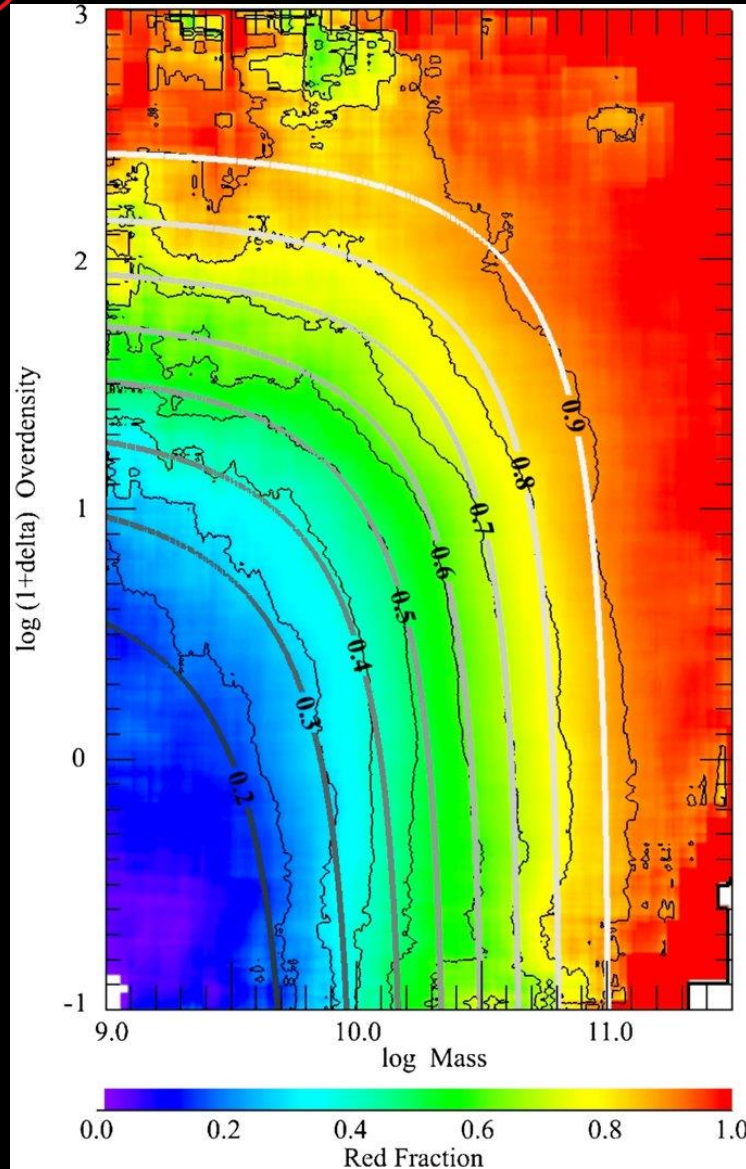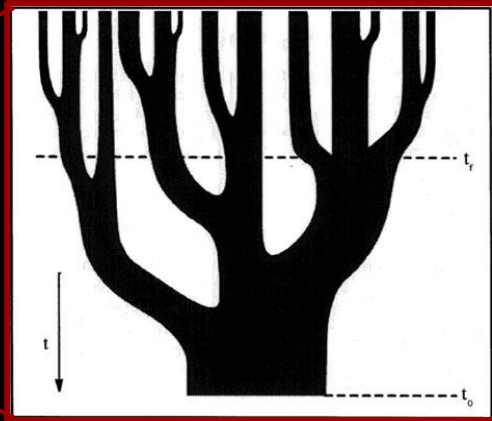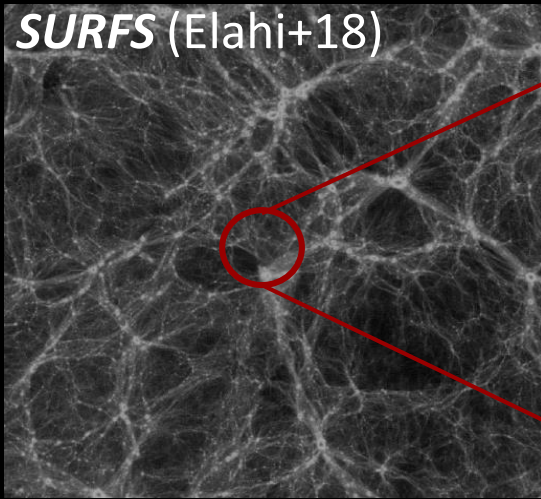Aaron S. G. Robotham, Sabine Bellstedt

Figure 6, Peng+2010
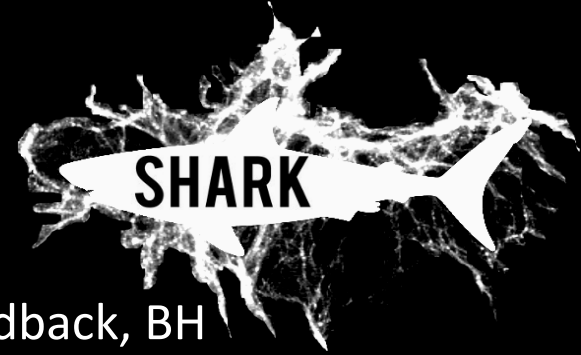
Figure 8, Guo+2016

Creating synthetic light-cones

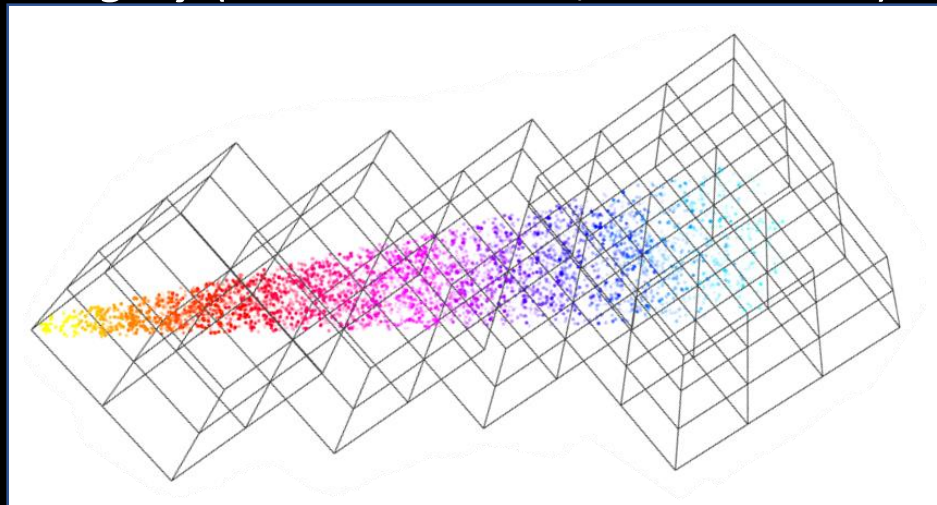**SURFS** (Elahi+18)

Shark (Lagos+18): Numerical scheme for baryon physics

Gas cooling, disk/bulge formation, star formation (from H_2), stellar and AGN feedback, BH growth, galaxy mergers, environmental processes, etc.
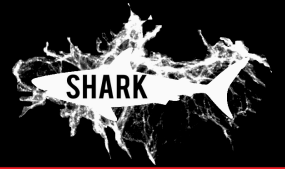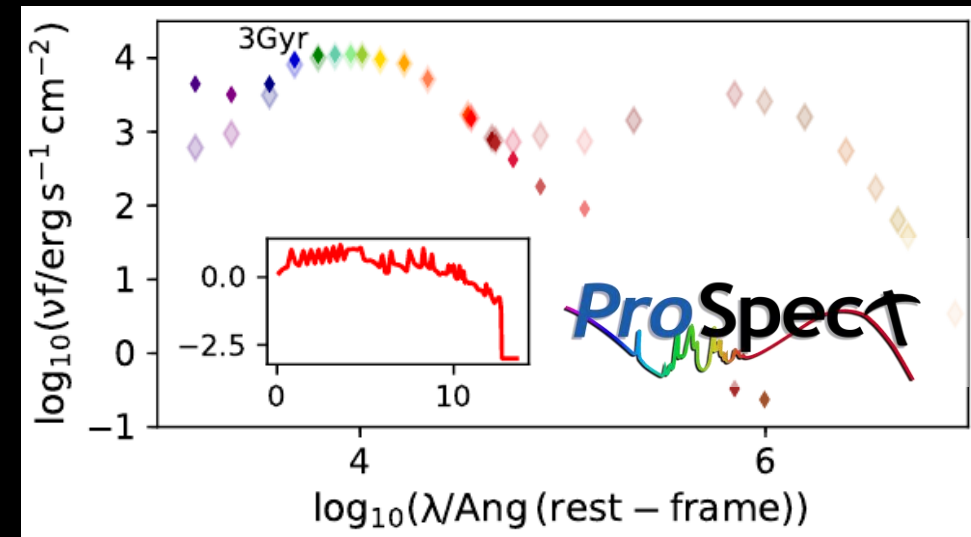
VELOCIraptor (Cañas+18, Elahi+19a)
TreeFrog (Poulton+19, Elahi+19b)

Stingray (Obreschkow+09, Chauhan+19)

ProSpect (Robotham+subm): SED generation

All codes are open source
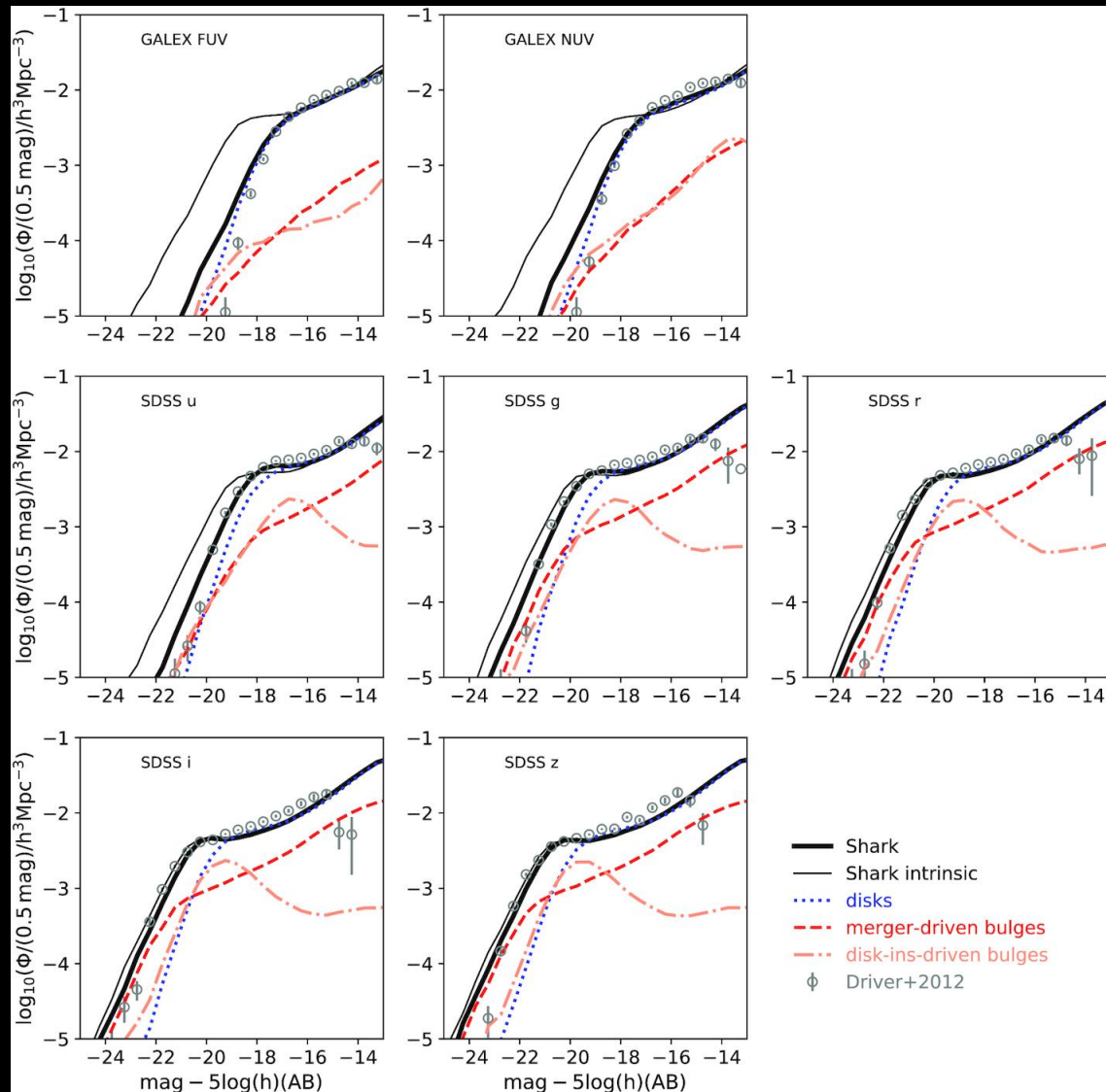
Luminosity functions

Figure 10, Lagos+2019

- ***ProSpect*** uses a Charlot+2000 attenuation model.

- Lagos+2019 tested several methods to provide the parameters

- We focus on their default: a combination of Remy-Ruyer+2014 with Trayford+2019 (T19-RR14)

(*More on this on Claudia's talk on Friday*)

Latest GAMA data

- Redshifts: Liske+2015

- Group Catalogue: Robotham+2011

- Photometry (*ProFound*): Robotham+2018, Bellstedt+submitted

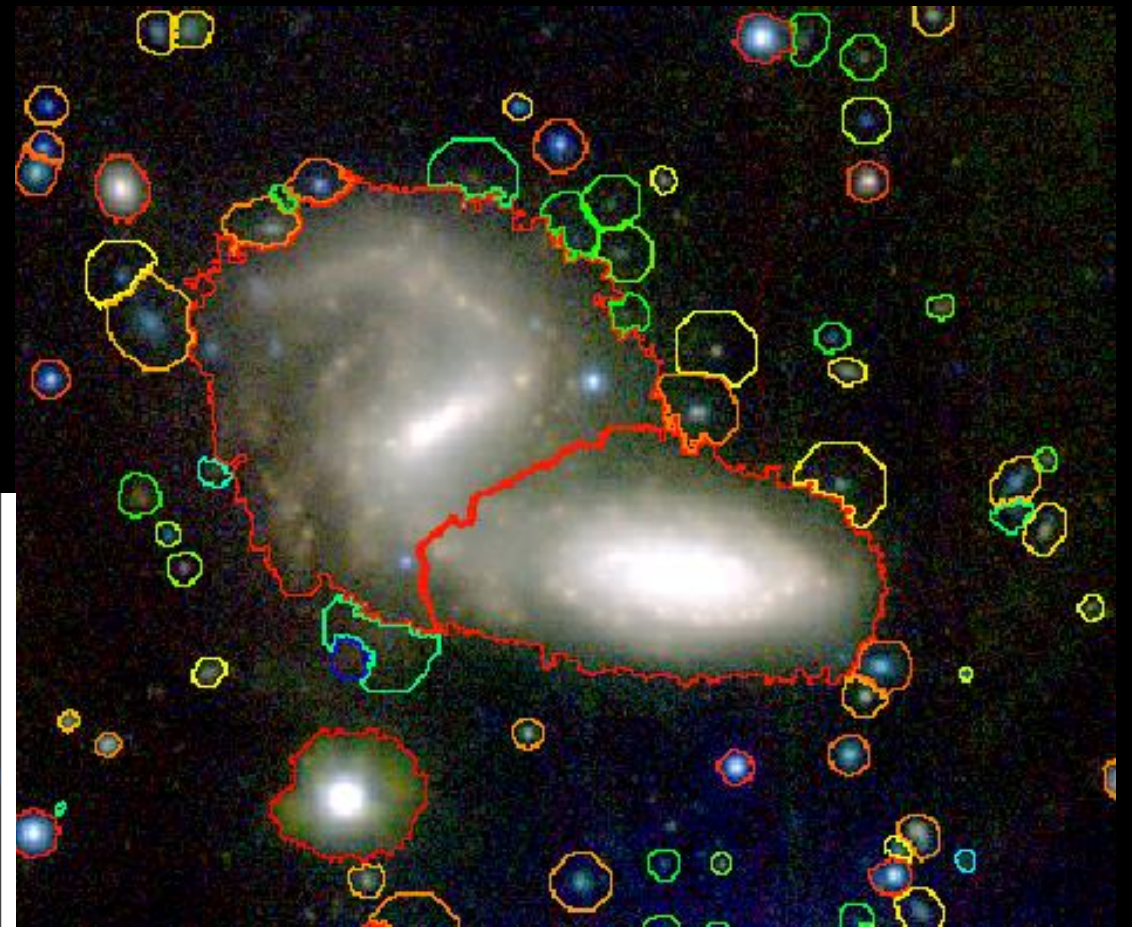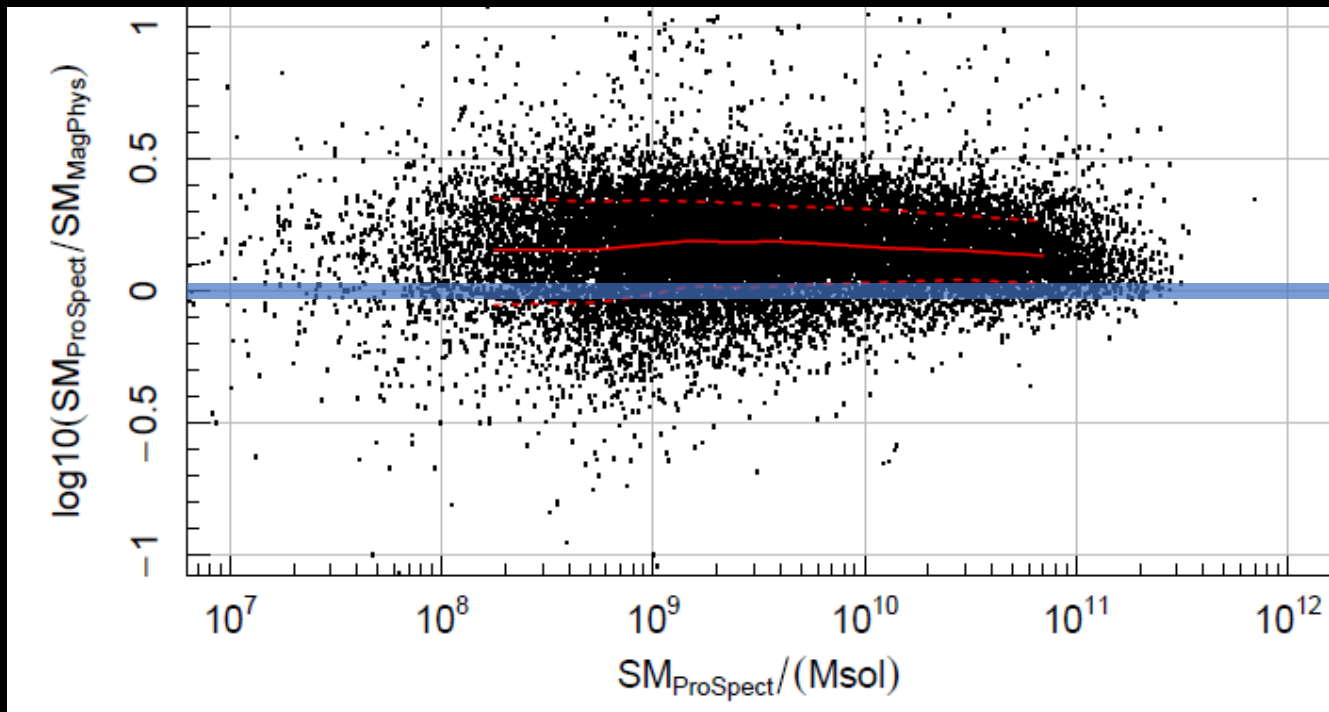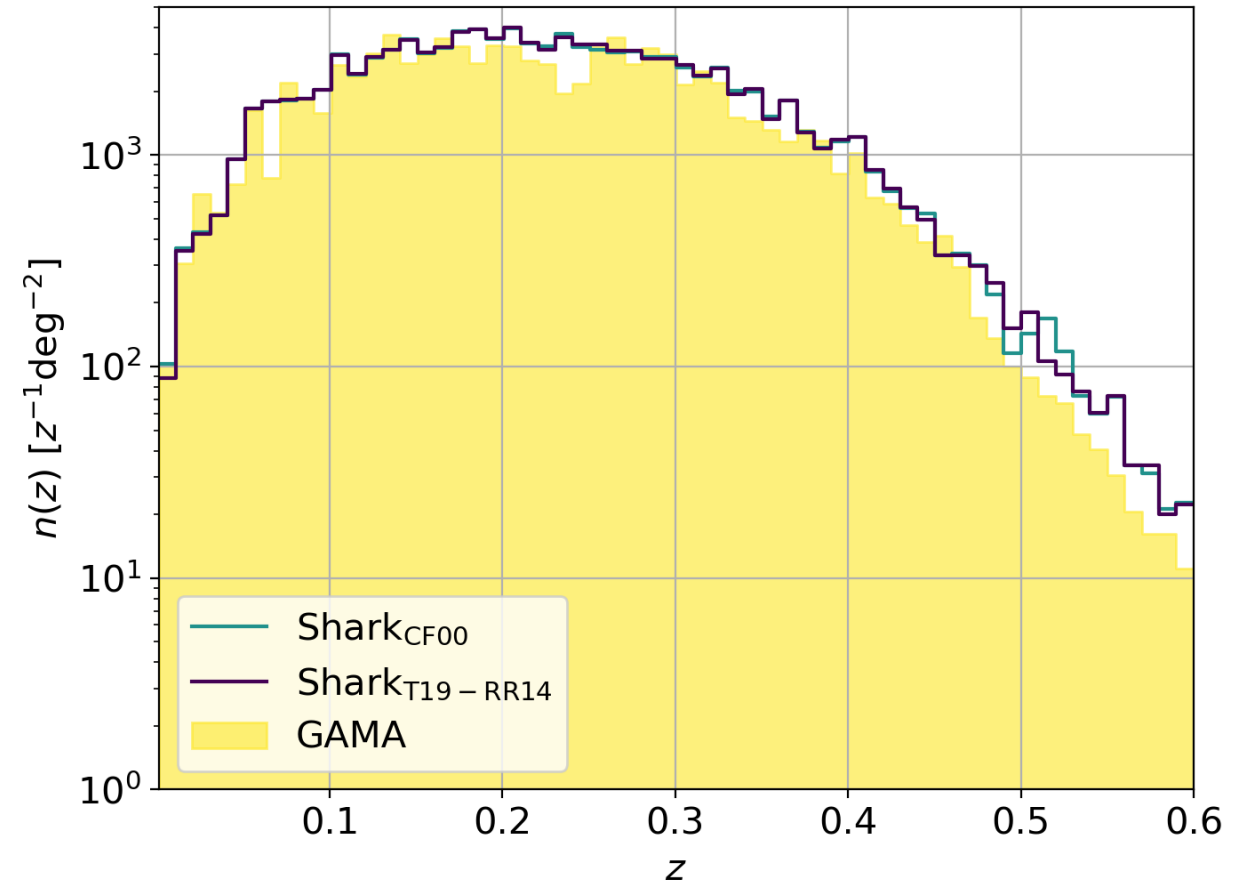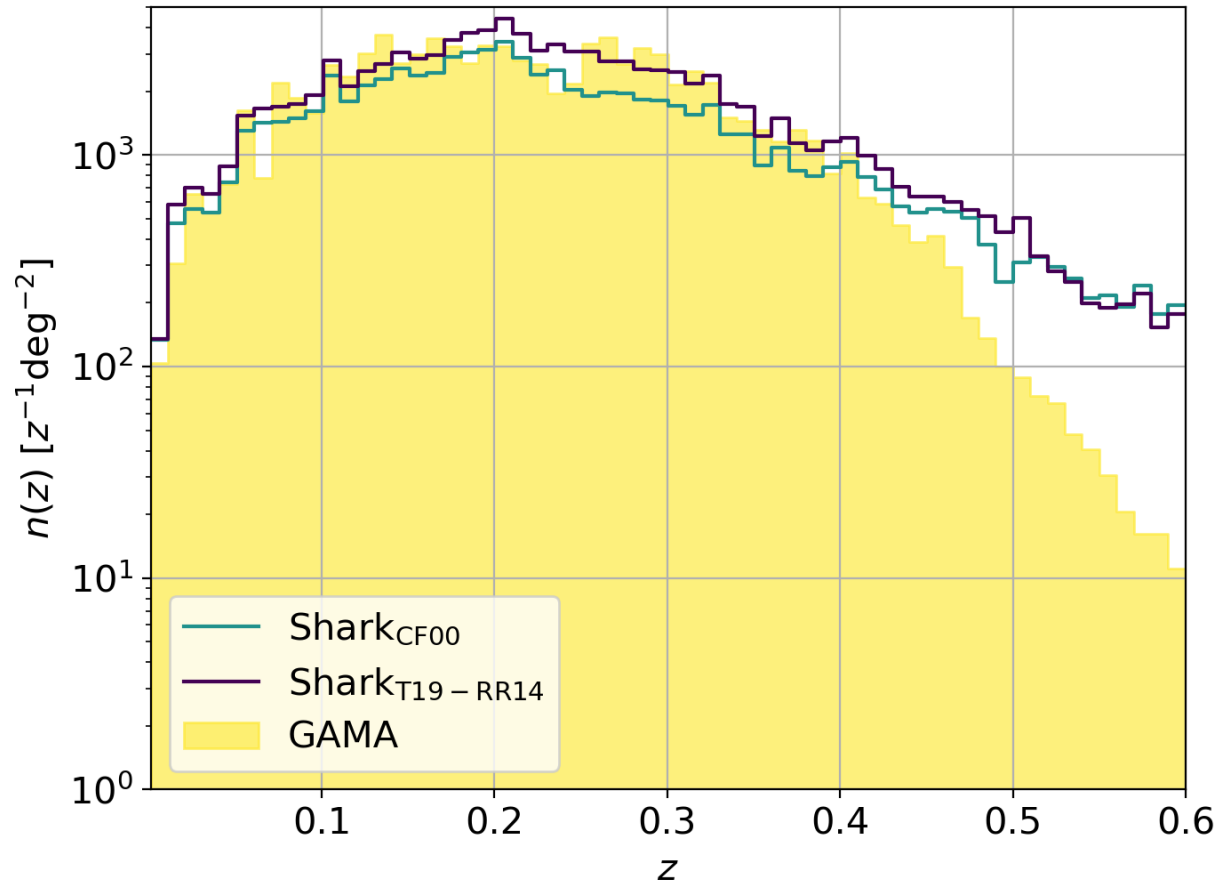- Galaxy properties (*ProSpect*): Robotham+submitted, Bellstedt+in prep.

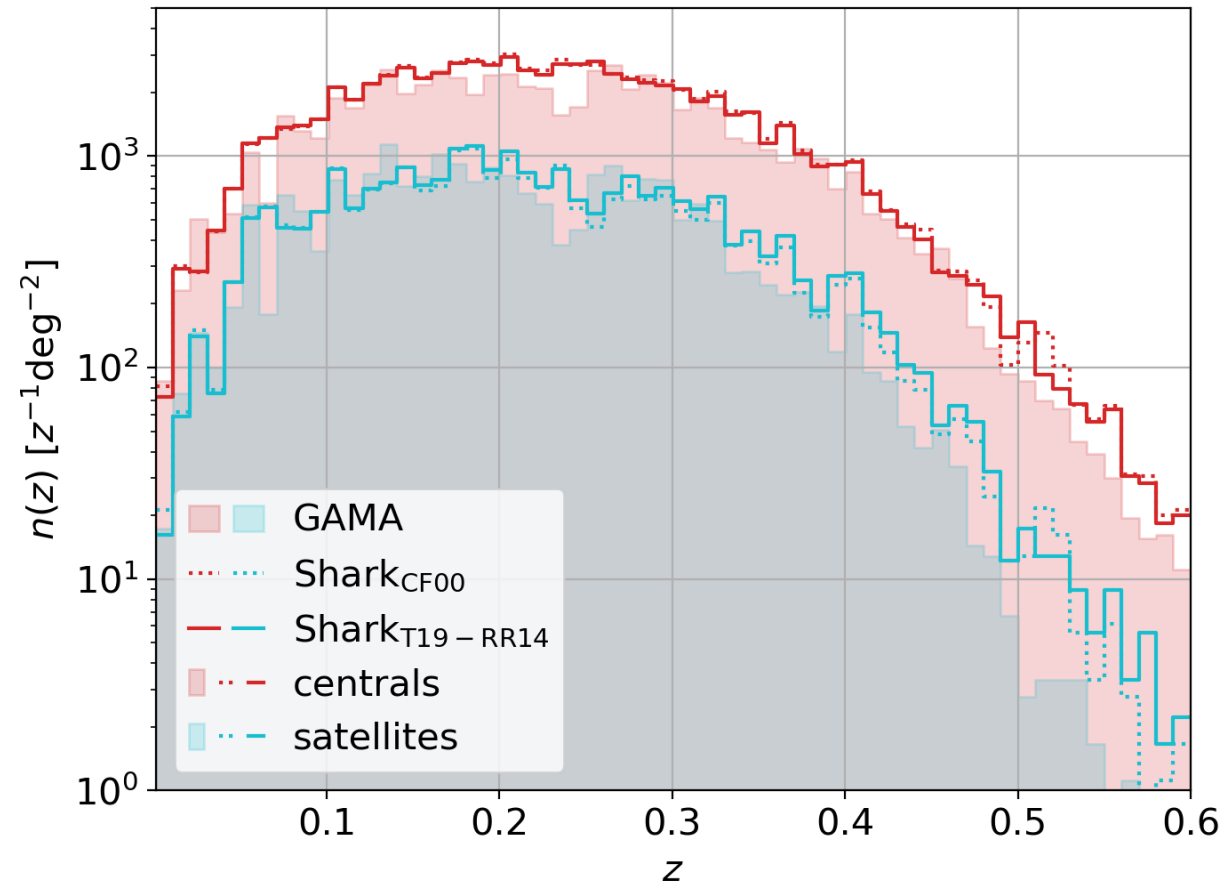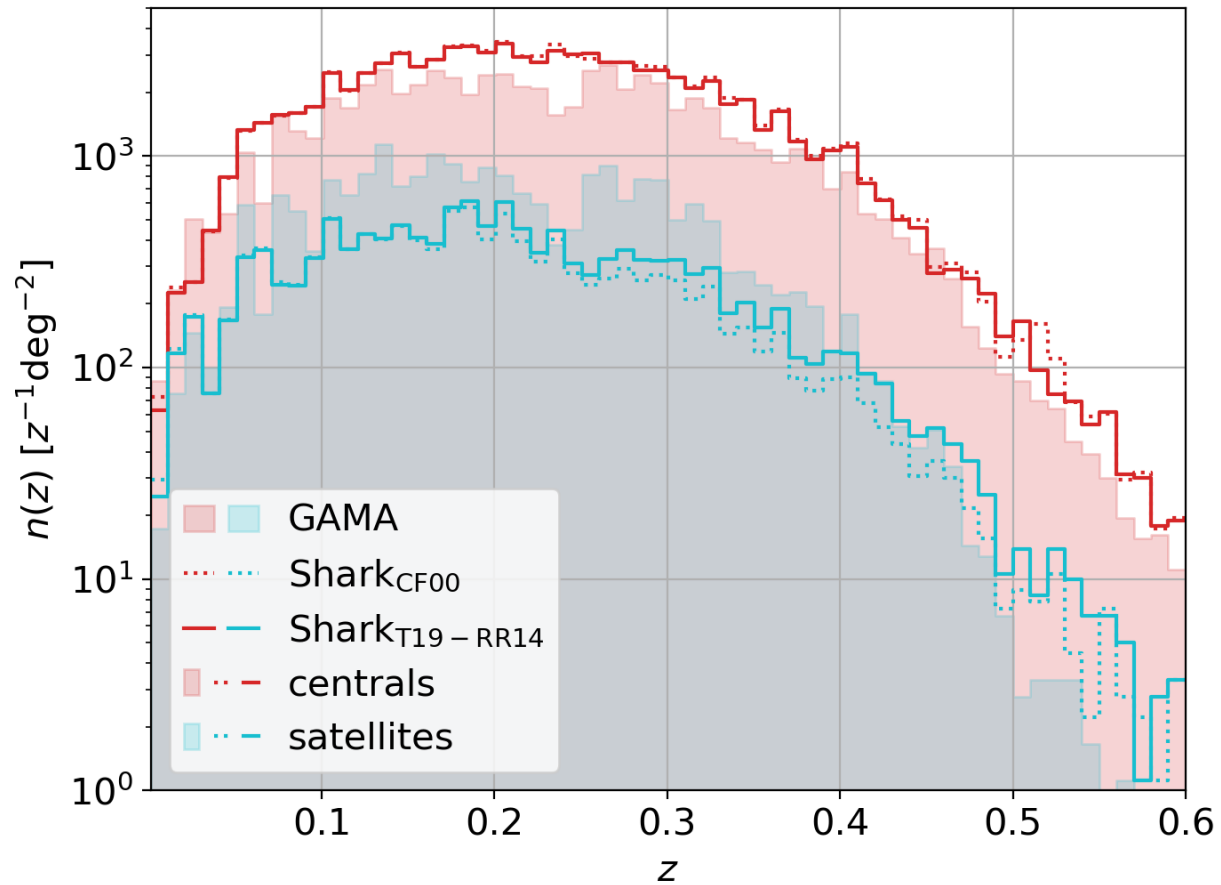Figure by Sabine Bellstedt

Figure 33, Robotham+submitted

Intrinsic

Abundance matching + magnitude errors

Bravo+in prep.

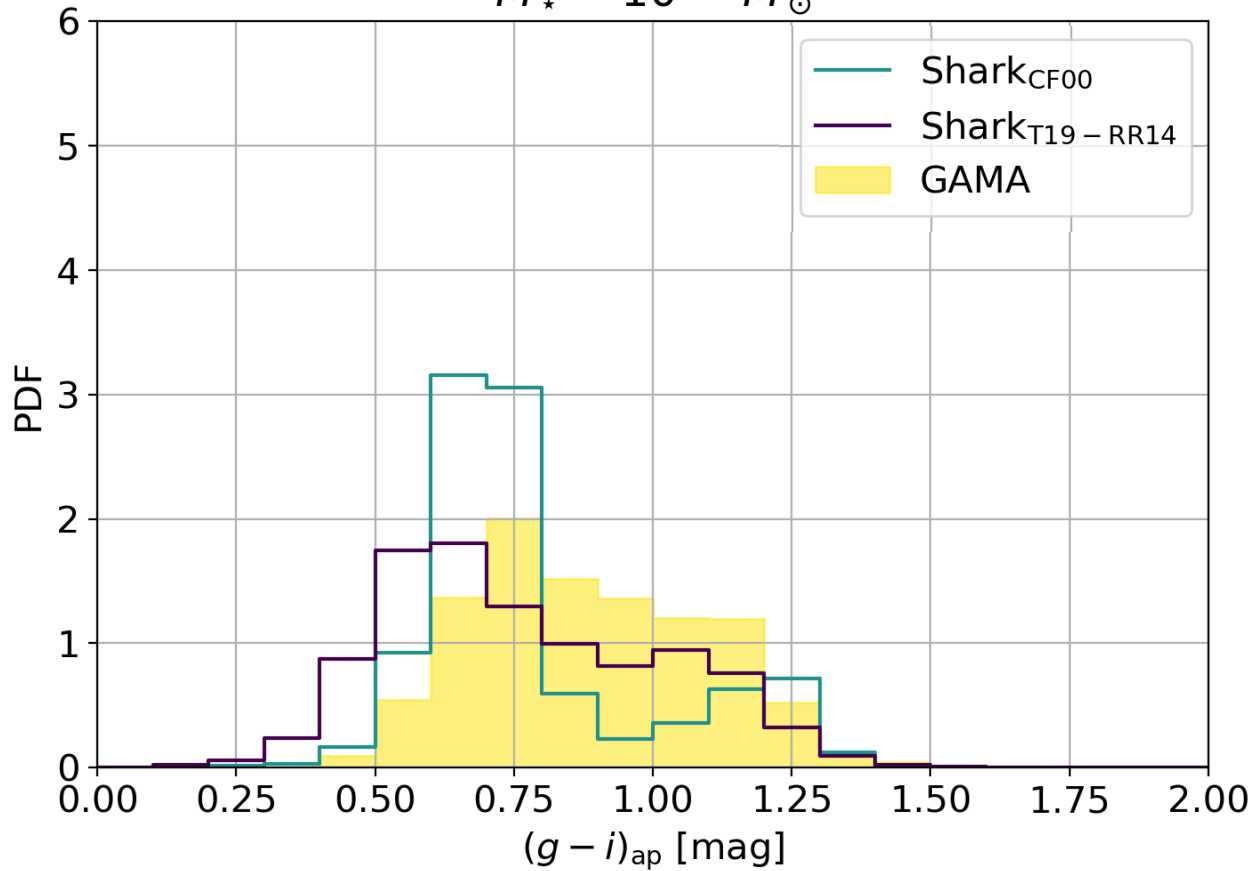# Redshift distributions

Abundance matching + errors

Abundance matching + errors +
Robotham+2011 group finder

Bravo+in prep.

$M_\star \sim 10^{9.8} \, M_\odot$

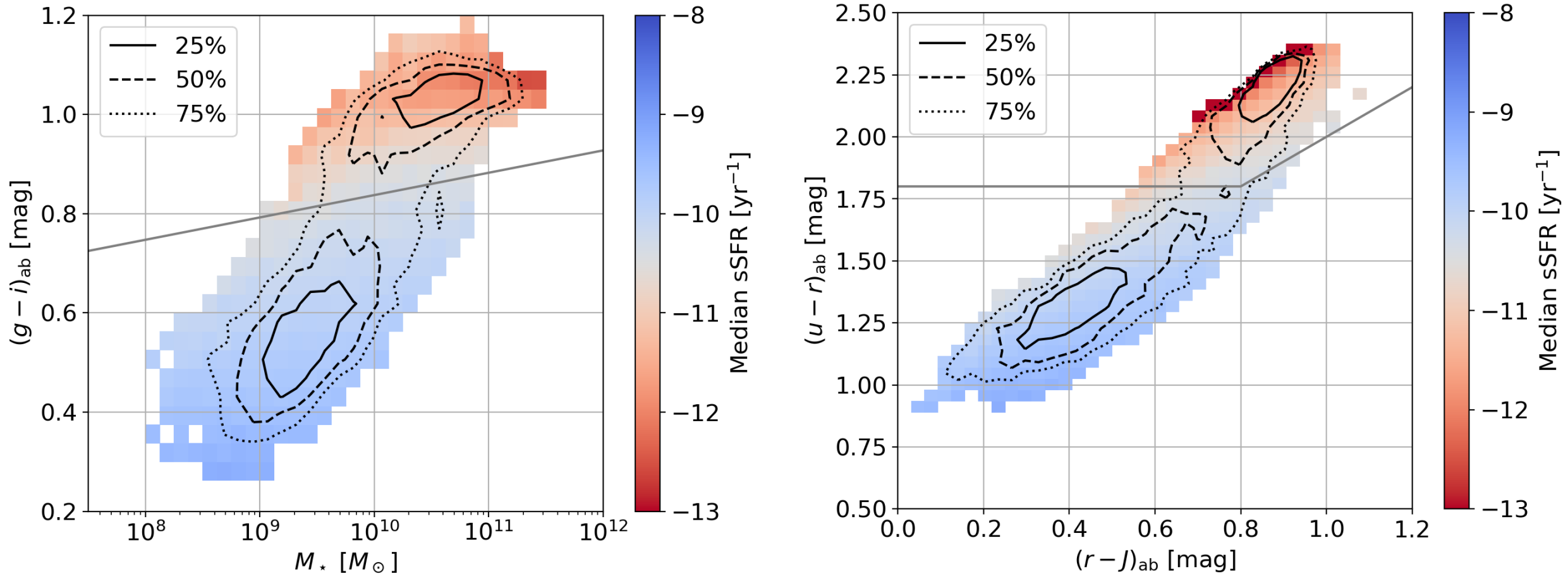$M_\star \sim 10^{10.4} \, M_\odot$

Legend: $\mathrm{Shark_{CF00}}$, $\mathrm{Shark_{T19-RR14}}$, GAMA

y-axis: PDF
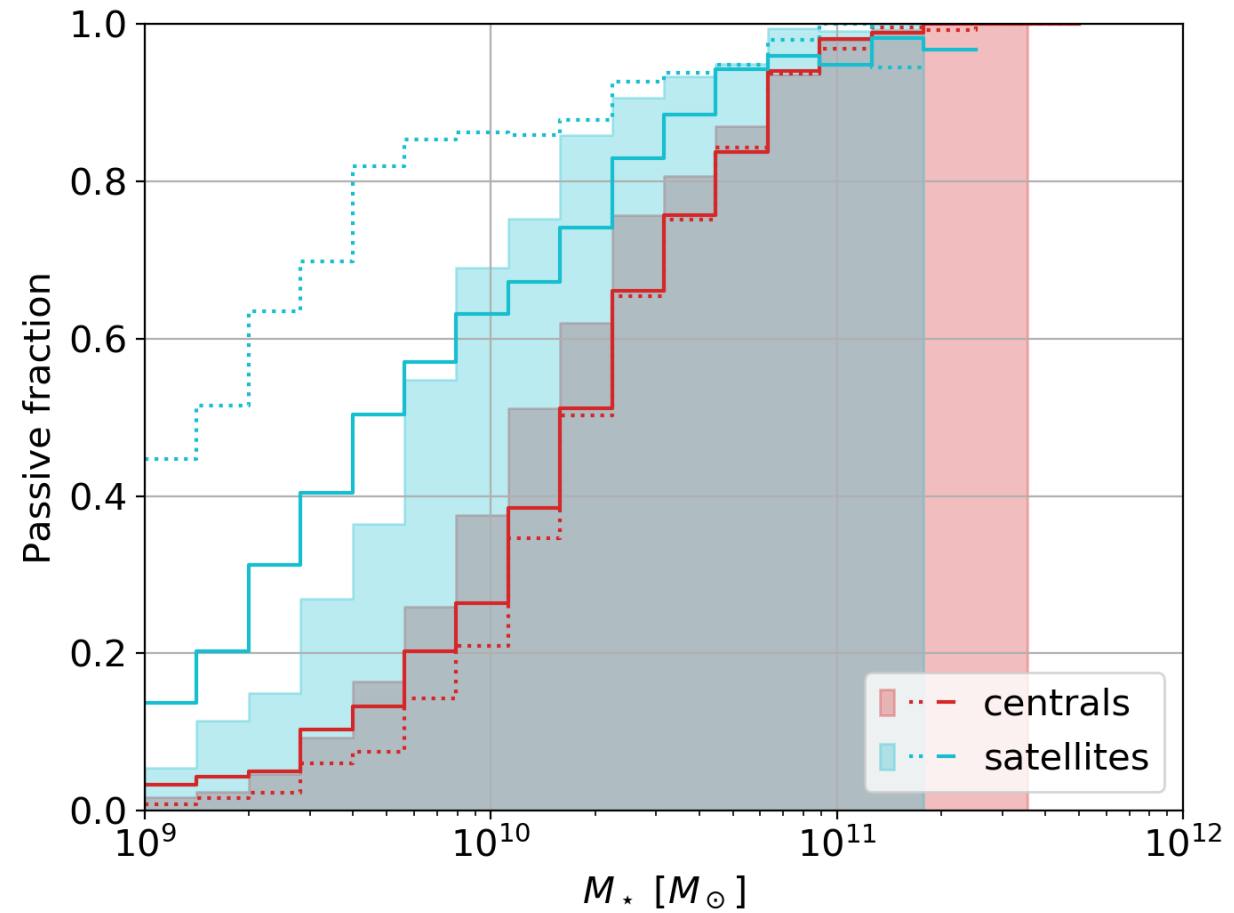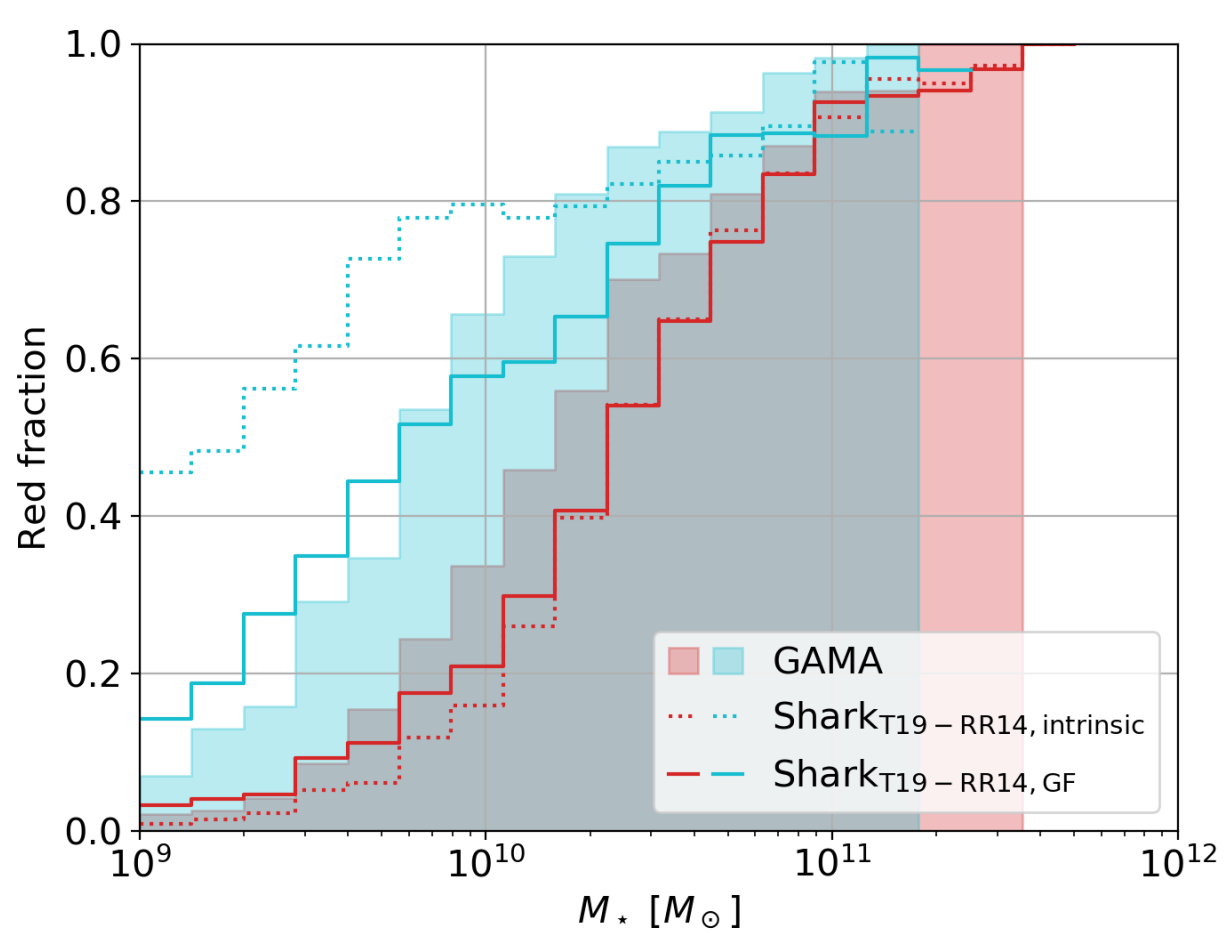
x-axis: $(g-i)_{\mathrm{ap}}$ [mag]
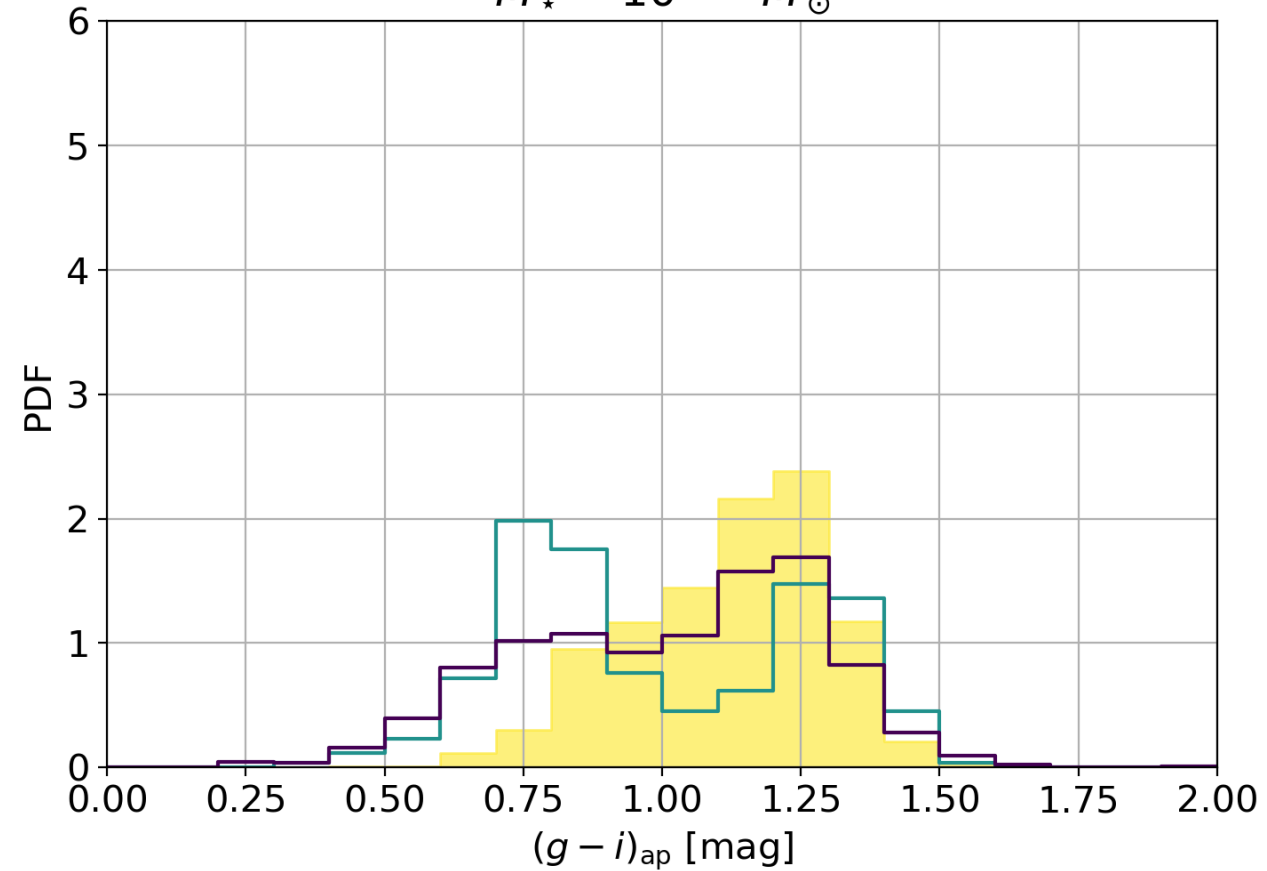
Bravo+in prep.

Colour selection informed only from GAMA

Bravo+in prep.

Bravo+in prep.

Summary

- *SURFS + SHARK + Stingray + ProSpect* is capable of reproducing observed colour distributions observed in GAMA.

- The choice of dust attenuation is critical.

- The intrinsic central/satellite classification make satellites look too red/passive.

- Replicating the observation classification greatly reduces the tension.