miniJPAS:
Probing the Impact of X-ray AGN on the Star Formation Rate Gradient in Host Galaxies

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The miniJPAS survey

- Javalambre-Physics of the Accelerating Universe Astrophysical Survey (J-PAS) (Benitez et al. 2014)
- Multiband (56 filters) spectro-photometric survey which will cover 8000 deg^2 of the northern sky with 2.55m telescope
- miniJPAS (Bonoli et al. 2021) covers 1 deg^2 with 54NB + 1MB(UV) +1MB(red) + 4 SDSS BB filters
- Covers the AEGIS field where several other multiband surveys are present with one 9k x 9k CCD with 0.3 deg^2 FOV & 0.23”/pixel
- Completeness of r=23.6 AB for point sources and r=22.7 for extended ones
- 64k objects in the r-band

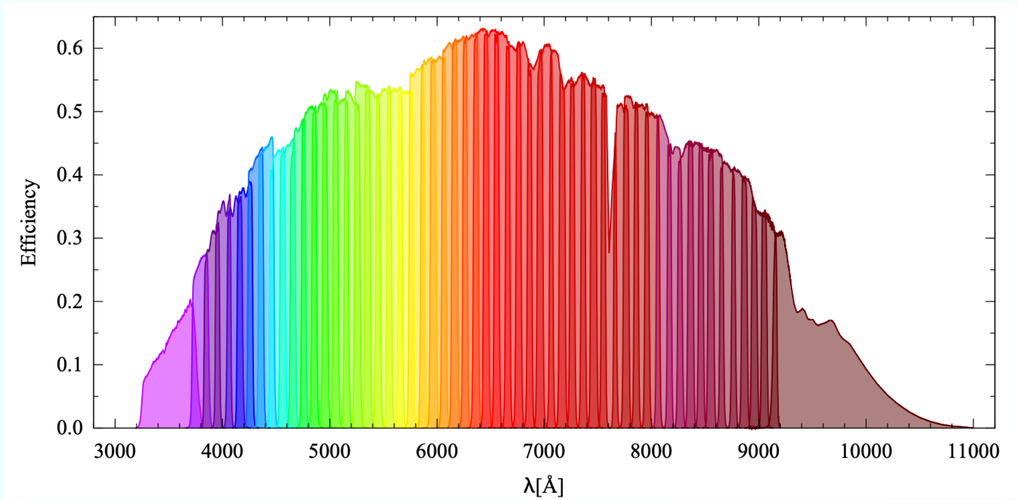


Fig: transmission curves of J-PAS filters

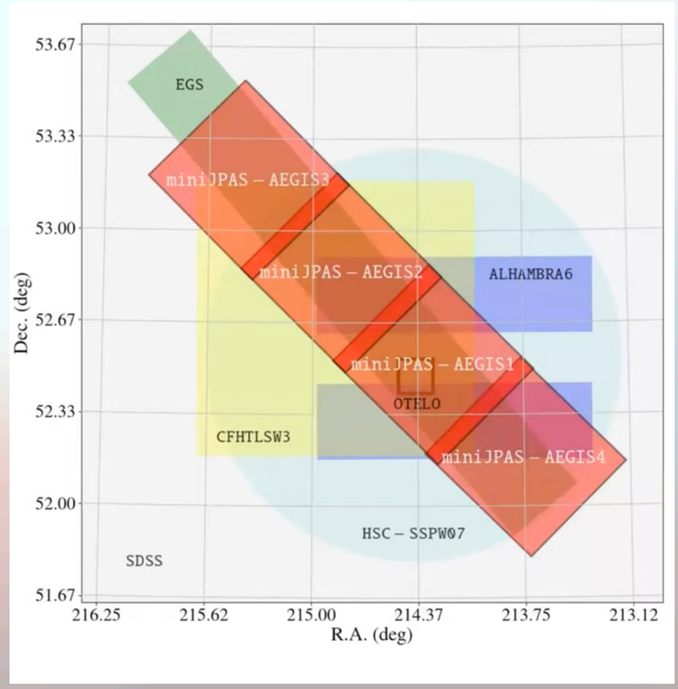
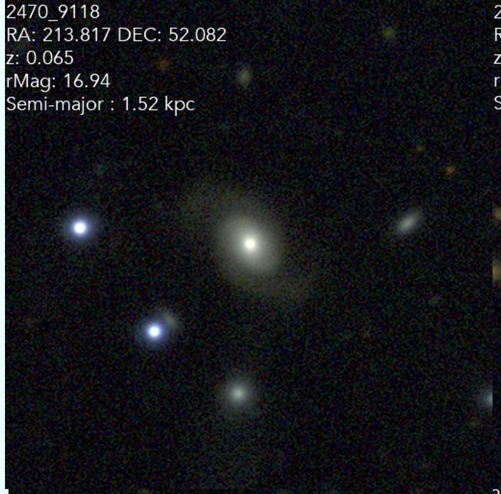
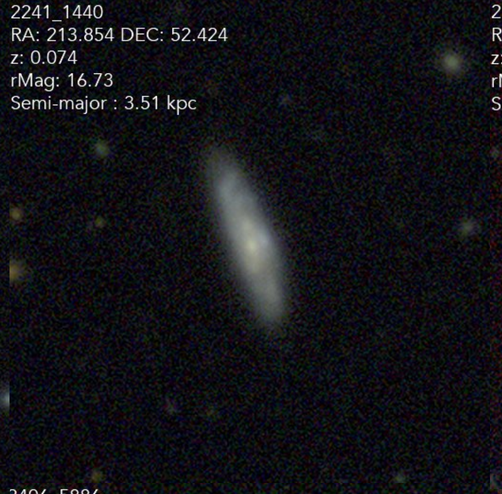
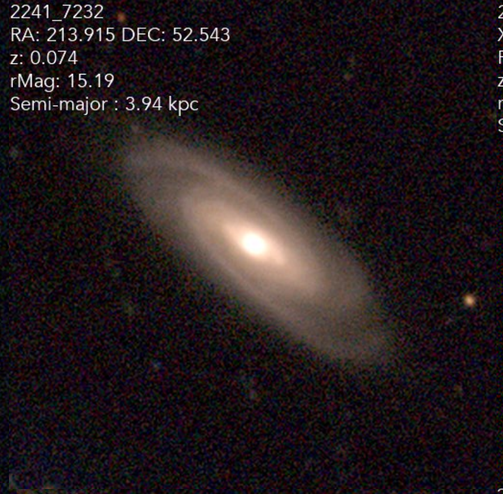


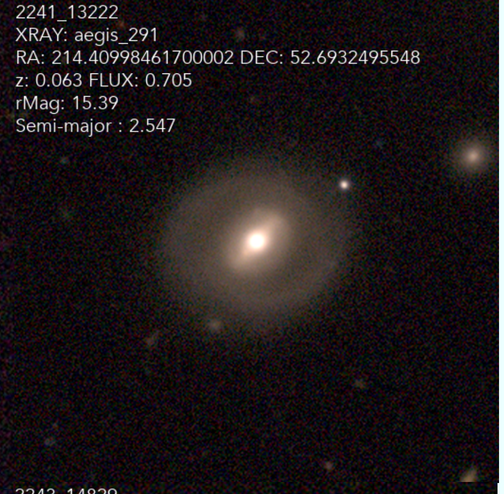
Fig: footprint of the miniJPAS field

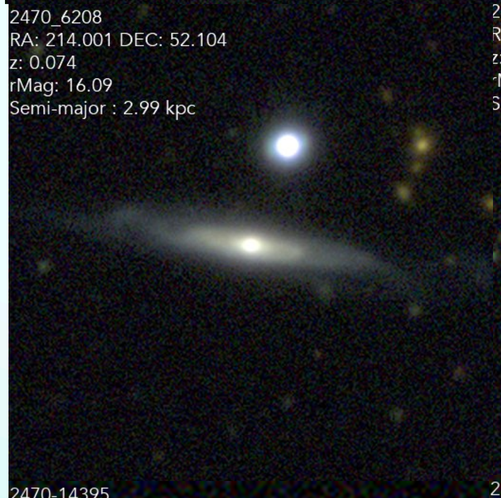
Figures from Bonoli et al. 2021


2470_9118
RA: 213.817 DEC: 52.082
z: 0.065
rMag: 16.94
Semi-major : 1.52 kpc

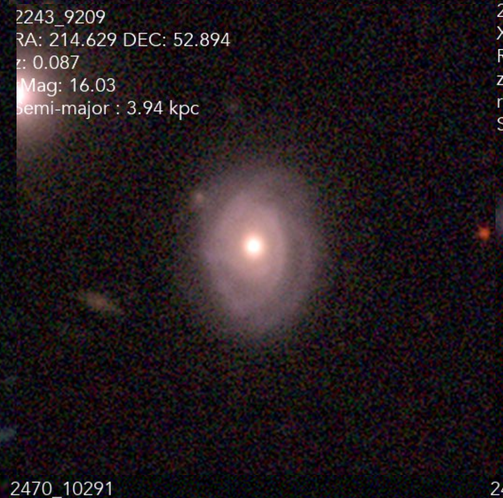

2241_1440
RA: 213.854 DEC: 52.424
z: 0.074
rMag: 16.73
Semi-major : 3.51 kpc

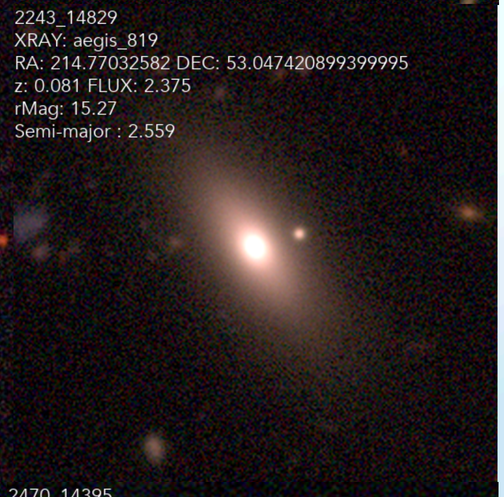

2241_7232
RA: 213.915 DEC: 52.543
z: 0.074
rMag: 15.19
Semi-major : 3.94 kpc


2241_13222
XRAY: aegis_291
RA: 214.40998461700002 DEC: 52.6932495548
z: 0.063 FLUX: 0.705
rMag: 15.39
Semi-major : 2.547


2470_6208
RA: 214.001 DEC: 52.104
z: 0.074
rMag: 16.09
Semi-major : 2.99 kpc

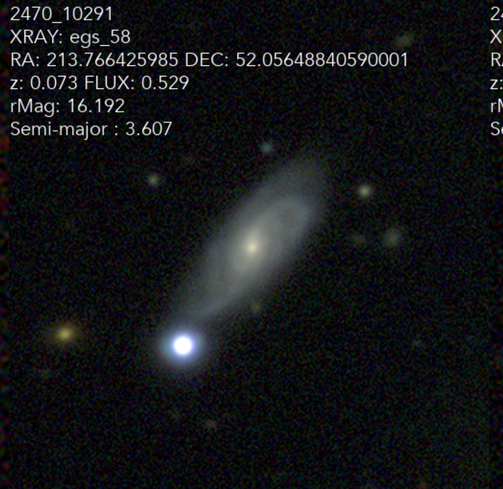

2406_5886
RA: 215.478 DEC: 53.004
z: 0.083
rMag: 16.82
Semi-major : 2.84 kpc


2243_9209
RA: 214.629 DEC: 52.894
z: 0.087
Mag: 16.03
emi-major : 3.94 kpc


2243_14829
XRAY: aegis_819
RA: 214.77032582 DEC: 53.047420899399995
z: 0.081 FLUX: 2.375
rMag: 15.27
Semi-major : 2.559


2470-14395
XRAY: egs_138
RA: 213.941 DEC: 52.224
z: 0.114 FLUX: 0.829
rMag: 17.03 M: -21.6
Semi-major : 3.13 kpc
d : 535.4Mpc

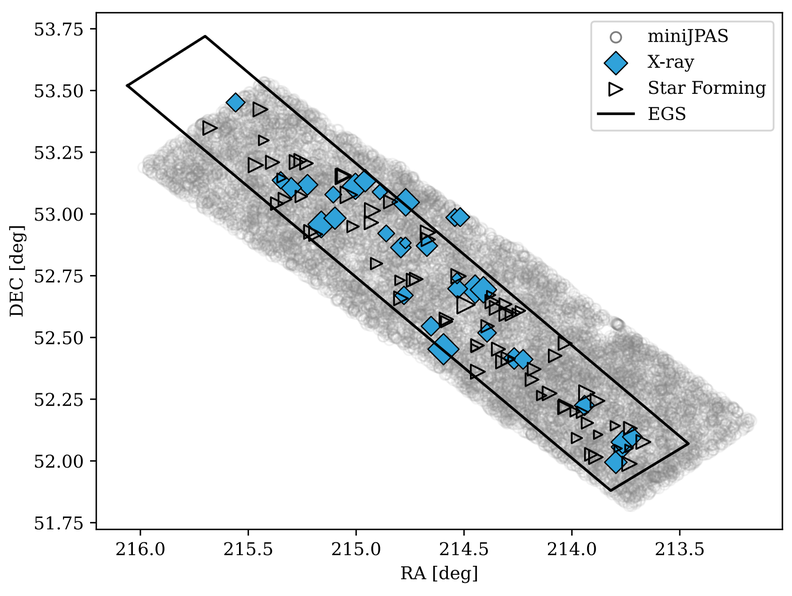

2243_11362
XRAY: aegis_654
RA: 215.161577665 DEC: 52.9576985832
z: 0.201 FLUX: 0.104
rMag: 17.616
Semi-major : 3.639

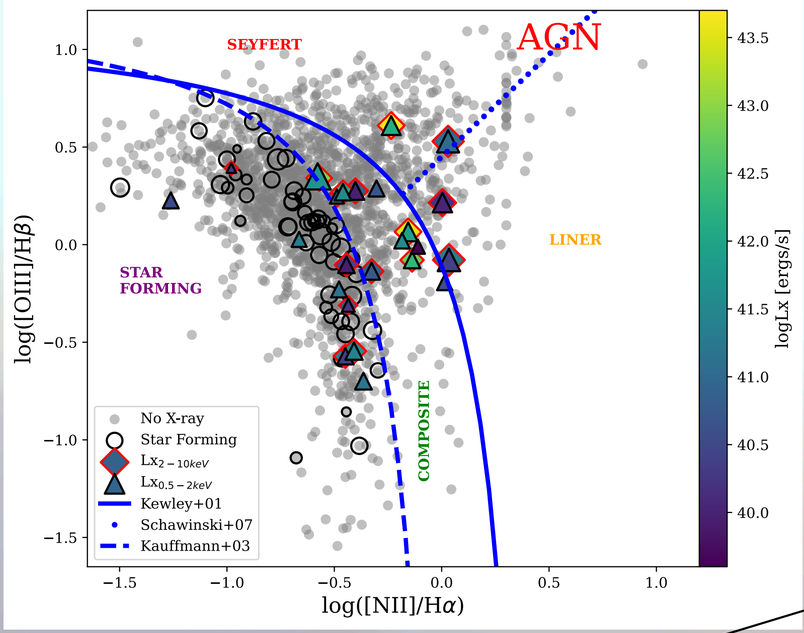

2470_10291
XRAY: egs_58
RA: 213.766425985 DEC: 52.05648840590001
z: 0.073 FLUX: 0.529
rMag: 16.192
Semi-major : 3.607

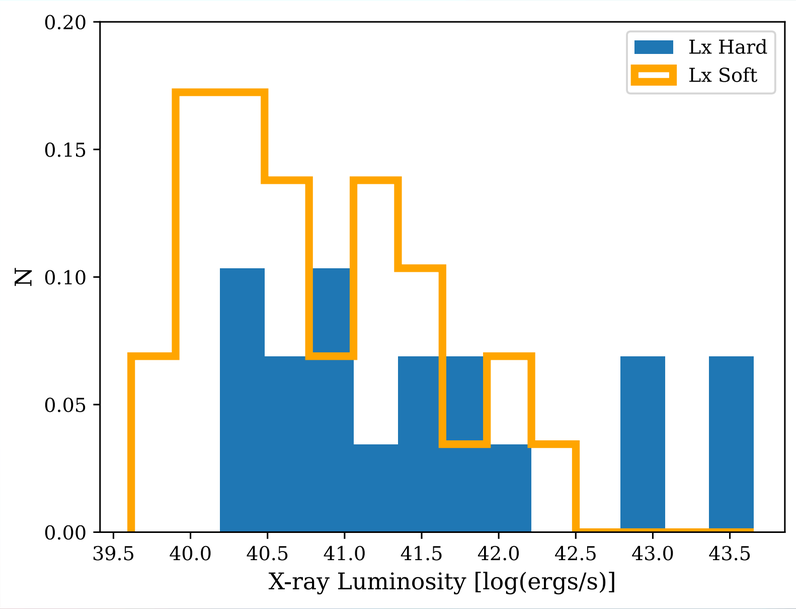

2470_14395
XRAY: egs_138
RA: 213.941465075 DEC: 52.2244283978
z: 0.111 FLUX: 0.829
rMag: 17.032
Semi-major : 3.085

Do AGN quench their host galaxies?

- Yes they do! Page et al. 2012, Barger et al. 2015
- Nope, they actually enhance! Mullaney et al. 2012, Kim & Ho 2019
- Ehh.. doesn’t really matter! Kaldountzou et al. 2017, Sun et al. 2019
- Depends on morphology, X-ray luminosity, AGN power, mass, etc.
- Recent studies on X-Ray AGN show no significant difference between the SF and AGN populations (Mountrichas et al. 2022 a,b) (1800+ galaxies in the XMM-Newton field)


miniJPAS
X-ray
Star Forming
EGS
DEC [deg]
RA [deg]


SEYFERT
AGN
LINER
STAR FORMING
COMPOSITE
No X-ray
Star Forming
Lx2 − 10keV
Lx0.5 − 2keV
Kewley+01
Schawinski+07
Kauffmann+03
log([OIII]/Hβ)
log([NII]/Hα)
logLx [ergs/s]

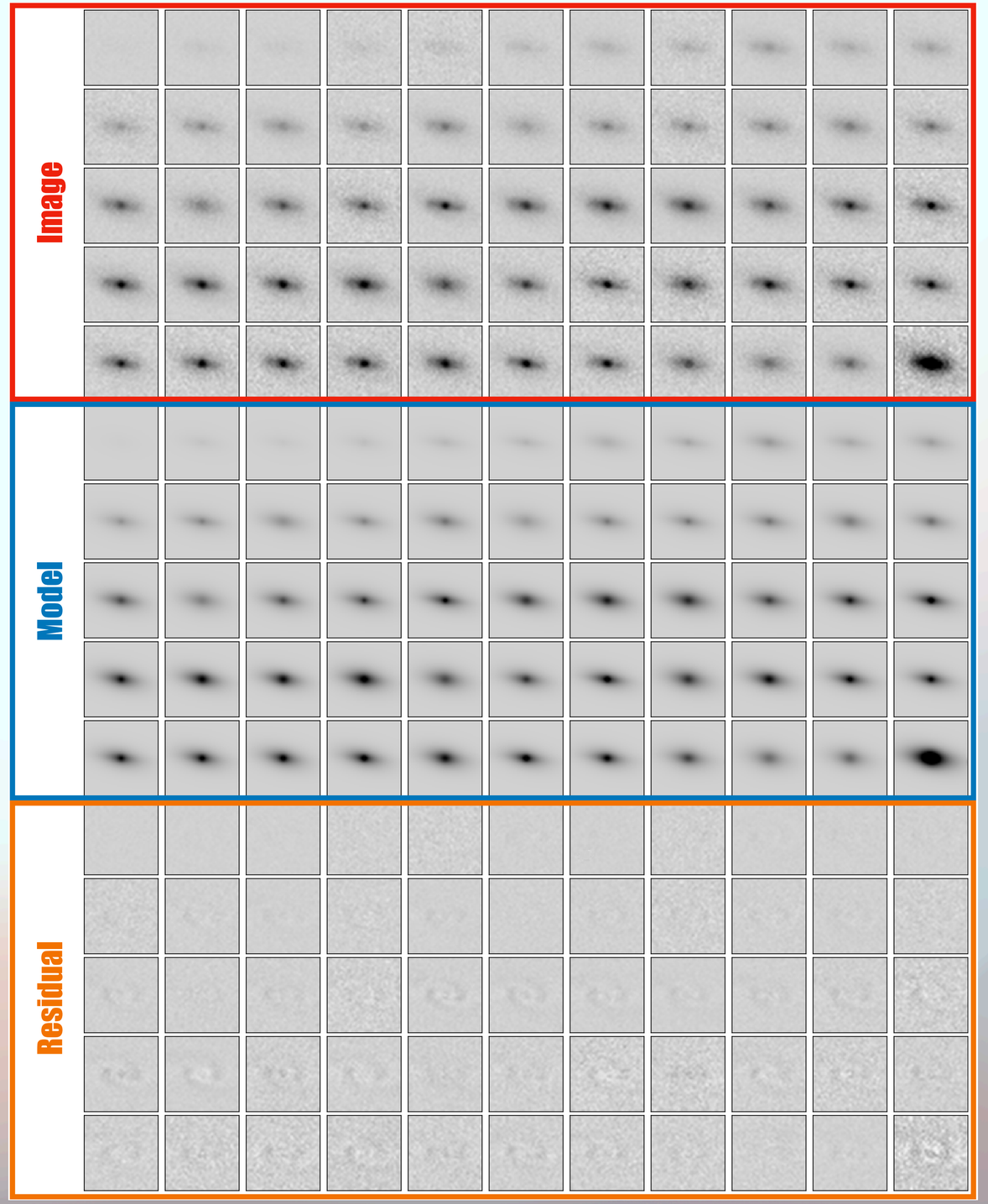

Lx Hard
Lx Soft
N
X-ray Luminosity [log(ergs/s)]

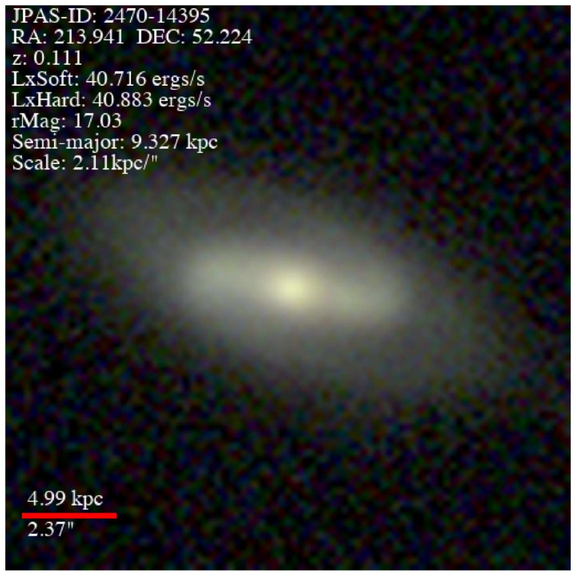
miniJPAS sources
N~64,000
rMag < 21
N=4,770
Spectroscopic Redshift < 0.3
N=456
Parent Sample
Objects classified as galaxies
& semi-major axis size > 2"
N=258
Cross-match with X-ray sources
True
False
X-ray Sample
N=32
Non X-ray Sample
N=226
BPT Selection
No Lx(2-10keV) Det.
N=9 (8)
Lx(2-10keV) < 41 erg/s
N=11 (9)
Lx(2-10keV) > 41 erg/s
N=12 (6)
Star Forming
N=71 (23)

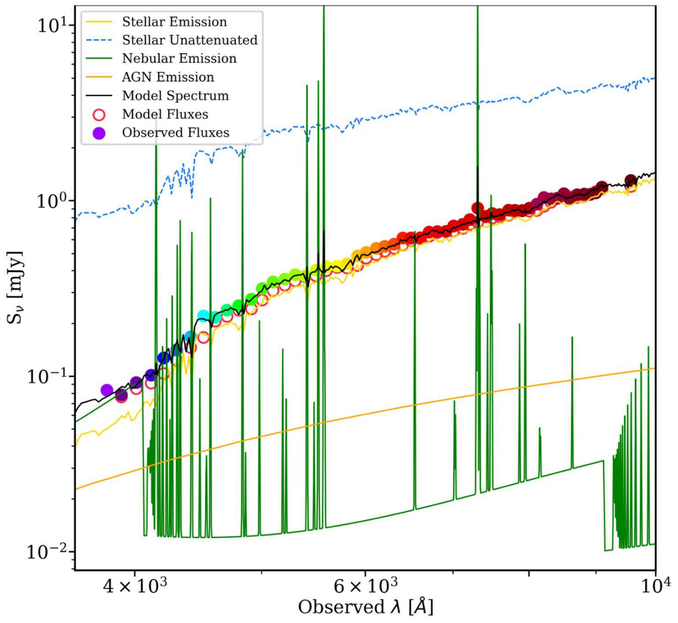
Multi band GALFIT decomposition

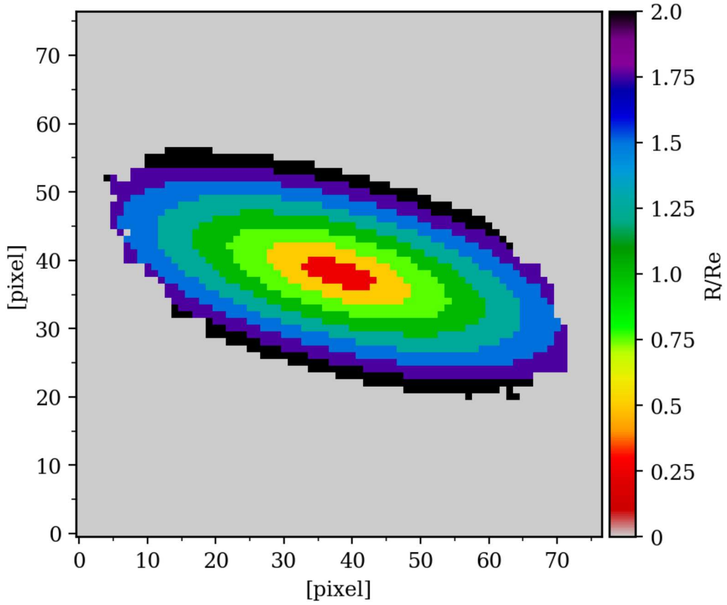
Model = Fixed Disk + Free Sersic + PSF

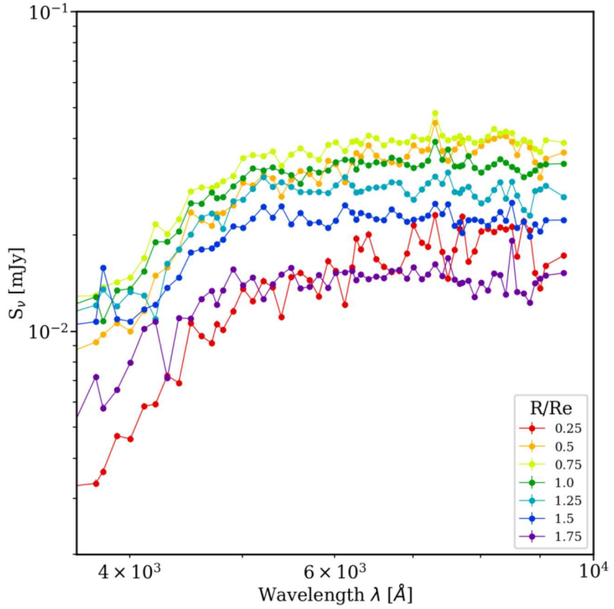
Residual = Image - Model

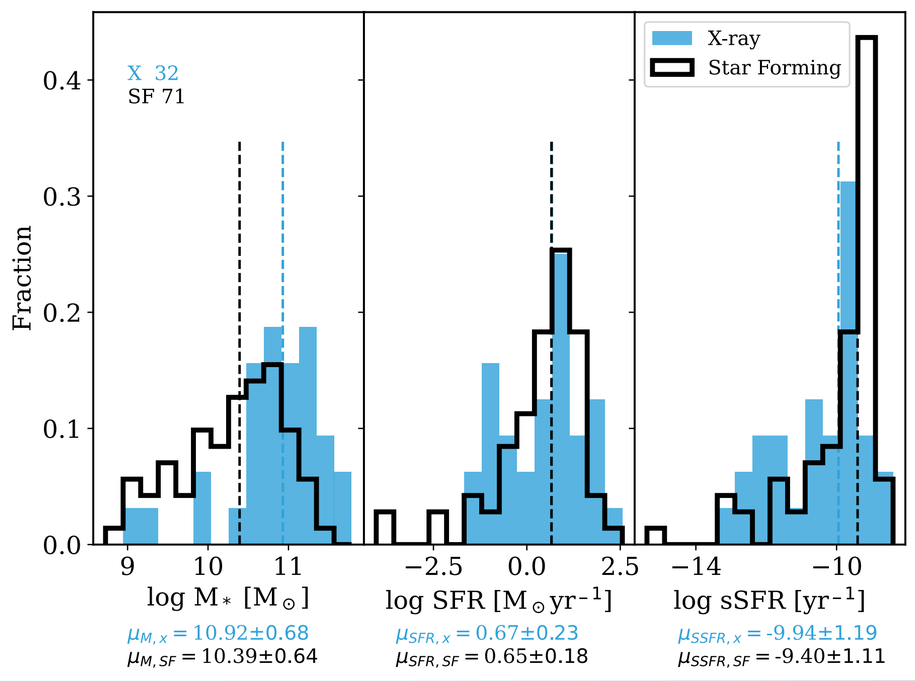


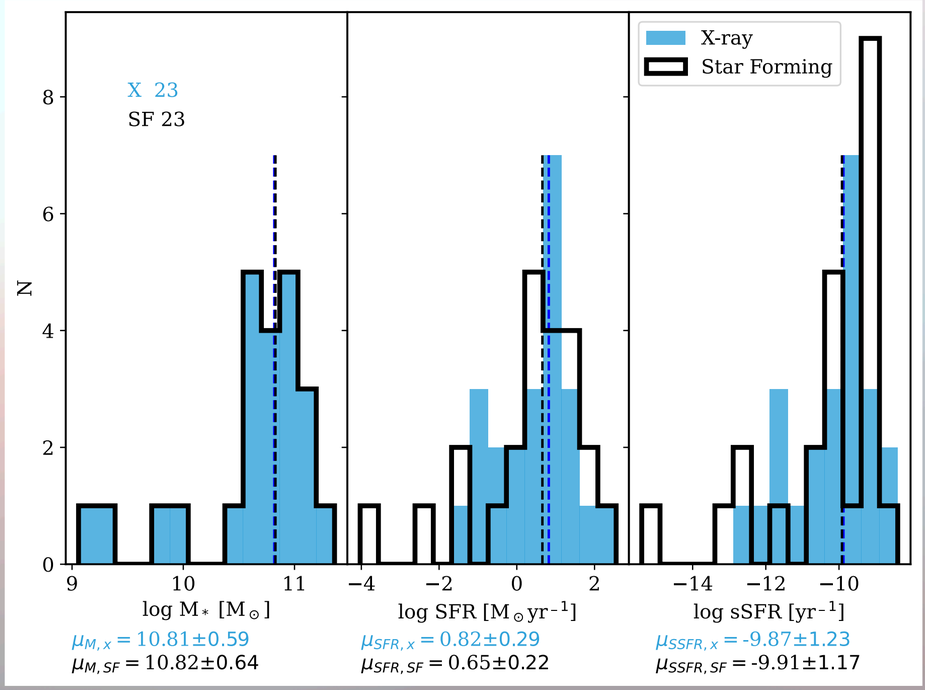

JPAS-ID: 2470-14395
RA: 213.941 DEC: 52.224
z: 0.111
LxSoft: 40.716 ergs/s
LxHard: 40.883 ergs/s
rMag: 17.03
Semi-major: 9.327 kpc
Scale: 2.11kpc/"
4.99 kpc
2.37"


Stellar Emission
Stellar Unattenuated
Nebular Emission
AGN Emission
Model Spectrum
Model Fluxes
Observed Fluxes
S_ν [mJy]
Observed λ [Å]

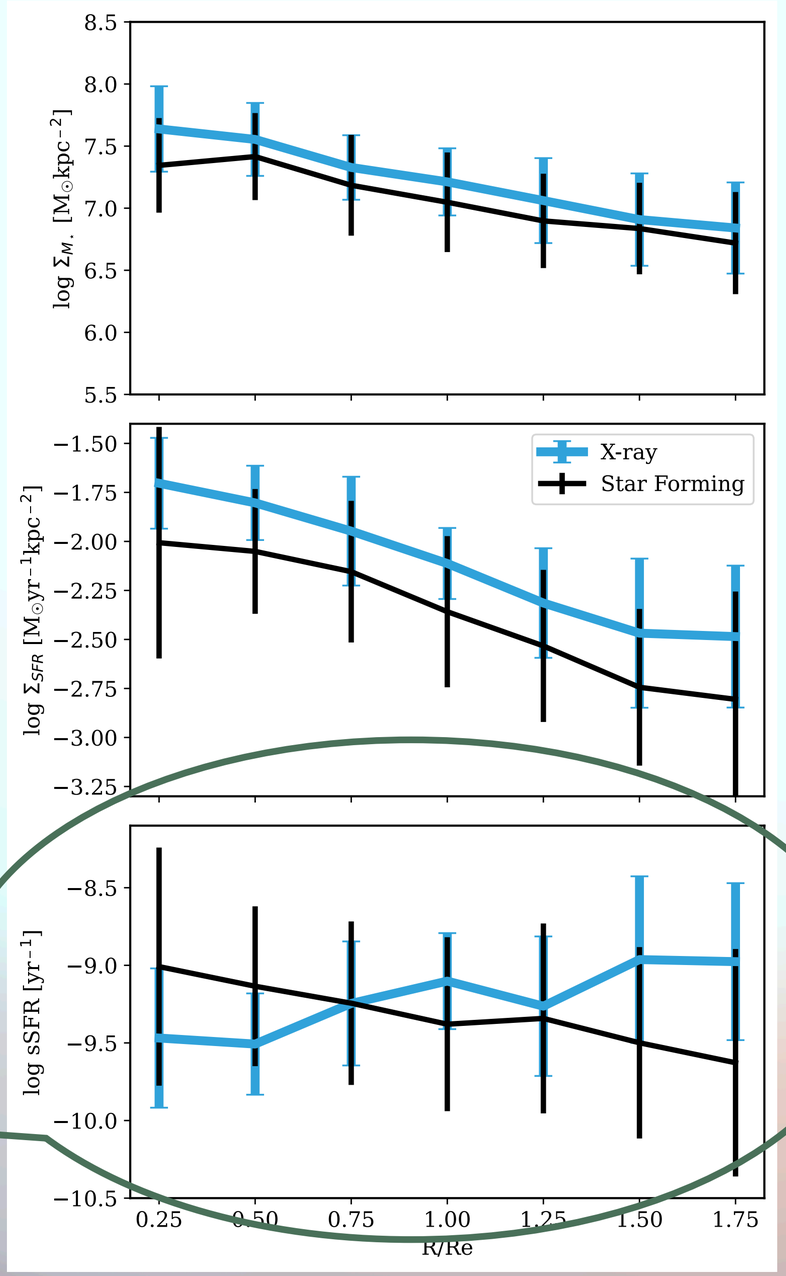

[pixel]
[pixel]
R/Re

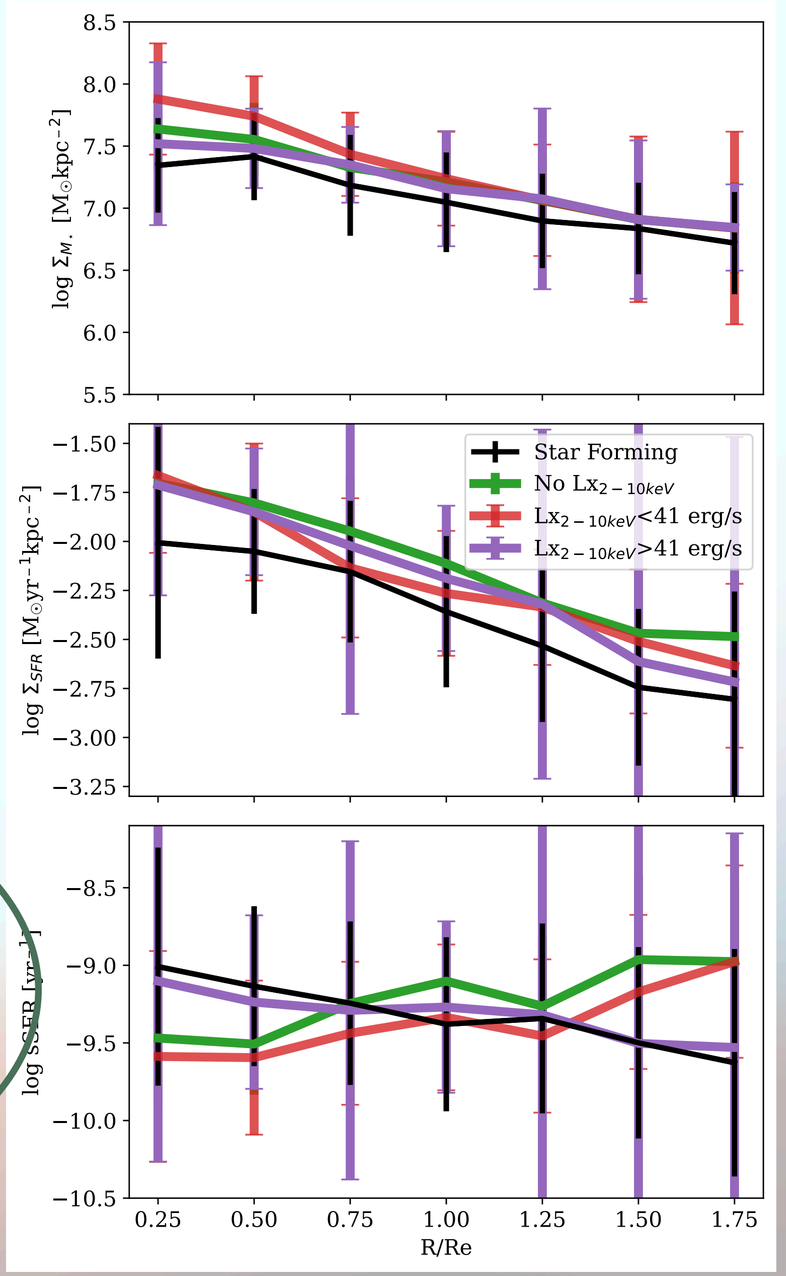

S_ν [mJy]
Wavelength λ [Å]
R/Re
0.25
0.5
0.75
1.0
1.25
1.5
1.75


X 32
SF 71
X-ray
Star Forming
Fraction
log M∗ [M⊙]
log SFR [M⊙ yr⁻¹]
log sSFR [yr⁻¹]
$\mu_{M,x}$ = 10.92±0.68
$\mu_{M,SF}$ = 10.39±0.64
$\mu_{SFR,x}$ = 0.67±0.23
$\mu_{SFR,SF}$ = 0.65±0.18
$\mu_{SSFR,x}$ = -9.94±1.19
$\mu_{SSFR,SF}$ = -9.40±1.11


X 23
SF 23
X-ray
Star Forming
N
log M∗ [M⊙]
log SFR [M⊙ yr⁻¹]
log sSFR [yr⁻¹]
$\mu_{M,x}$ = 10.81±0.59
$\mu_{M,SF}$ = 10.82±0.64
$\mu_{SFR,x}$ = 0.82±0.29
$\mu_{SFR,SF}$ = 0.65±0.22
$\mu_{SSFR,x}$ = -9.87±1.23
$\mu_{SSFR,SF}$ = -9.91±1.17

Radial Profiles of X-ray AGN vs SF galaxies

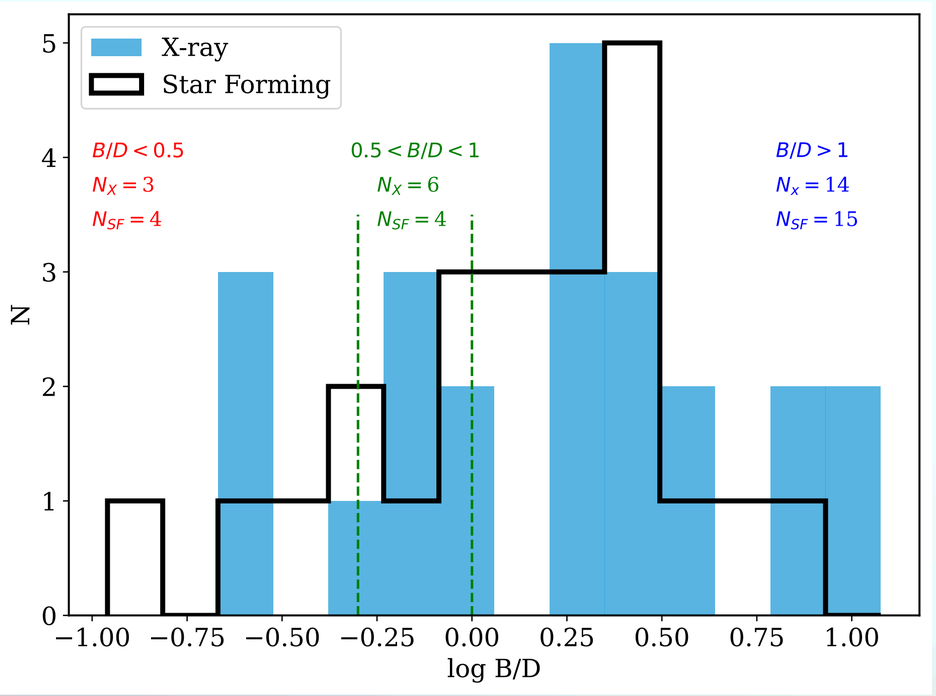


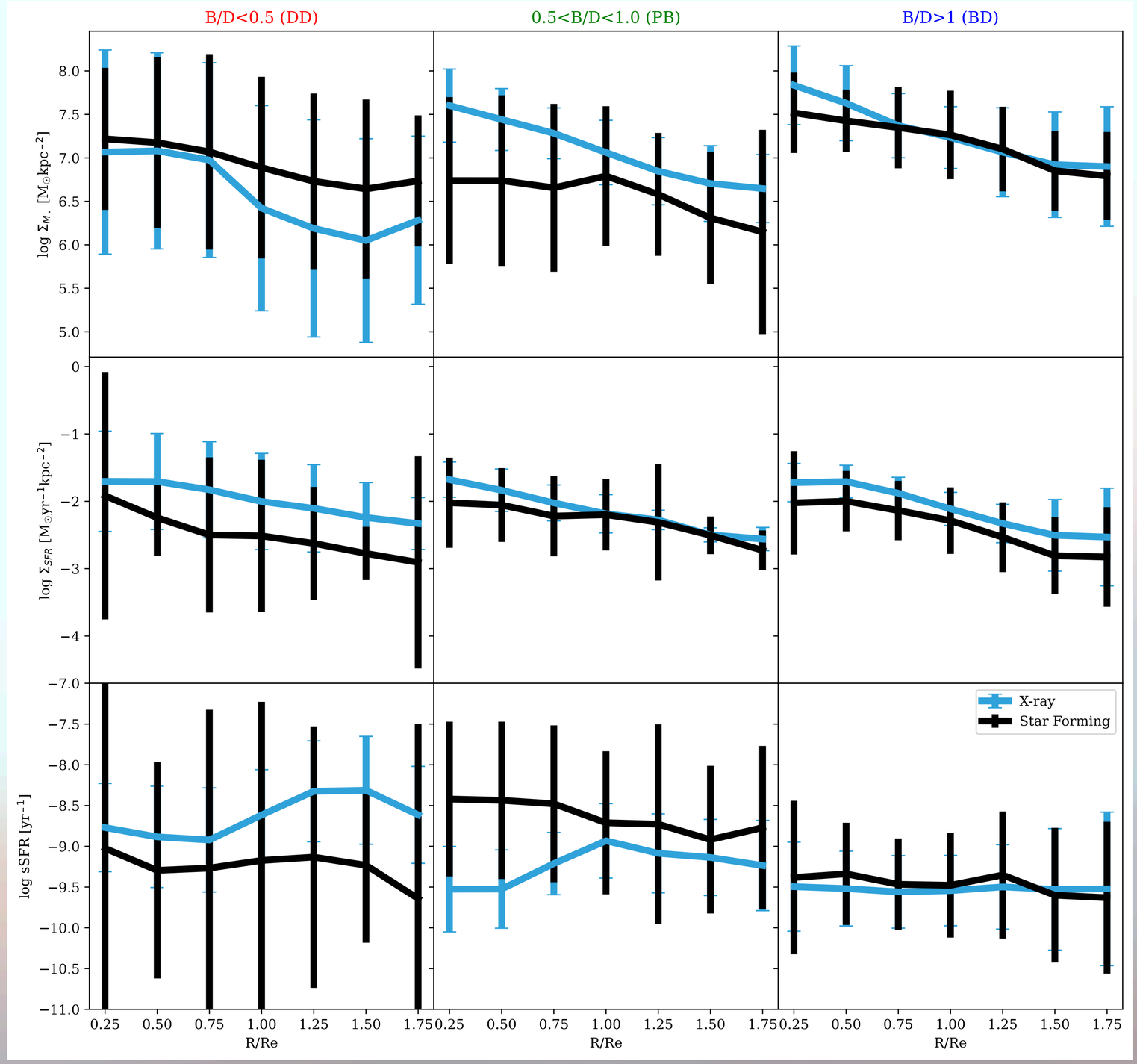


No difference because of this!

Radial Profiles differentiated by X-ray Strength

Morphology


X-ray
Star Forming
B/D < 0.5
N_X = 3
N_SF = 4
0.5 < B/D < 1
N_X = 6
N_SF = 4
B/D > 1
N_x = 14
N_SF = 15
N
log B/D


B/D<0.5 (DD)
0.5<B/D<1.0 (PB)
B/D>1 (BD)
log Σ_M. [M⊙kpc⁻²]
log Σ_SFR [M⊙yr⁻¹kpc⁻²]
log sSFR [yr⁻¹]
R/Re
X-ray
Star Forming

J-PLUS: 2-D analysis of the stellar population in NGC 5473 and NGC 5485

I. San Roman[1,⋆], P. Sánchez-Blázquez[2], A. J. Cenarro[1], L. A. Díaz-García[1], C. López-Sanjuan[1], J. Varela[1], G. Vilella-Rojo[1], S. Akras[3], S. Bonoli[1], A. L. Chies Santos[4], P. Coelho[5], A. Cortesi[5], A. Ederoclite[1], Y. Jiménez-Teja[3], R. Logroño-García[1], R. Lopes de Oliveira[6,7,8], J. P. Nogueira-Cavalcante[5], A. Orsi[1], H. Vázquez Ramió[1], K. Viironen[1], D. Cristóbal-Hornillos[1], R. Dupke[3], A. Marín-Franch[1], C. Mendes de Oliveira[5], M. Moles[1] and L. Sodré[5]

[1] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), Unidad Asociada al CSIC, Plaza San Juan 1, E-44001 Teruel, Spain
[2] Departamento de Física Teórica, Universidad Autonoma de Madrid (UAM-CSIC), 28049 Cantoblanco, Madrid, Spain
[3] Observatório Nacional/MCTI, Rua Gal. José Cristino, 77, São Cristóvão 20921-400 Rio de Janeiro, RJ, Brazil
[4] Departamento de Astronomia, Instituto de Física, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil
[5] Instituto de Astronomia, Geofísica e Ciências Atmosféricas (IAG), Universidade de São Paulo (USP), R. do Matão 1226, 05508-090, São Paulo, Brazil
[6] Departamento de Física, Universidade Federal de Sergipe, Av. Marechal Rondon, S/N, 49000-000 São Cristóvão, SE, Brazil
[7] X-ray Astrophysics Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA
[8] Department of Physics, University of Maryland, Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250, USA

April 12, 2018

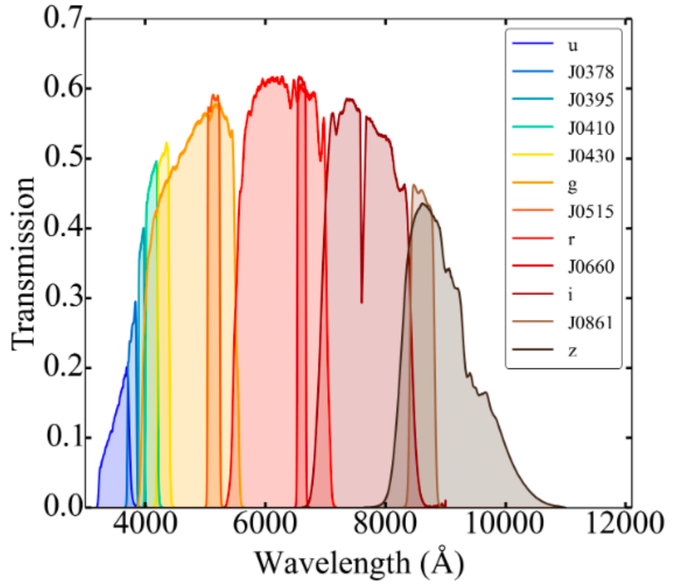


Fig. 1. Transmission curves of the J-PLUS filter system. The curves are computed after accounting for the effects of both the efficiency of the CCD and the atmospheric extinction.

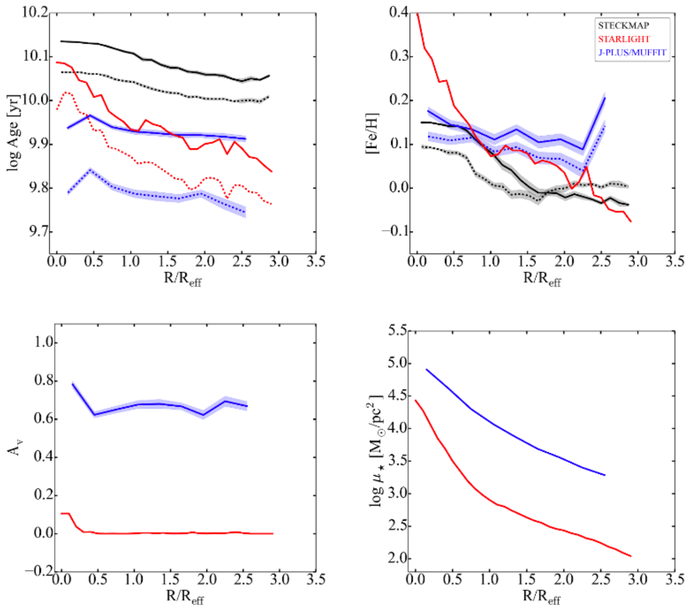


Fig. 9. Mass-weighted (solid lines) and luminosity-weighted (dashed lines) radial profiles for NGC 5473 of log Age, [Fe/H], A_v and log $\mu_\star$ for the three different methods. Enclosed shadowed regions correspond to the uncertainties of each profile.

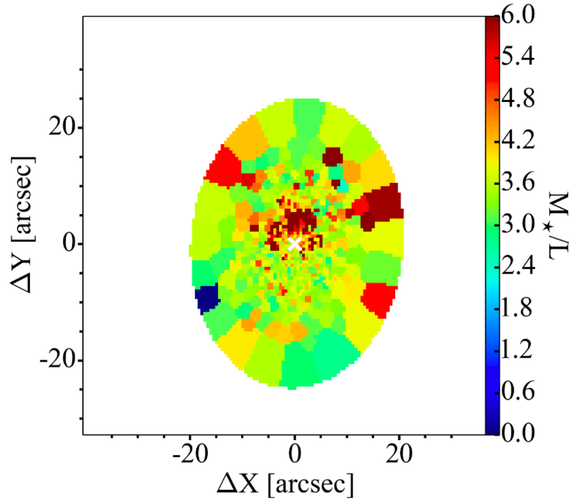


Fig. 11. Stellar mass-to-light ratio maps determined by J-PLUS/MUFFIT for NGC 5473 (top panel) and NGC 5485 (bottom panel). The center of the galaxy is marked with a white cross in each panel.

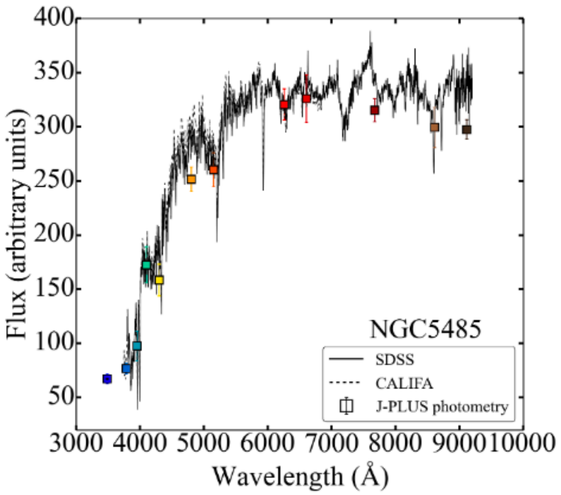


Fig. 12. Comparison between the integrated spectra in a 3" diameter fiber of SDSS, CALIFA and the photo-spectrum of J-PLUS for NGC 5485. The color scheme correspond to Fig. . Error bars correspond to the photometric errors.

A catalogue of quasars and active nuclei: 13th edition

M.-P. Véron-Cetty and P. Véron (2010)

80 AGN sources

eROSITA-DE

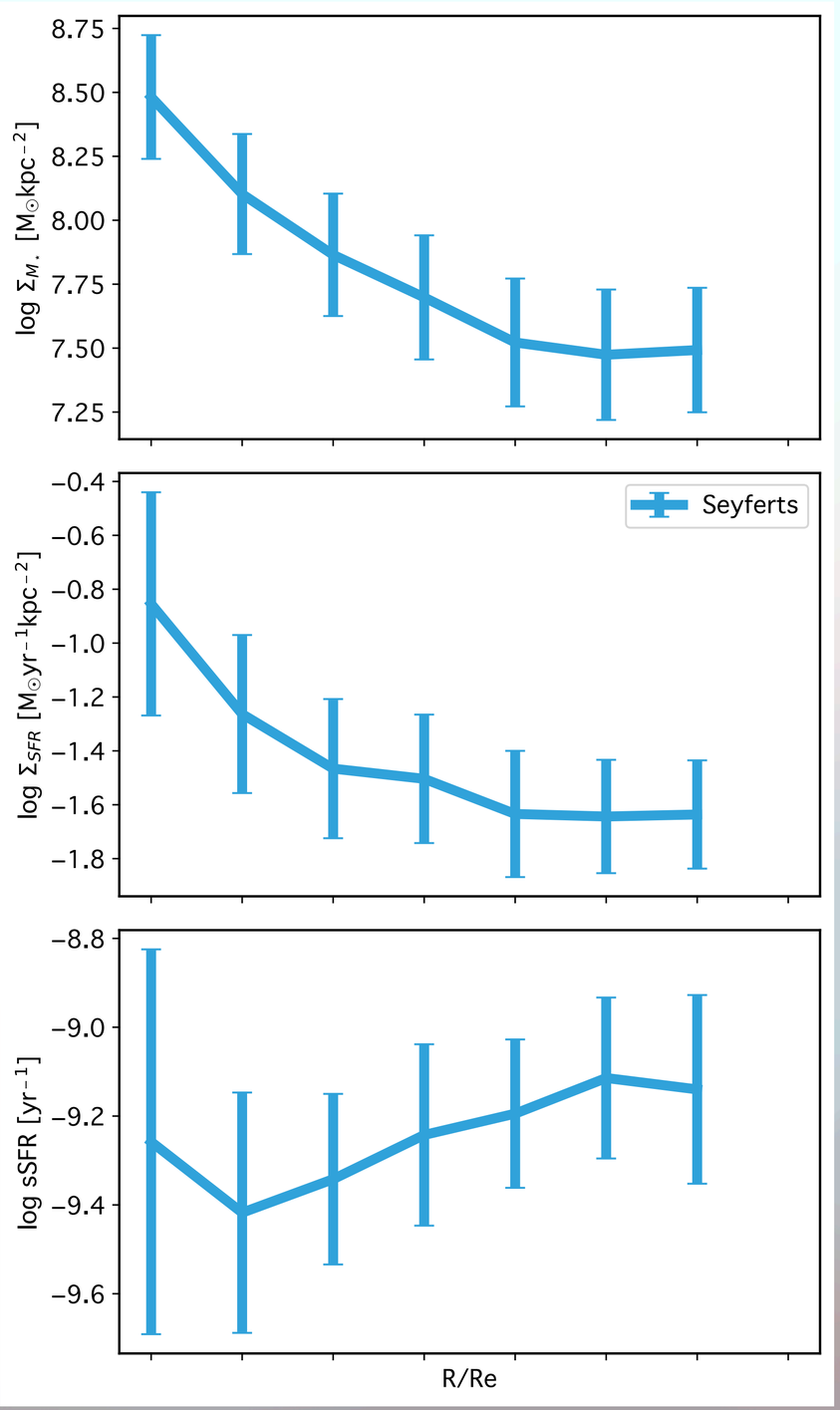
A. Merloni, A. Georgakakis, M. Brusa,

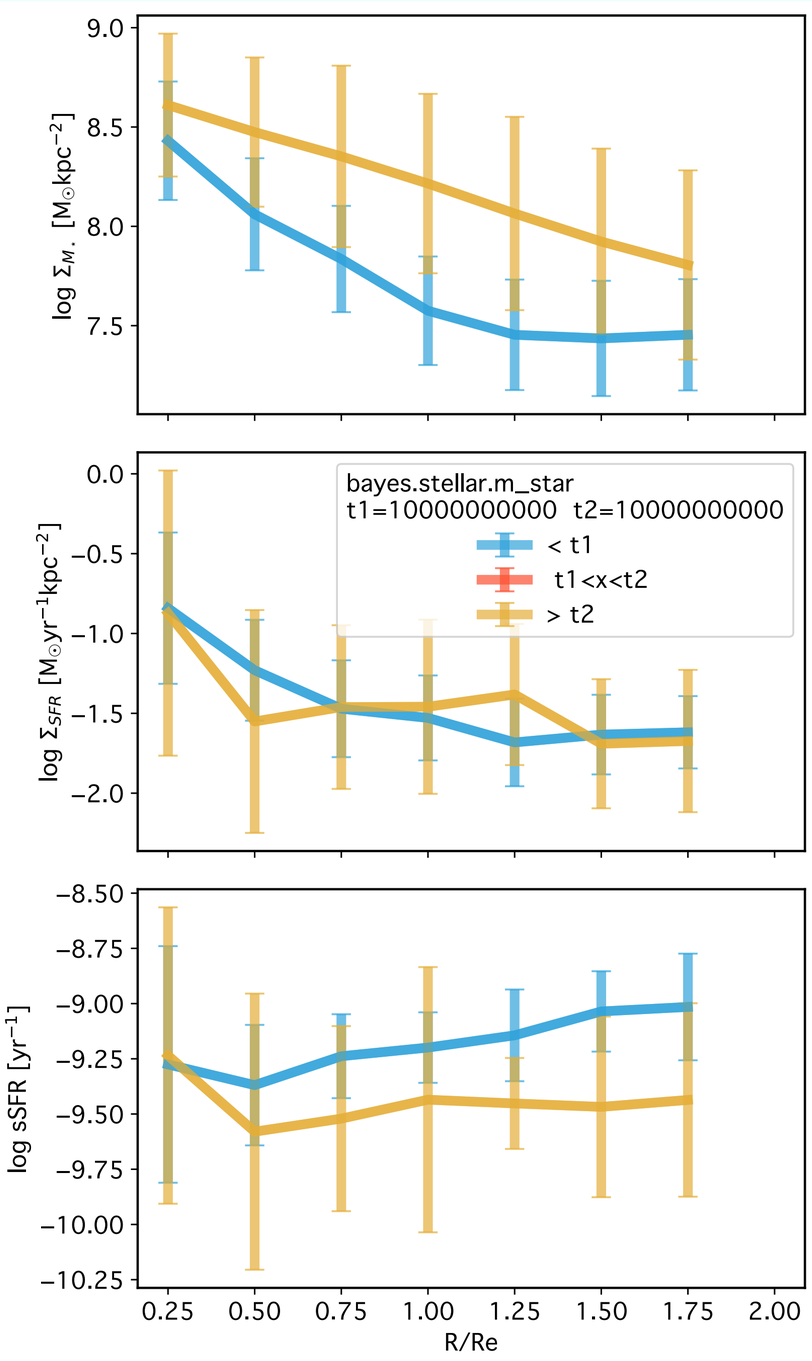
M. Salvato, K. Dolag, B. Musiimenta, et al. (2024)

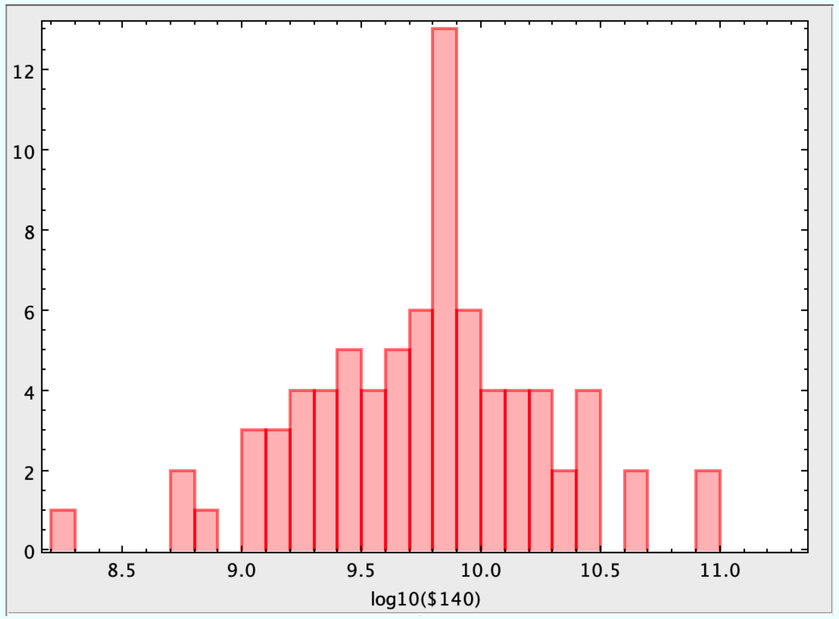
75 X-ray detections

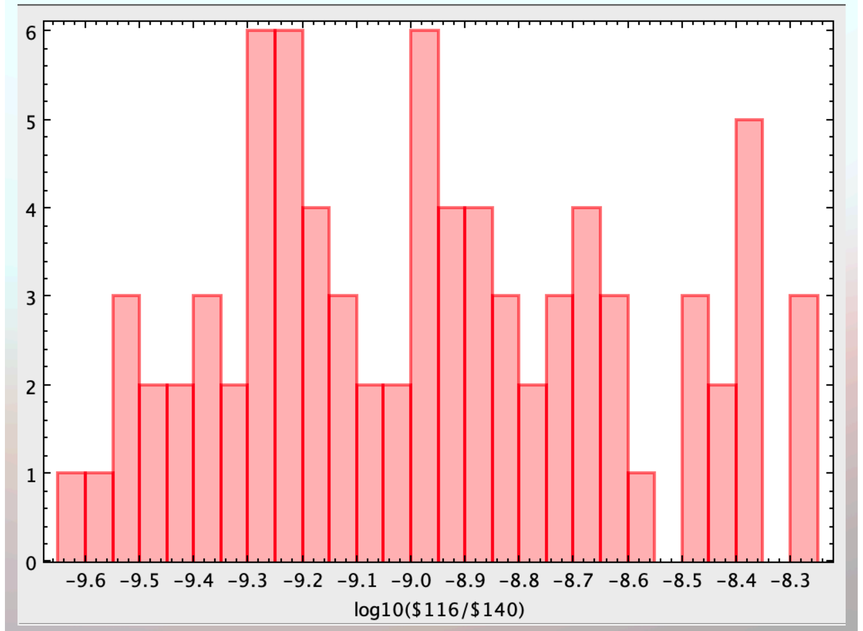
3 ALMA detections (so far)

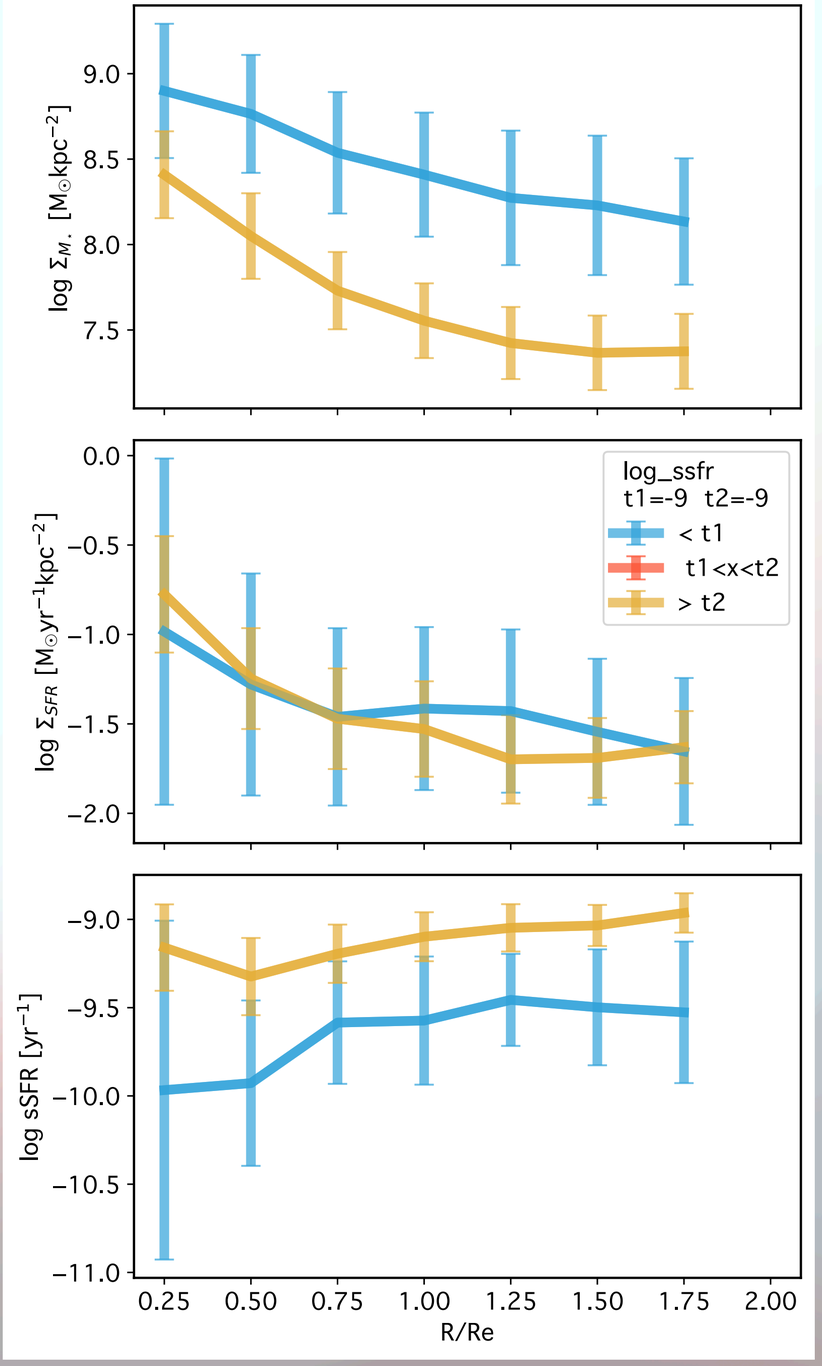
N. Acharya, S. Bonoli, M. Salvato et. al. (in prep)
Plans: With a larger sample, study sSFR Profiles vs BHM, BHAR




log $\Sigma_{M_\odot}$ [$M_\odot kpc^{-2}$]
log Σ_{SFR} [$M_\odot yr^{-1} kpc^{-2}$]
log sSFR [yr^{-1}]
bayes.stellar.m_star
t1=10000000000 t2=10000000000
< t1
t1<x<t2
> t2
R/Re


log10($140)


log10($116/$140)


log $\Sigma_{M_\odot}$ [$M_\odot kpc^{-2}$]
log Σ_{SFR} [$M_\odot yr^{-1} kpc^{-2}$]
log sSFR [yr^{-1}]
log_ssfr
t1=-9 t2=-9
< t1
t1<x<t2
> t2
R/Re


THANK YOU
13 ESR detections