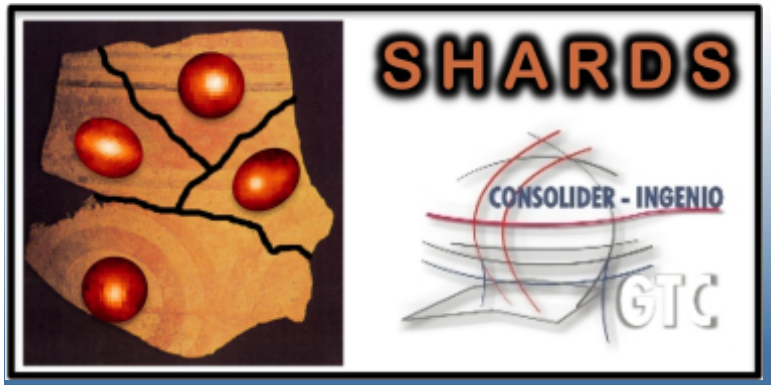


AGN in the SHARDS survey: (work in progress)

Almudena Alonso Herrero

Antonio Hernán Caballero

1st SHARDS meeting, Madrid, June 2013

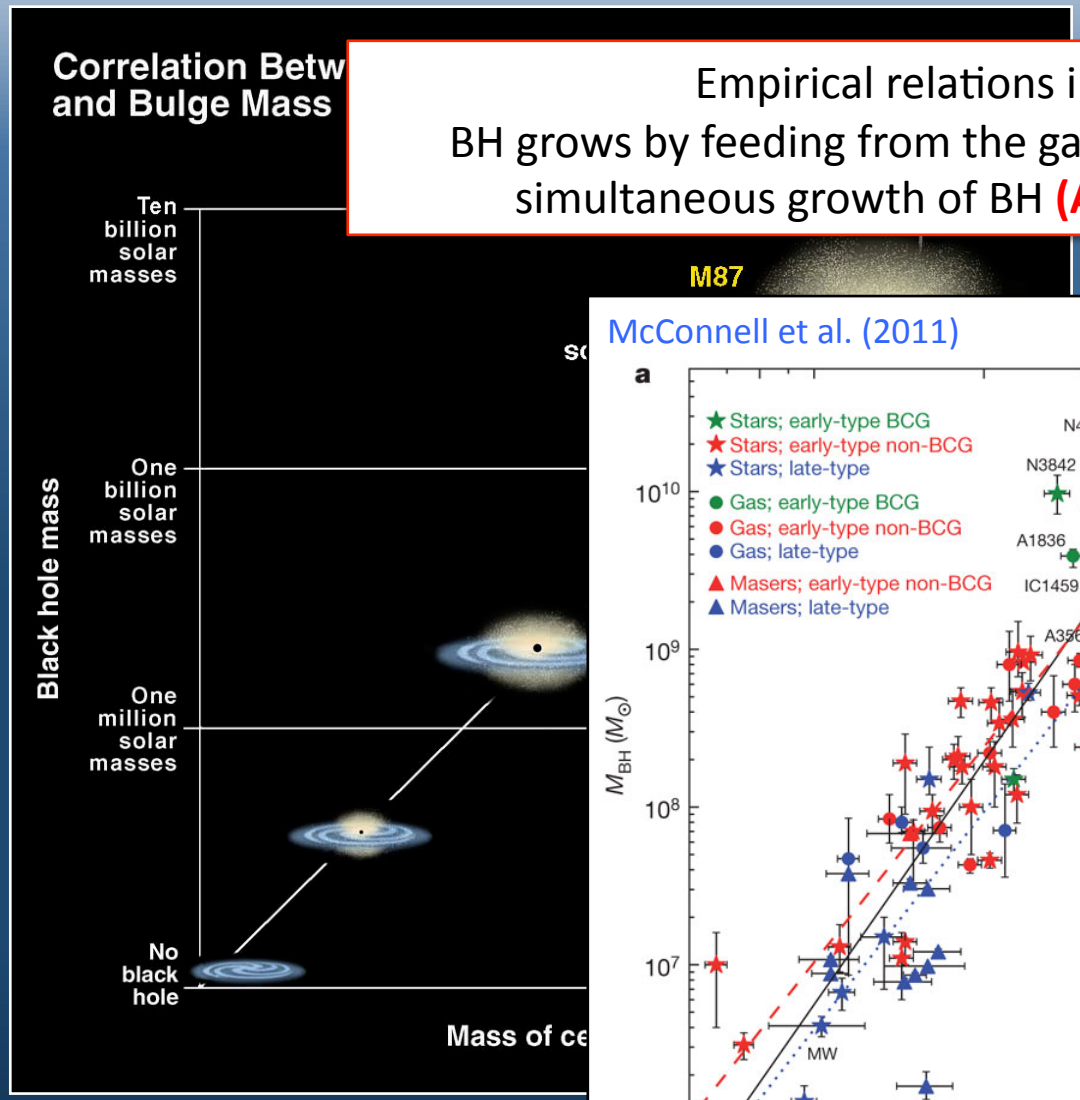
Instituto de Física de Cantabria

UNIVERSIDAD DE CANTABRIA

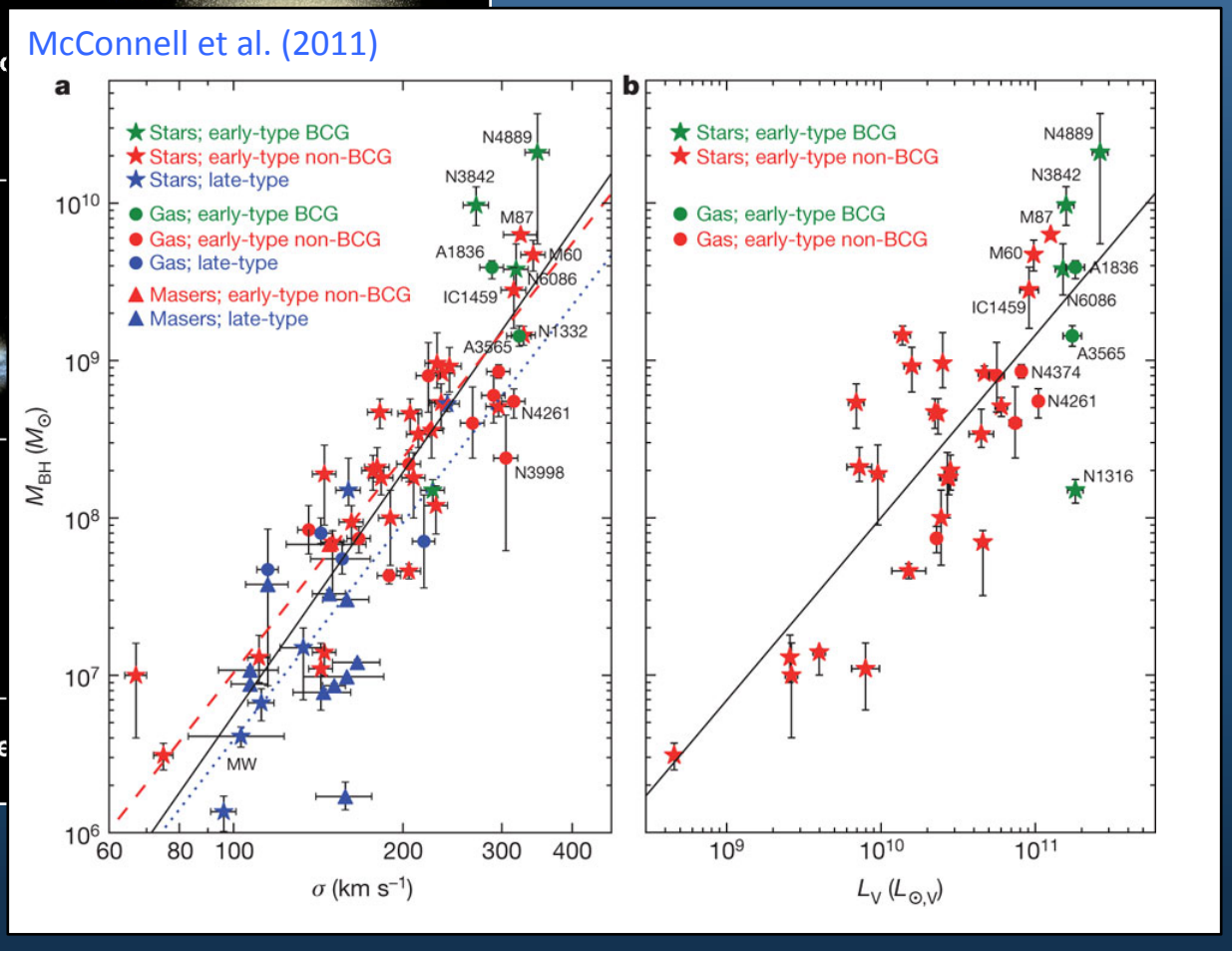
CANTABRIA CAMPUS INTERNACIONAL

Supermassive Black Holes in the centers of galaxies

Empirical relations in local Universe ➔
BH grows by feeding from the gas accreted by the host galaxy ➔
simultaneous growth of BH **(AGN phase)** and stellar bulge

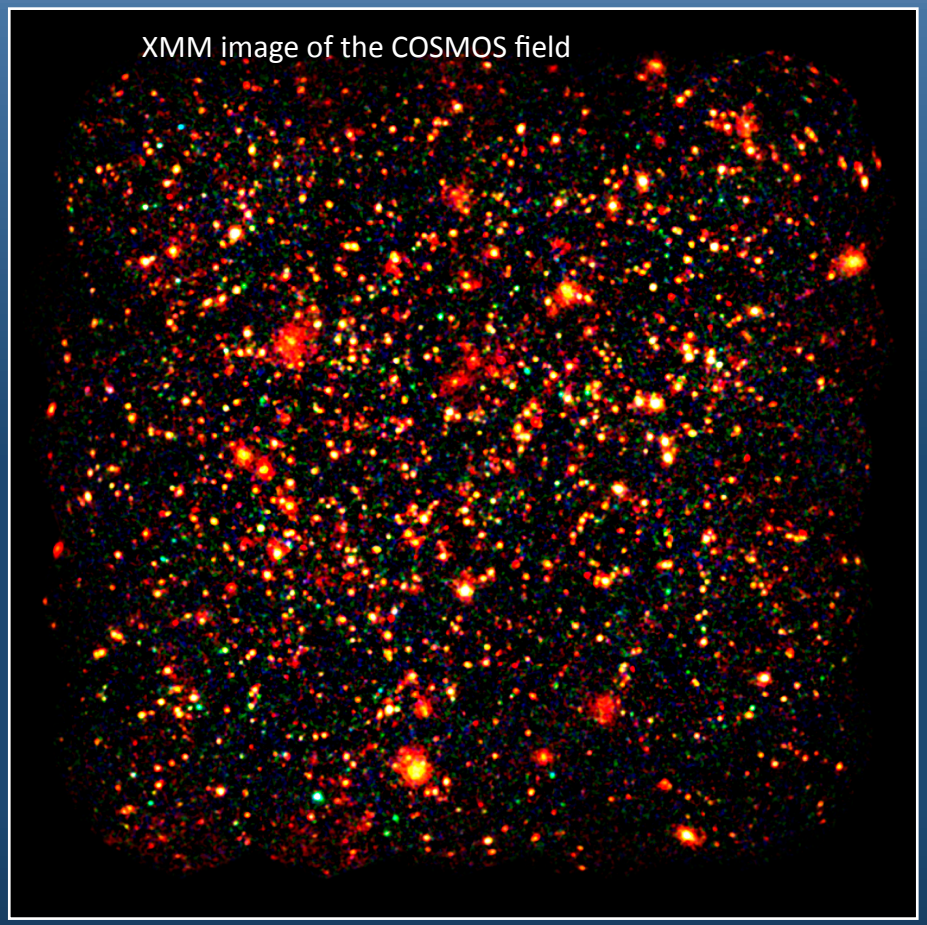


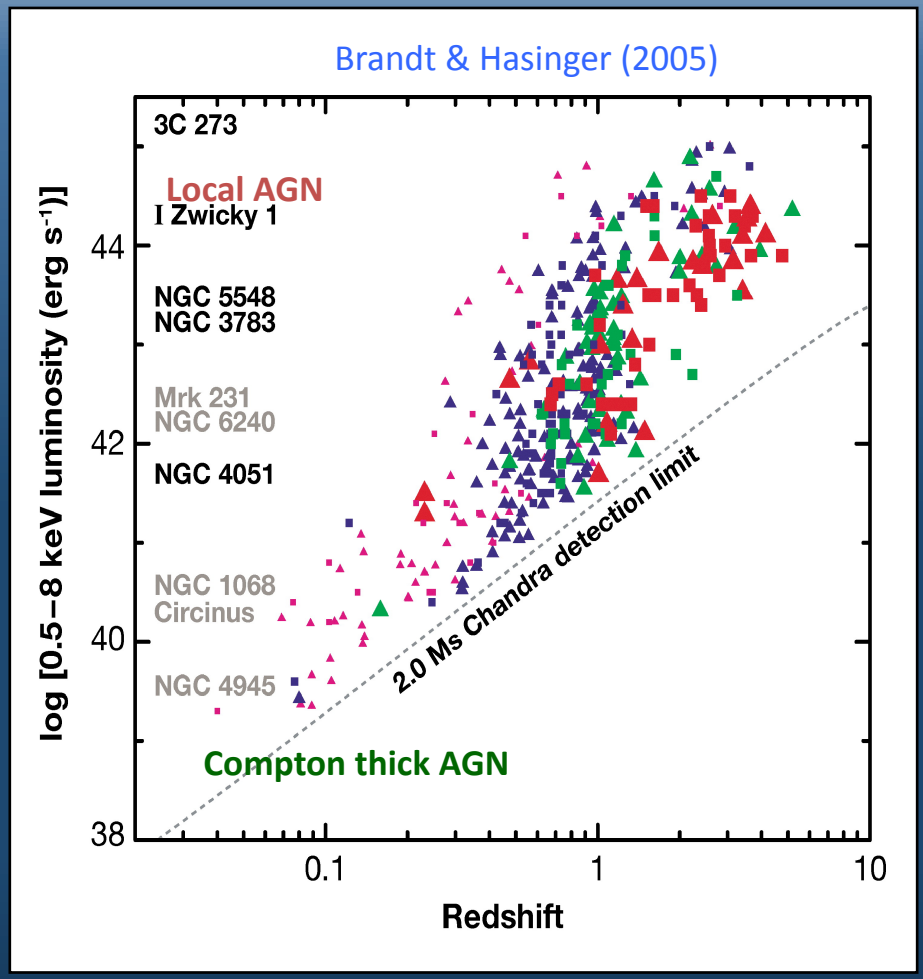
McConnell et al. (2011)



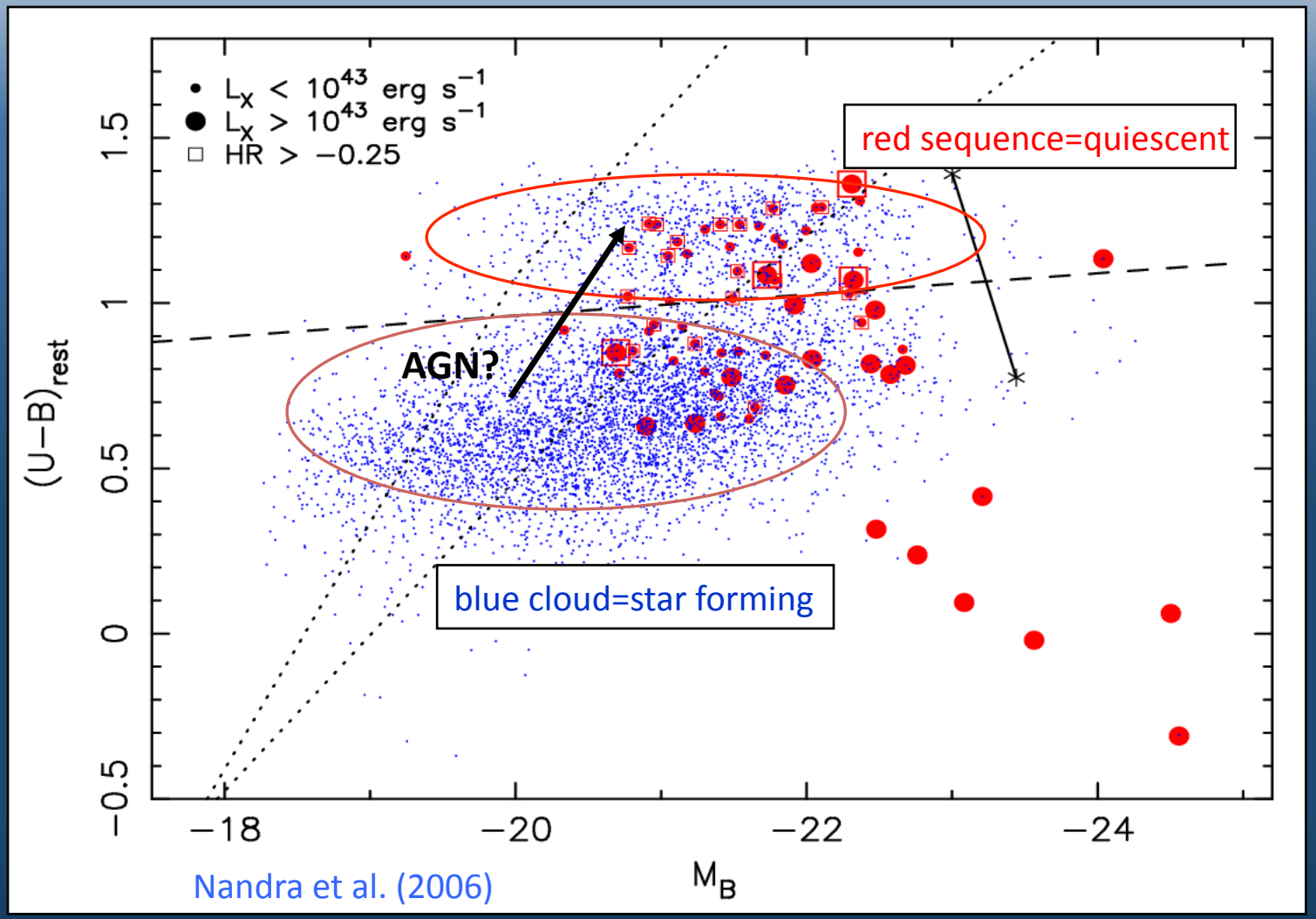
X-ray selected AGN at cosmological distances

Deep X-ray observations are extremely efficient in selecting AGN at cosmological distances, but they are likely missing the MOST OBSCURED AGN



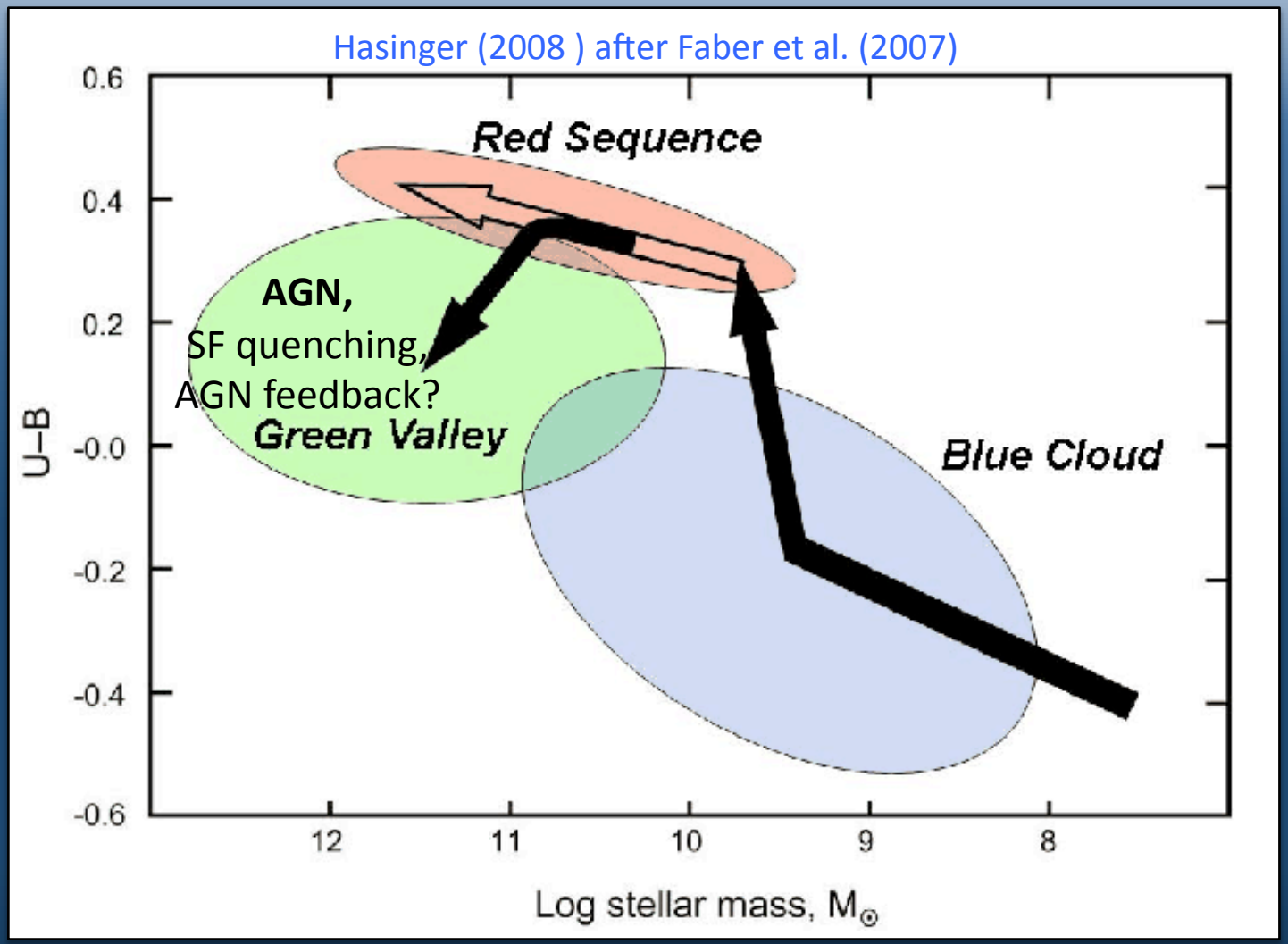


Role of AGN in the evolution of galaxies?



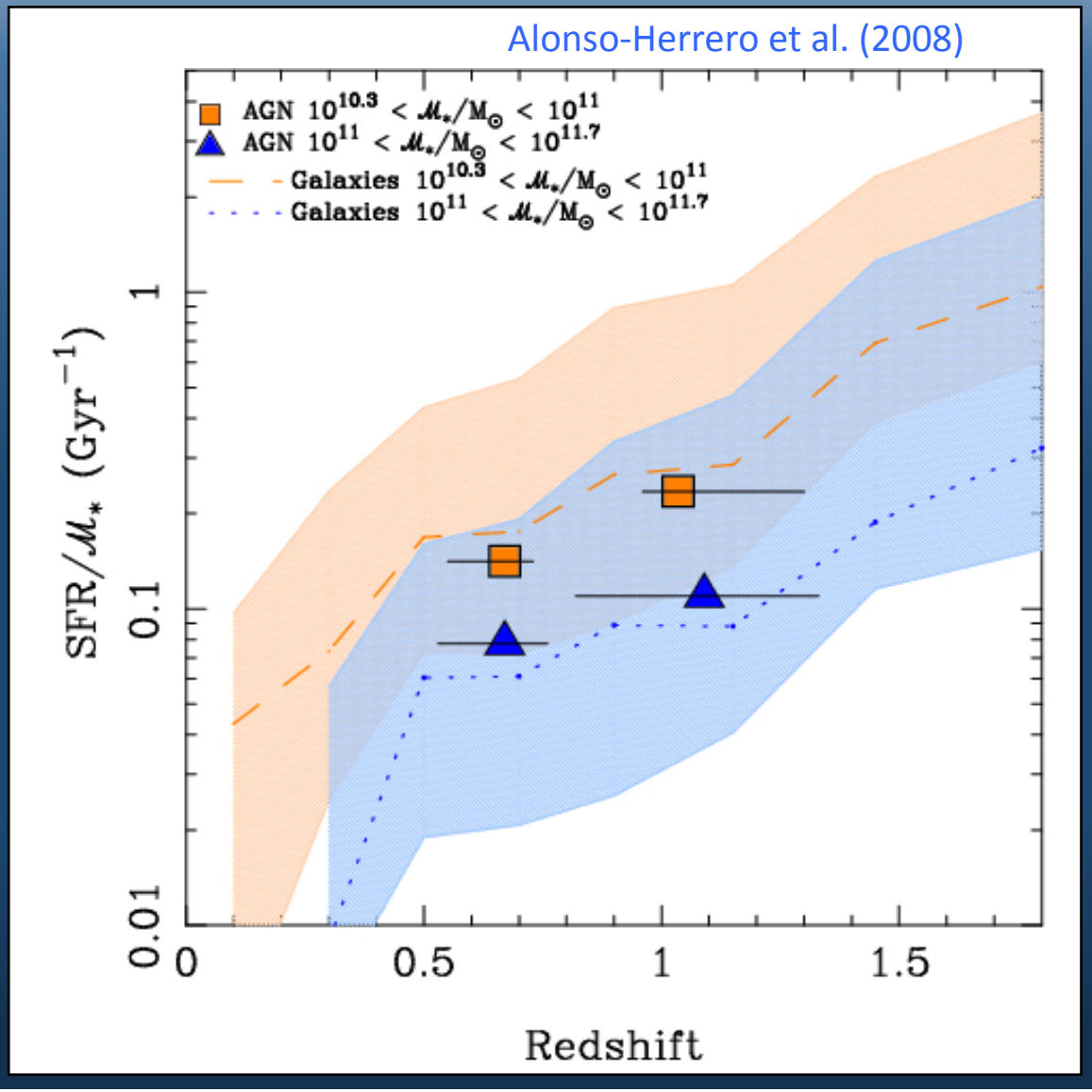
Nandra et al. (2006)

Role of AGN in the evolution of galaxies?



No evidence for AGN quenching star formation?

X-ray selected AGN with Seyfert-like luminosities and massive host galaxies



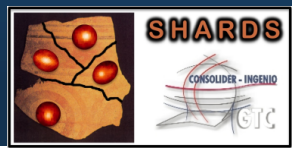
Current AGN projects in SHARDS

Star Formation Histories of X-ray selected AGN at 0.65<z<1.07

- Redshift range chosen to have the 4000Å break
- Sample of 38 Chandra hard X-ray detected sources
- Median log $L_{2\text{-}8keV}$= 42.6 erg/s (i.e., Seyfert-like luminosities)
- Most of them have near-IR SED dominated by the 1.6μm bump (stellar emission)

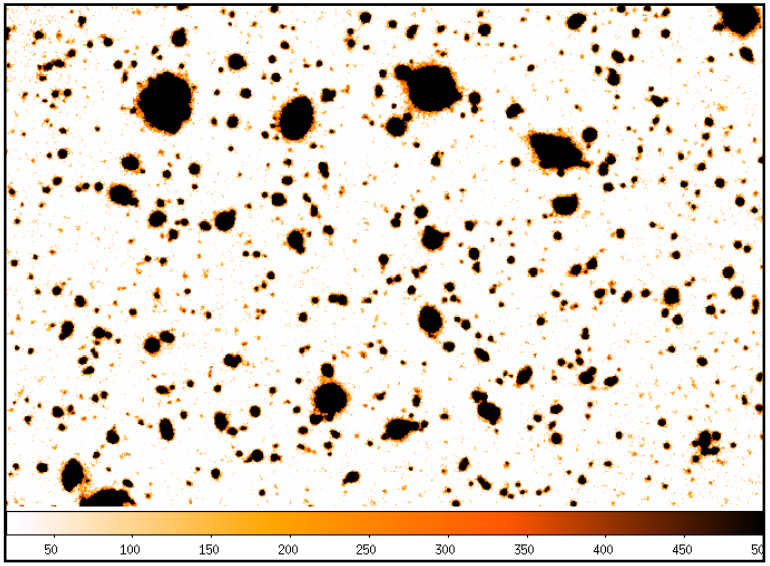
Looking for Obscured AGN: IRAC Infrared Power Law Galaxies

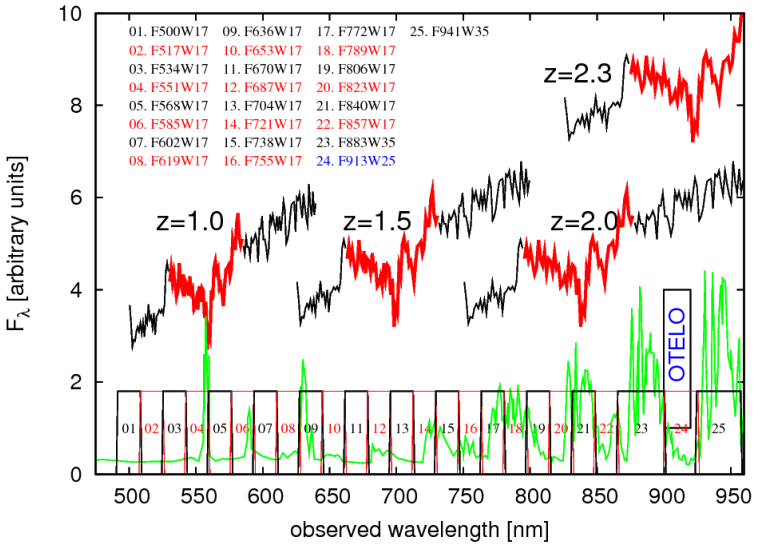
- Sample of 85 IR Power Law Galaxies in the SHARDS field selected using IRAC color-color diagram of Donley et al. (2012)
- 53% detected in X-rays
- Remaining sources, no z_{spec}, no activity class

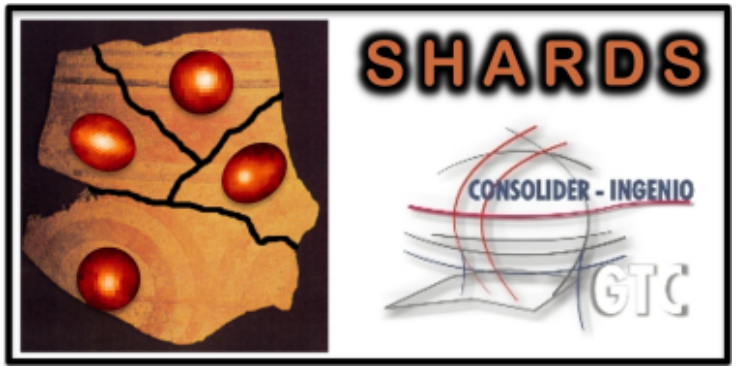


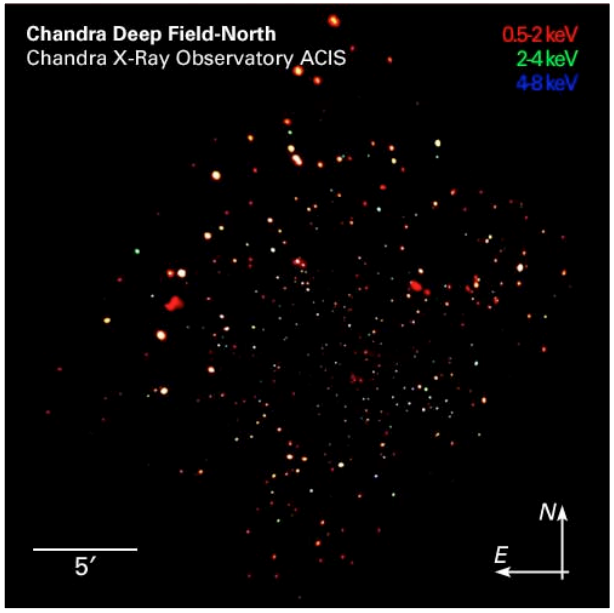
Our work: SHARDS + RAINBOW+ 2Ms Chandra

Pérez-González et al. (2013)



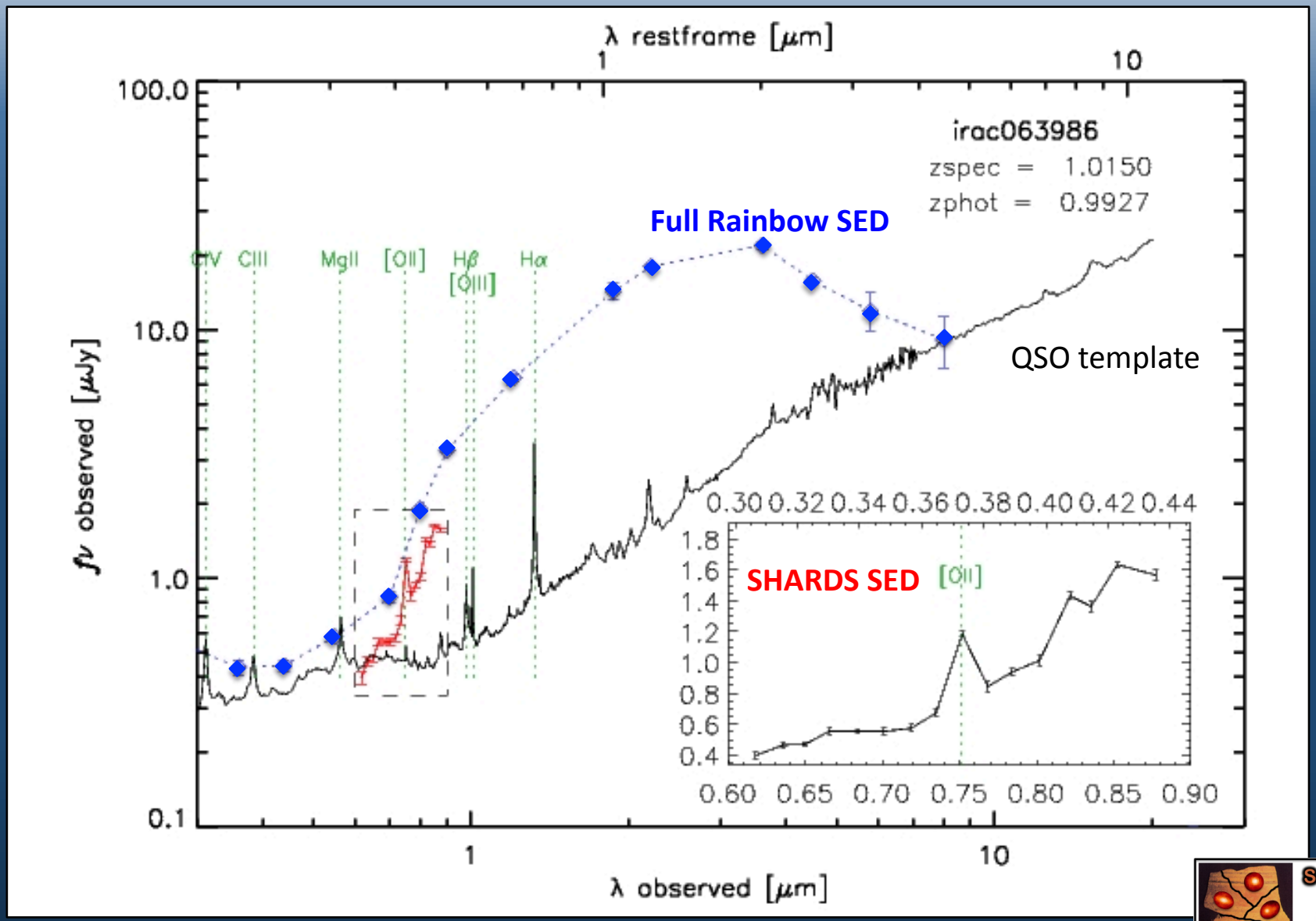






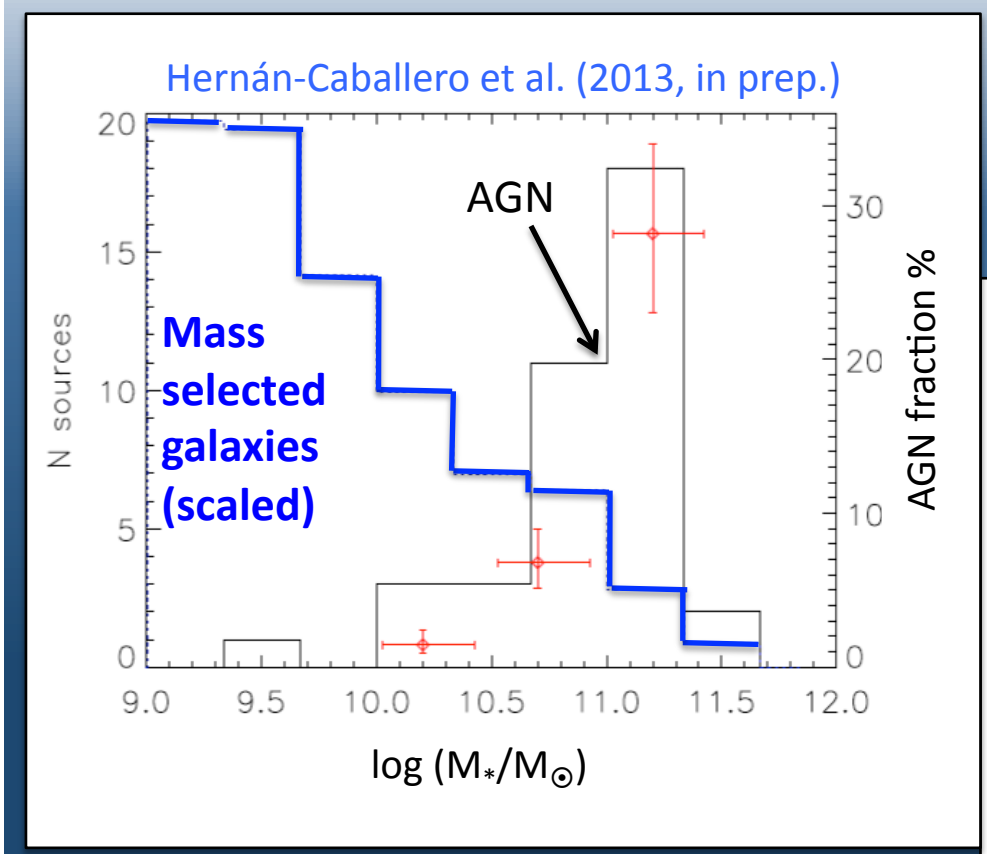
Alexander et al. (2003)

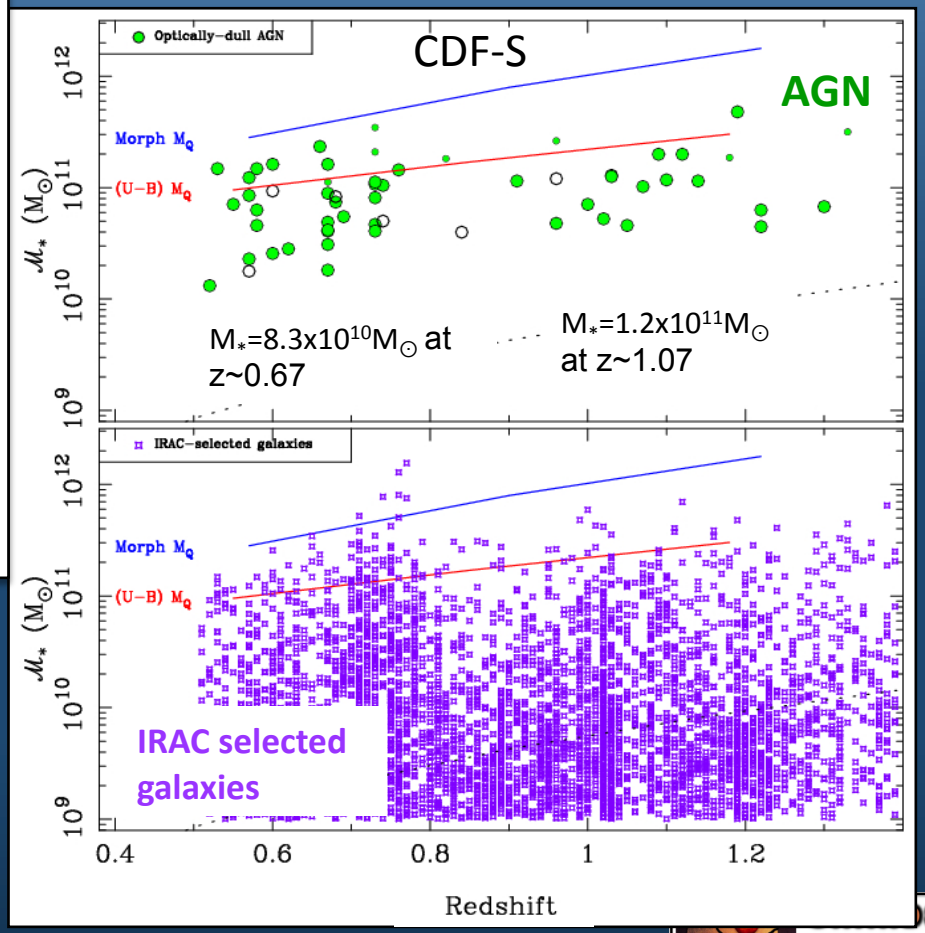
Example of SED of an X-ray selected AGN: SED dominated by stellar emission



AGN reside in the most massive galaxies at a given z

Hernán-Caballero et al. (2013, in prep.)



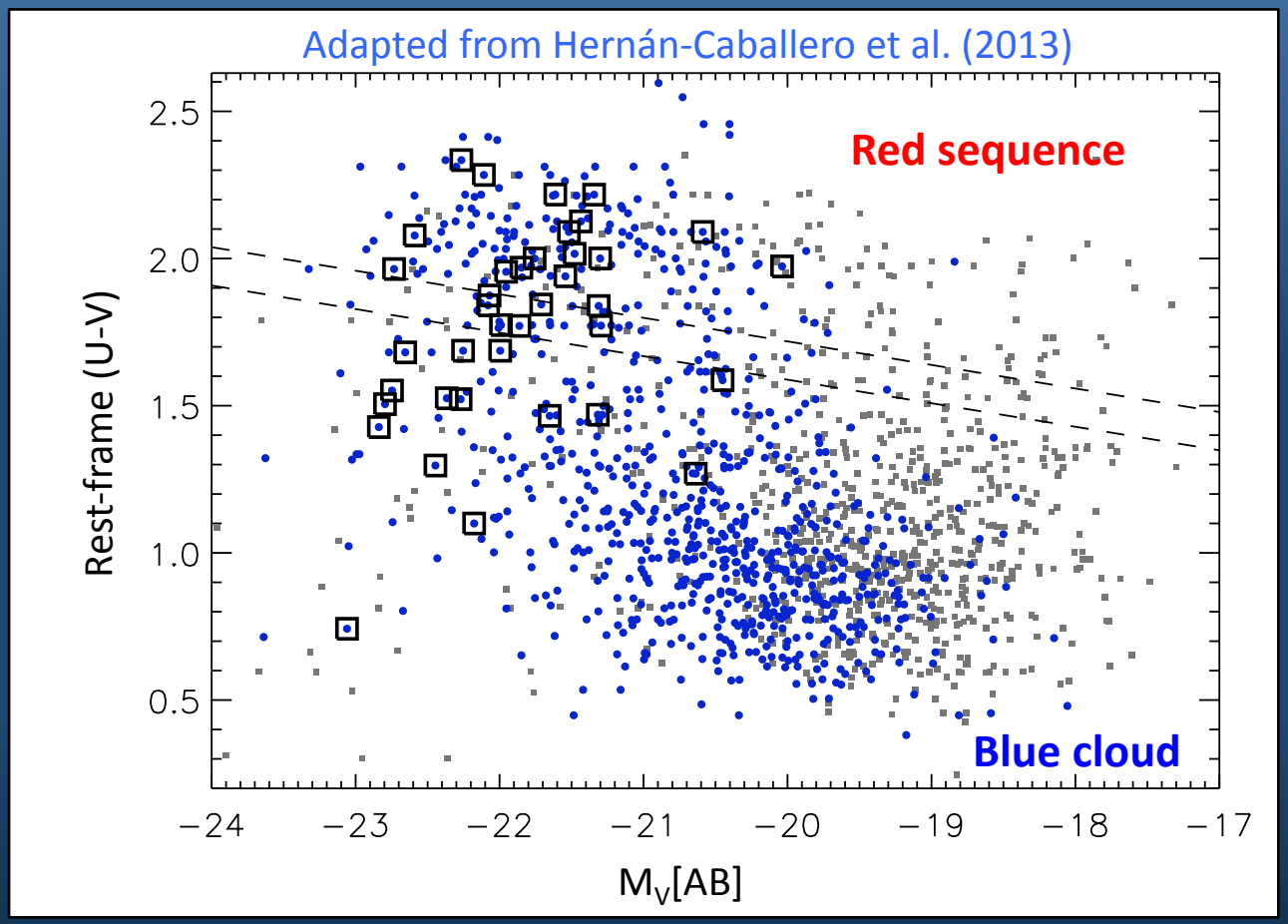


Alonso-Herrero et al. (2008)

AGN in “color-magnitude” diagrams

In (U-V) vs M_* diagram a lot of X-ray selected AGN located in the green valley (transition between blue cloud (SF galaxies) and red sequence (dead galaxies)

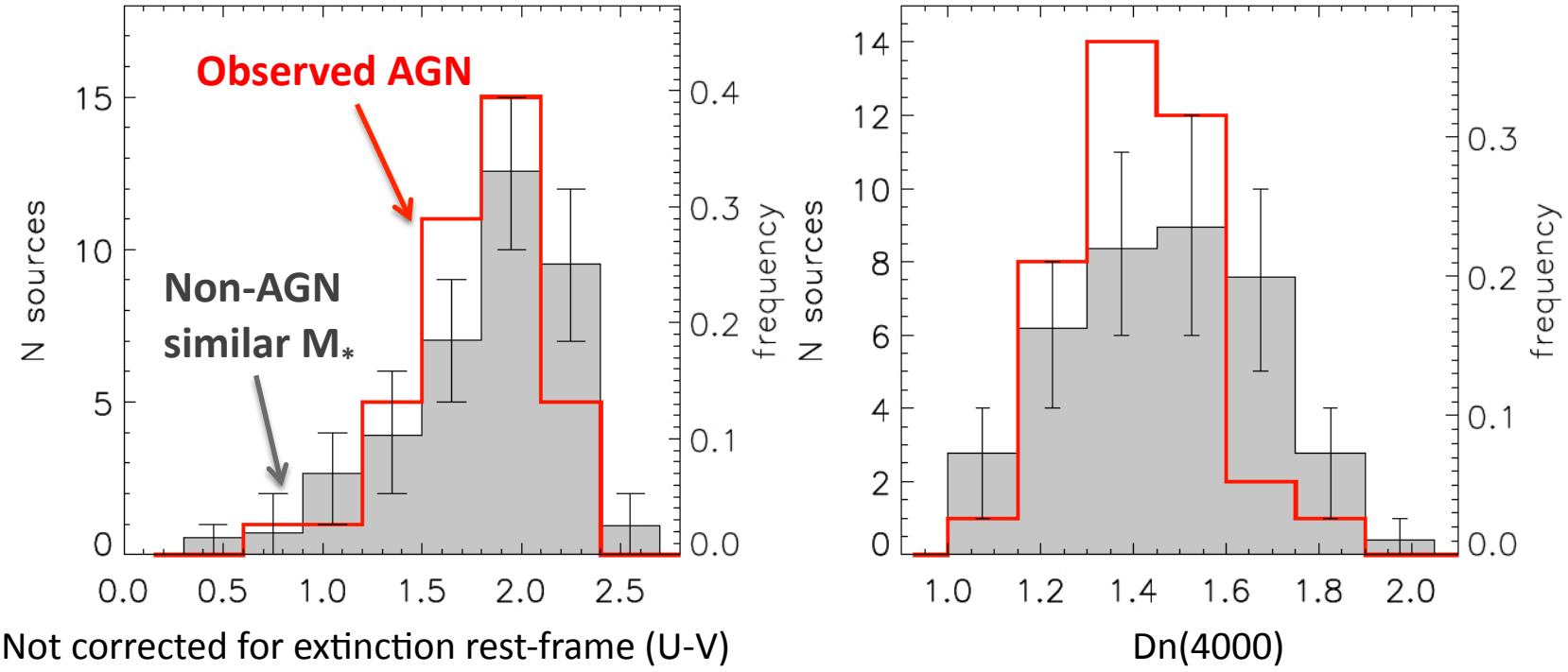
Role of AGN in quenching SF? (if any)



Distribution of (U-V) and Dn(4000) for AGN and non-AGN of similar stellar masses

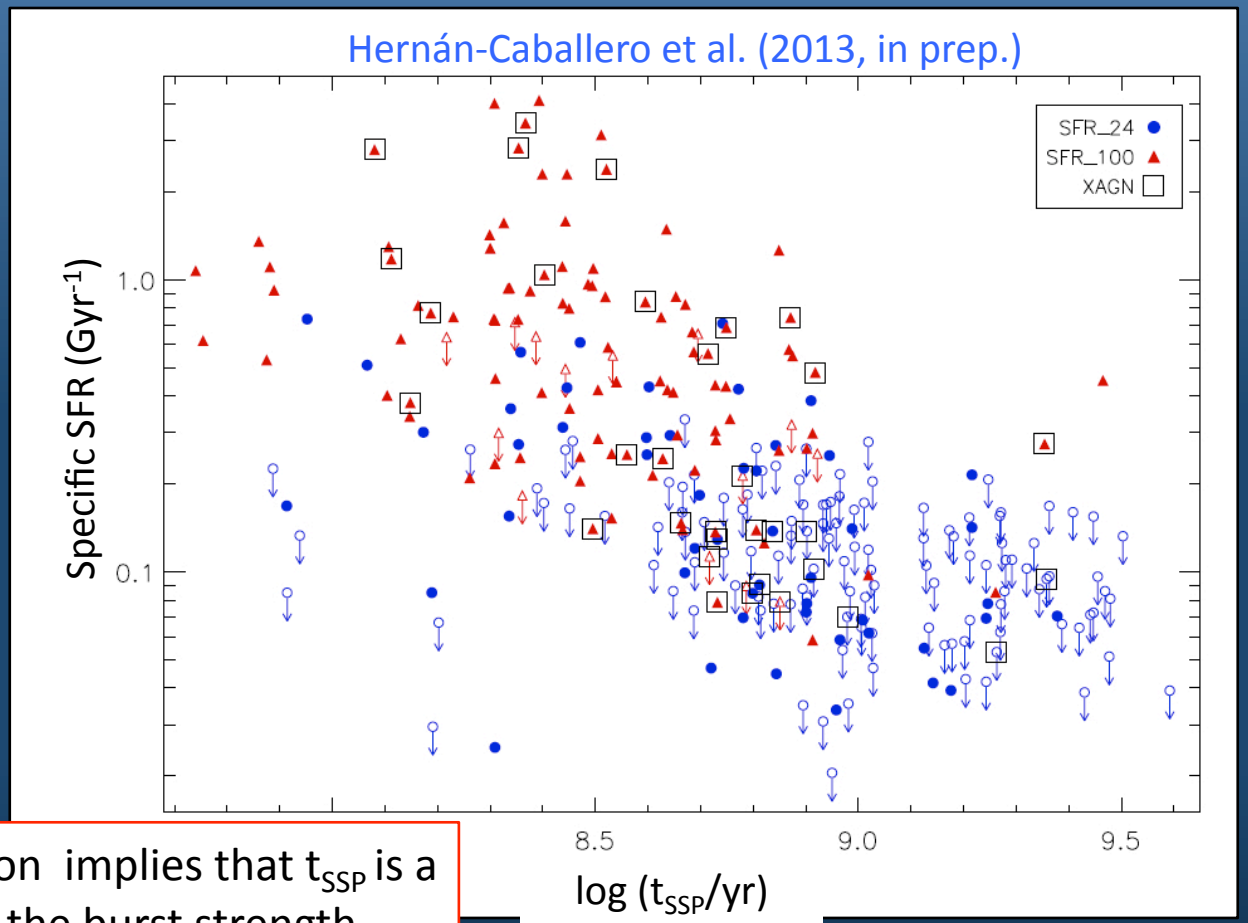
AGN have statistically significant different distributions of (U-V) and Dn(4000) when compared to non-AGN of similar M_*

Hernán-Caballero et al. (2013, in prep.)



Infrared SFR for SHARDS galaxies

SFR are calculated from L_{IR} and L_{IR} using MS star forming template of Elbaz et al. (2011) scaled to match either MIPS 24μm or PACS 100μm
X ray selected AGN occupy same region in SSFR vs. t_{SSP} diagram

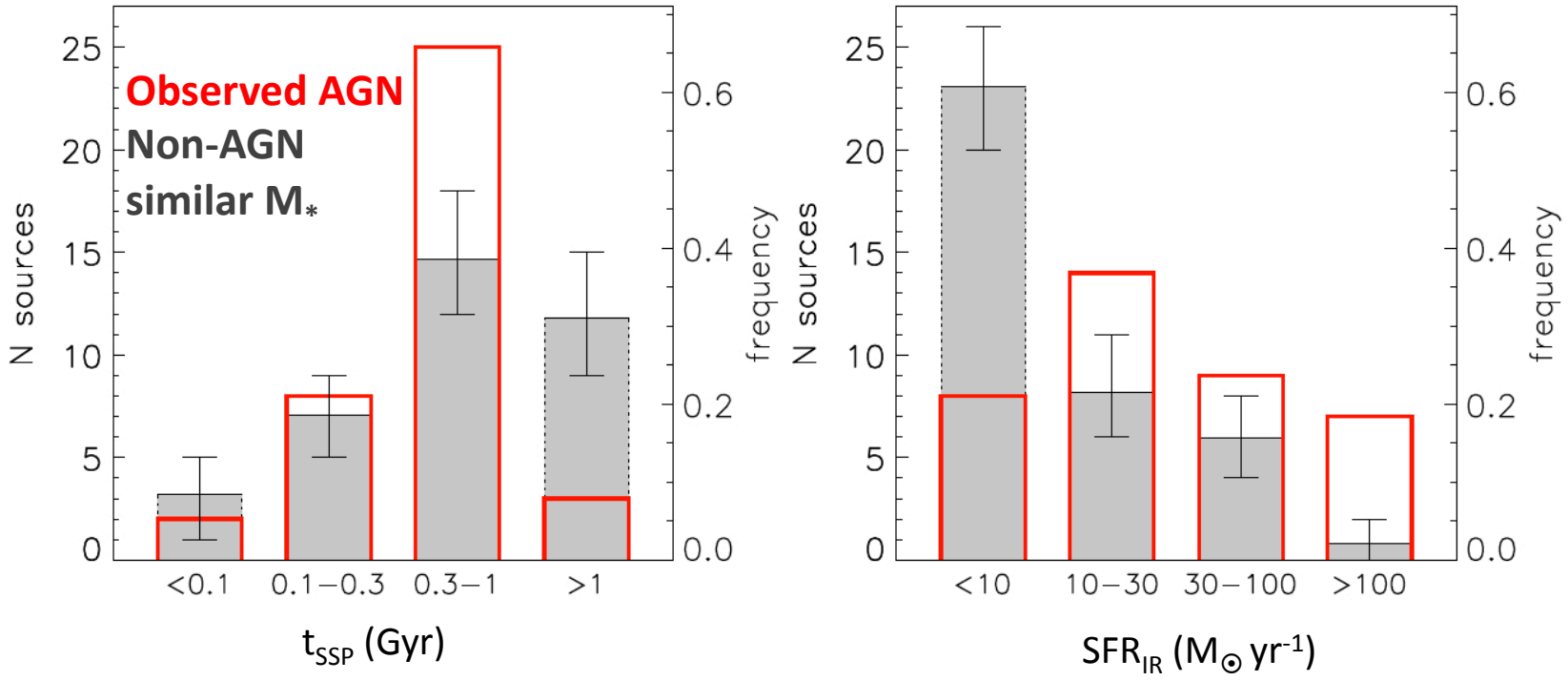


Good correlation implies that t_{SSP} is a good proxy for the burst strength (current vs. past SFRs)

No evidence for AGN quenching of SF at these z´s and L_{AGN}

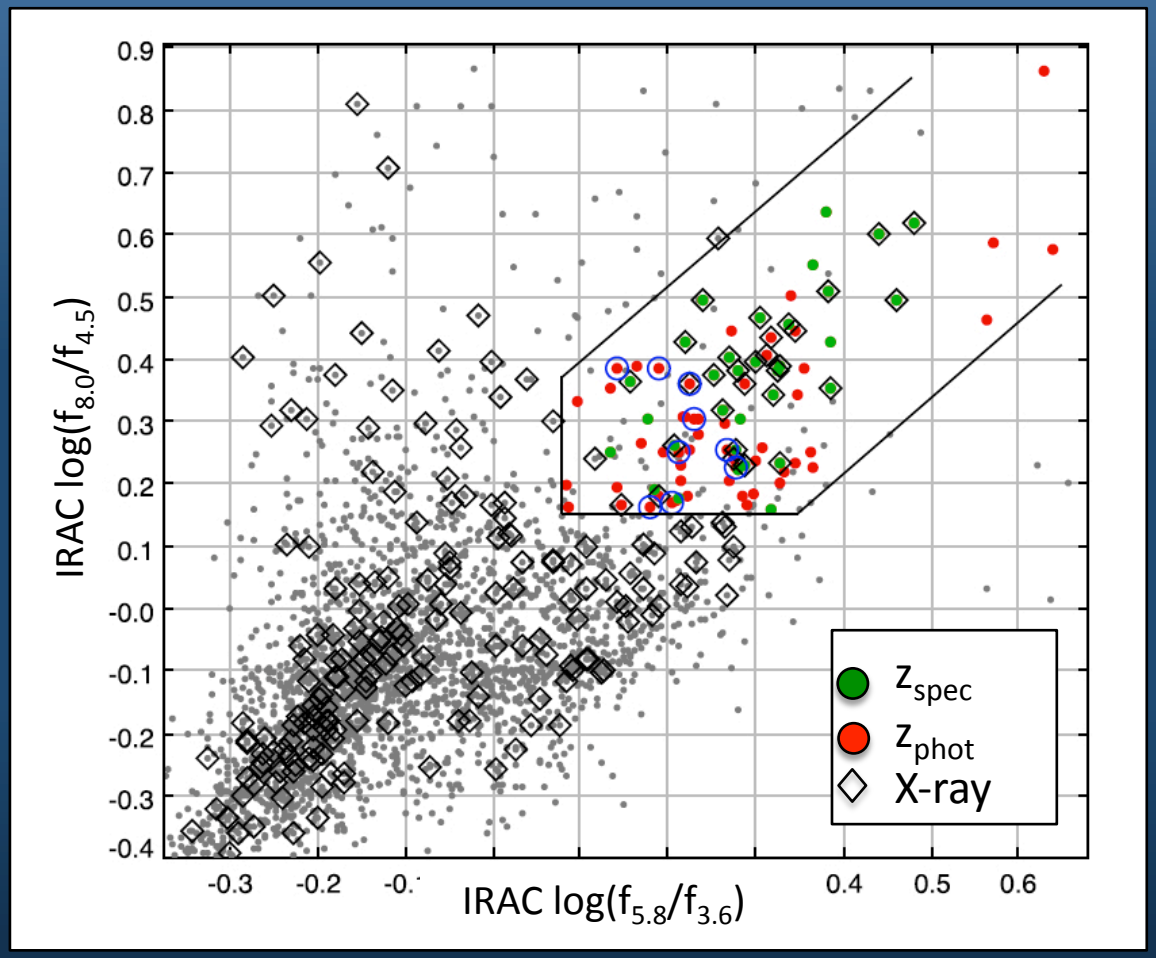
For same stellar masses, AGN tend to reside in host galaxies with younger stellar populations (or higher burst strengths) and higher on-going SFR_{IR}
Connection between SF and AGN similar to local Universe AGN (Kauffmann et al. 2003)

Hernán-Caballero et al. (2013, in prep.)



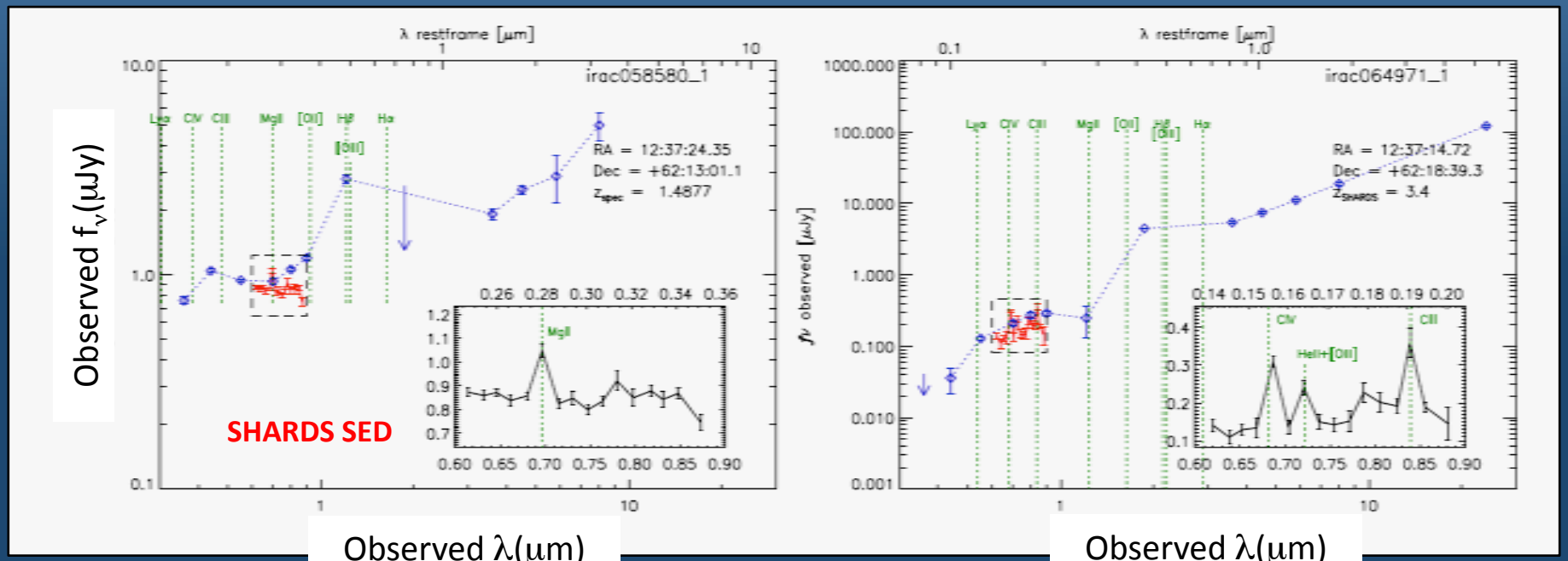
Infrared Power Law Galaxies are good candidates to luminous obscured AGN

Used Donley et al. (2012) criteria based on the IRAC IR power law selection of AAH06
Selected 85 candidates: 53% detected in X rays (2Ms exposure) and 62% (mostly those not detected in X-rays) missing spectroscopic redshifts



A couple of examples of SHARDS+Rainbow SEDs of IR power law galaxies

Approximately 50% of sources show clear emission lines in the SHARDS SEDs!



Follow-up: GTC/OSIRIS spectroscopy of IR power law galaxies

2013A Proposal: long-slit spectroscopy (PI: A. Hernán Caballero)

- Sample of 9 brightest $24.5<m_{AB}(636nm)<25.5$ IR power law galaxies
- Requested 3 nights, 1 dark night was awarded (March 2013)
- Long-slit using the 300B grism to cover the [3500Å,7000Å] range
- 5 IR power laws observed in four pointings. Integration times 1.5-2.5h under excellent seeing conditions 0.6-0.8”
- Data reduction and analysis is in progress

2014A Proposal: MOS observations

- We will propose for the whole sample/combine with other MOS proposals?

Goals:

- Spectroscopic redshifts
- Confirm AGN nature of candidates