



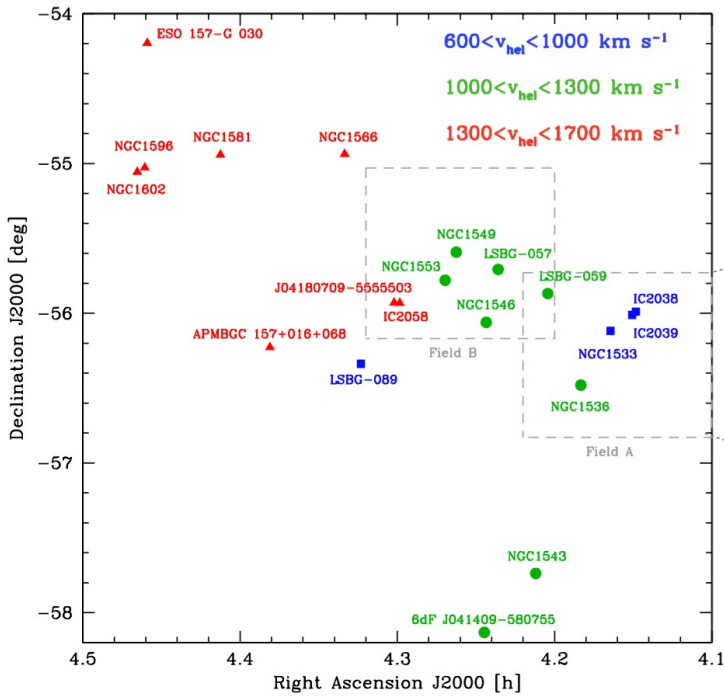
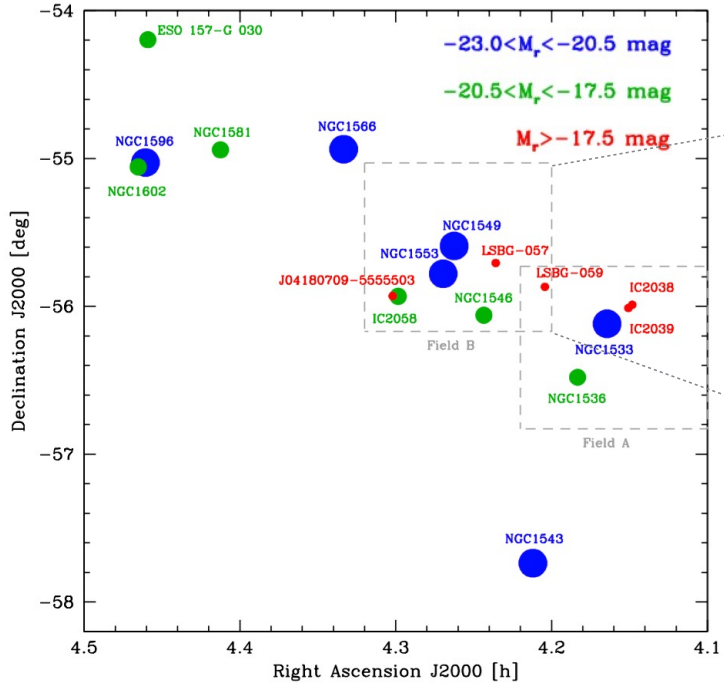
Publication Year	2018
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Title	A Deep Look at NGC1533 in the Dorado Group with VST
Authors	CATTAPAN, ARIANNA; IODICE, ENRICHETTA; RAMPAZZO, Roberto; Ciroi, S.; MAZZEI, Paola; et al.
DOI	10.5281/zenodo.1303938
Handle	http://hdl.handle.net/20.500.12386/27833

A deep look at NGC1533 in the Dorado Group with VST

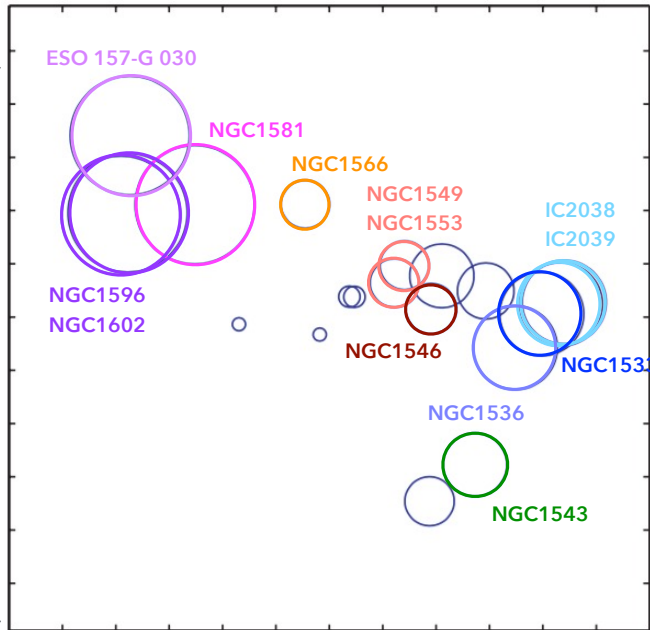
*A. Cattapan*¹

*E. Iodice*², *R. Rampazzo*³, *S. Ciroi*¹, P. Mazzei³, A. Grado², L.
Limatola², M. Spavone², P. Schipani², A. Marino³, E. V. Held³

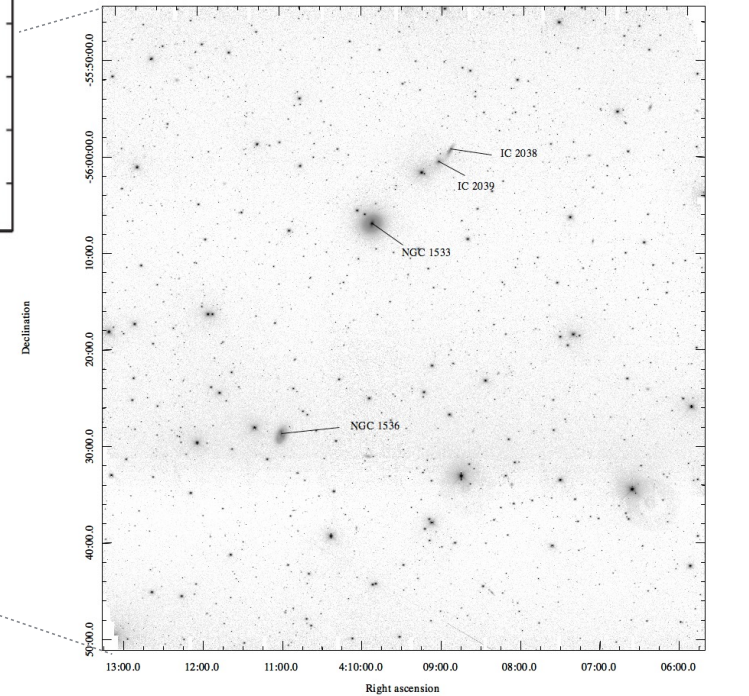
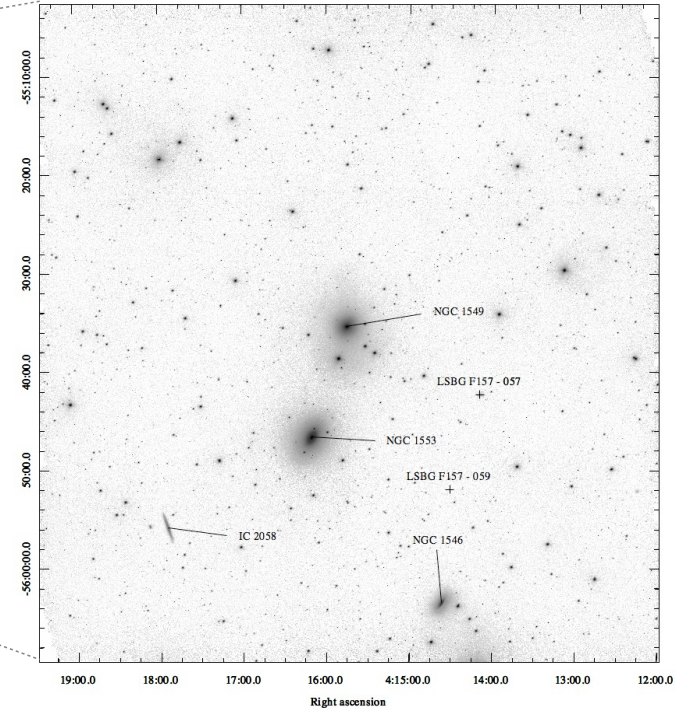
Dorado Group



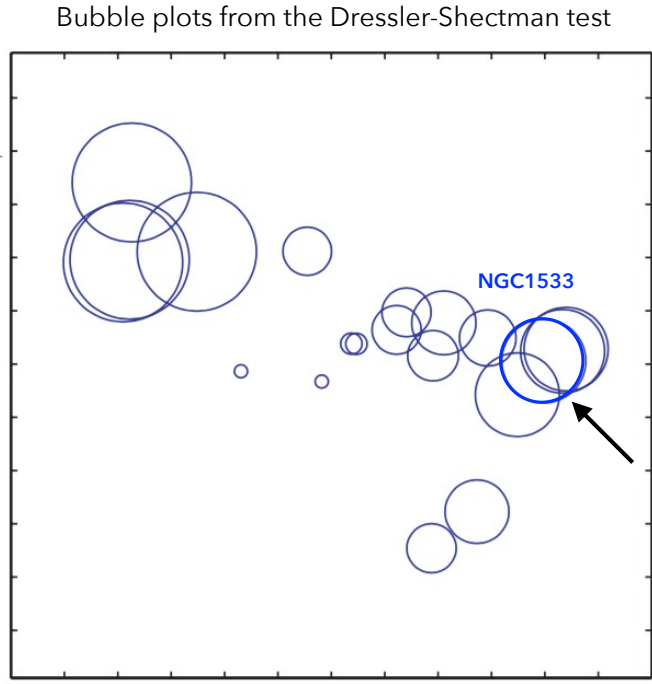
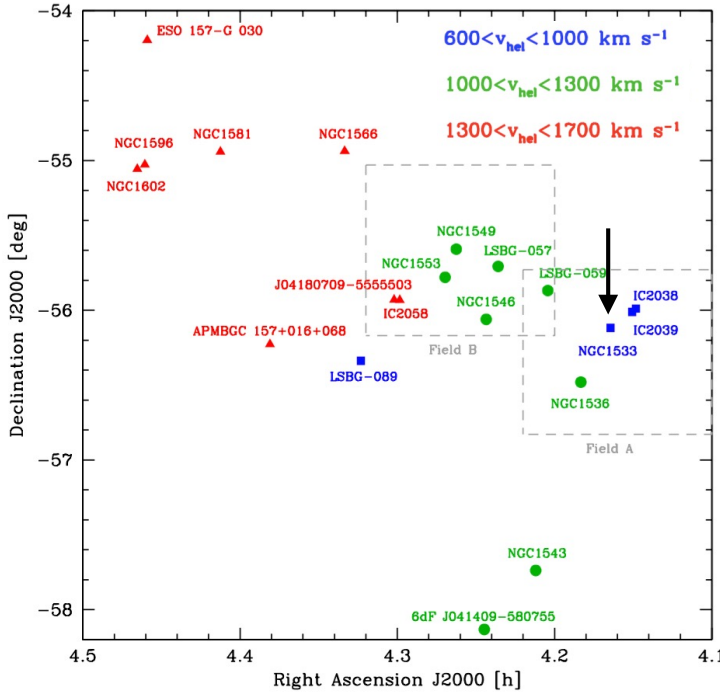
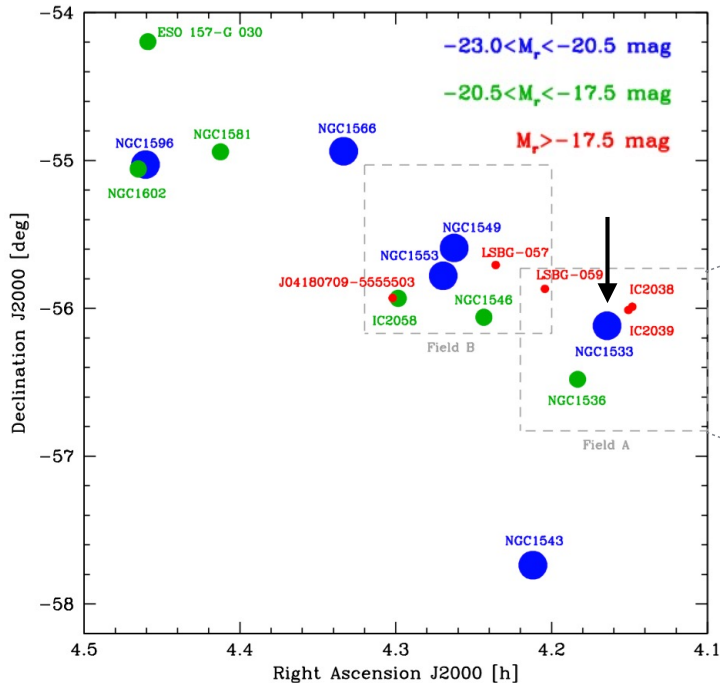
Bubble plots from the Dressler-Shectman test



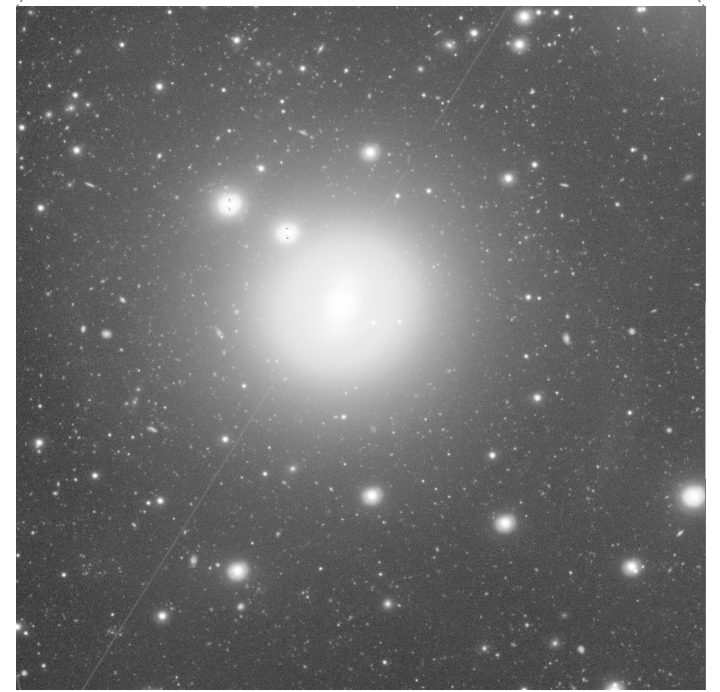
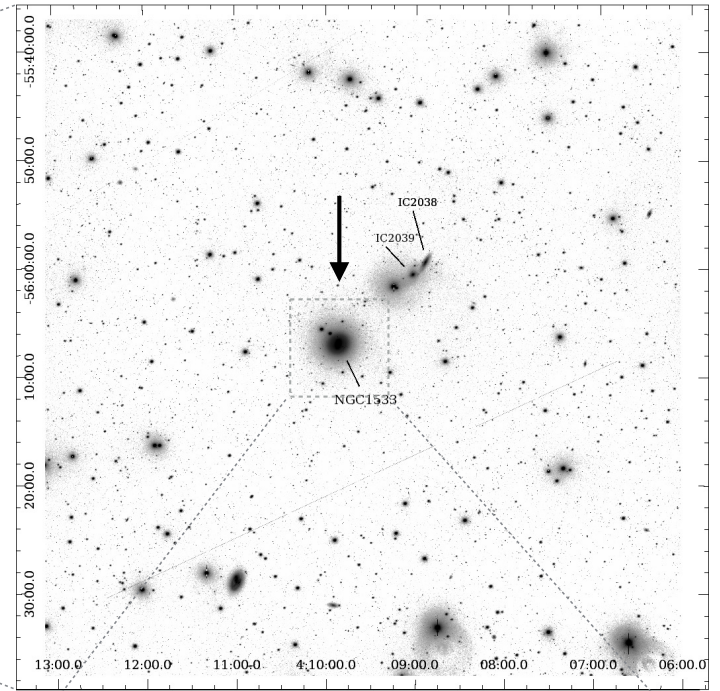
Firth et al. 2006



VEGAS target - NGC 1533



Firth et al. 2006



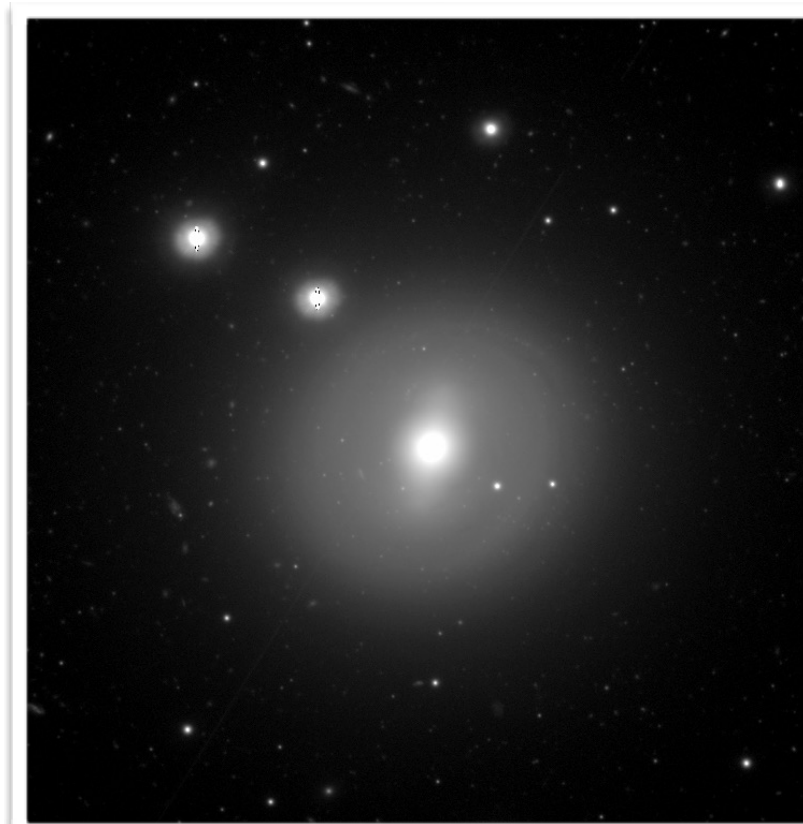
VEGAS target - NGC 1533

RA	Dec	v_{hel}	z
<i>[h:m:s]</i>	<i>[°:':"]</i>	<i>[km s⁻¹]</i>	
04:09:51.8	-56:07:06	790±5	0.002635±0.000017

Firth et al. 2006

Outline

1. Previous works
2. Photometry
3. Decomposition
4. Conclusion



g band image from VST

ARRAKIS classification:

(RL)SB0⁰

Comerón et al. (2014)

Band	RA pointing	Dec pointing	T_{exp}	FWHM	Combined frames
<i>(SDSS)</i>	<i>[deg]</i>	<i>[deg]</i>	<i>[s]</i>	<i>[arcsec]</i>	
g	62.444	-56.101	7800	0.7893	26
r	62.289	-56.114	4800	0.7852	16

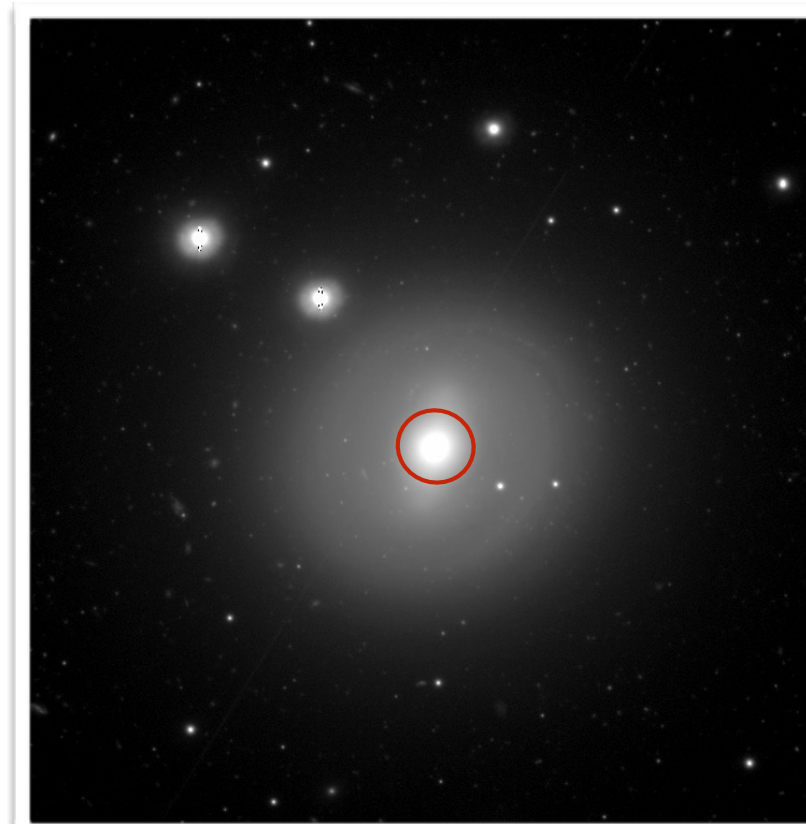
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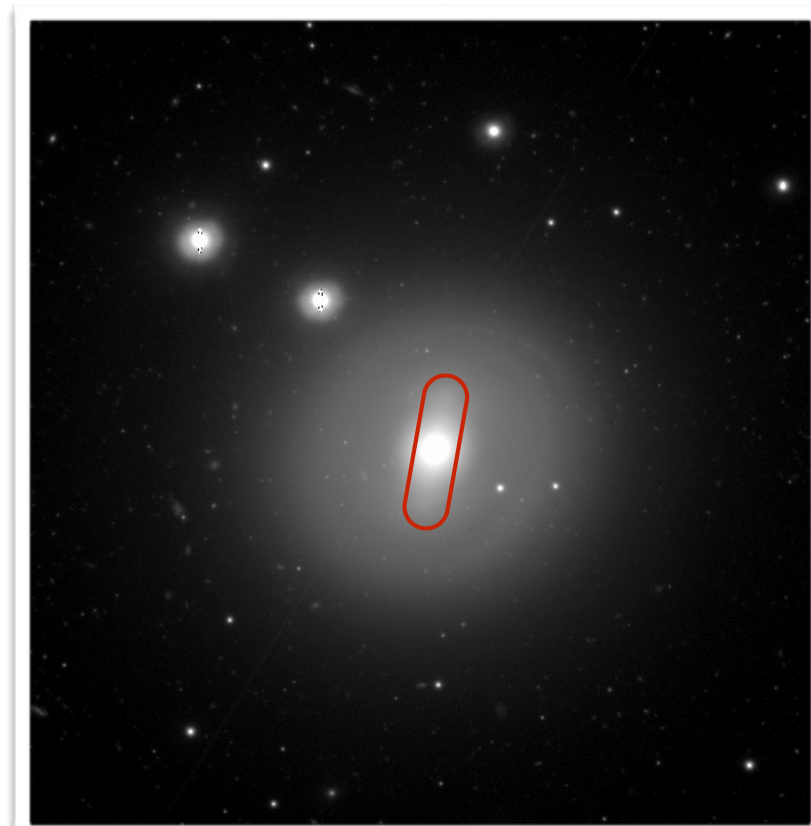
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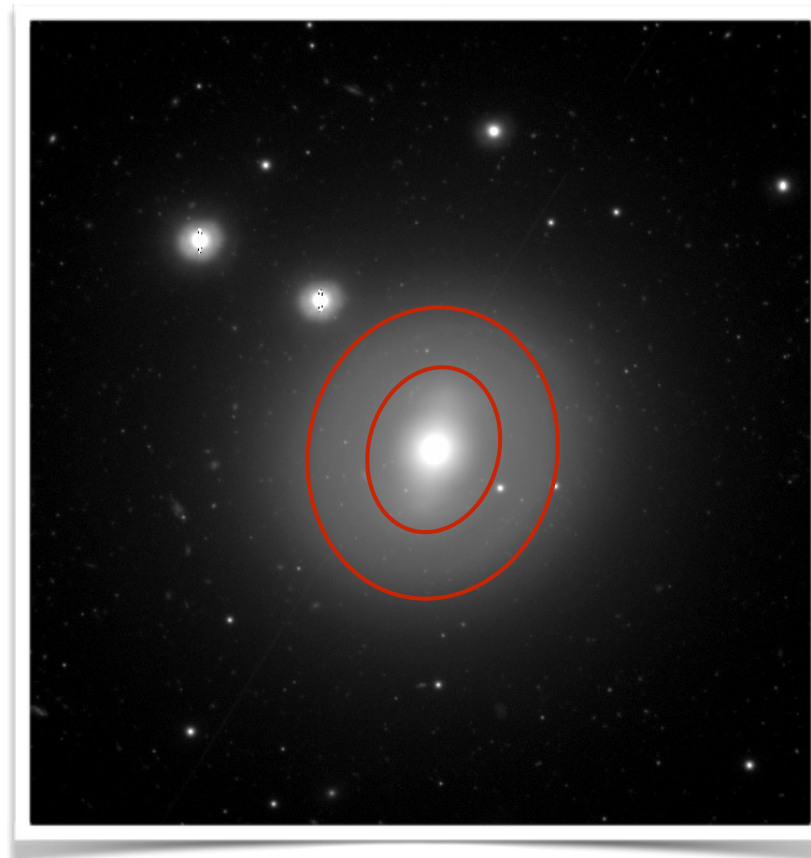
VEGAS target - NGC 1533

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[h:m:s]	[°:':"]	[km s ⁻¹]	
04:09:51.8	-56:07:06	790±5	0.002635±0.000017

Firth et al. 2006

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ARRAKIS classification:

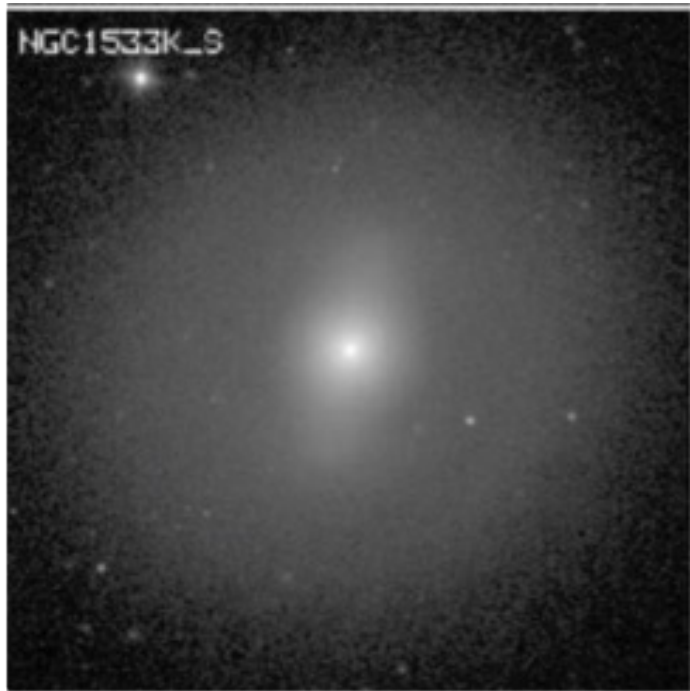
(RL)SB0⁰

Comerón et al. (2014)

g band image from VST

Band (SDSS)	RA pointing [deg]	Dec pointing [deg]	T_{exp} [s]	FWHM [arcsec]	Combined frames
g	62.444	-56.101	7800	0.7893	26
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From imaging previous works

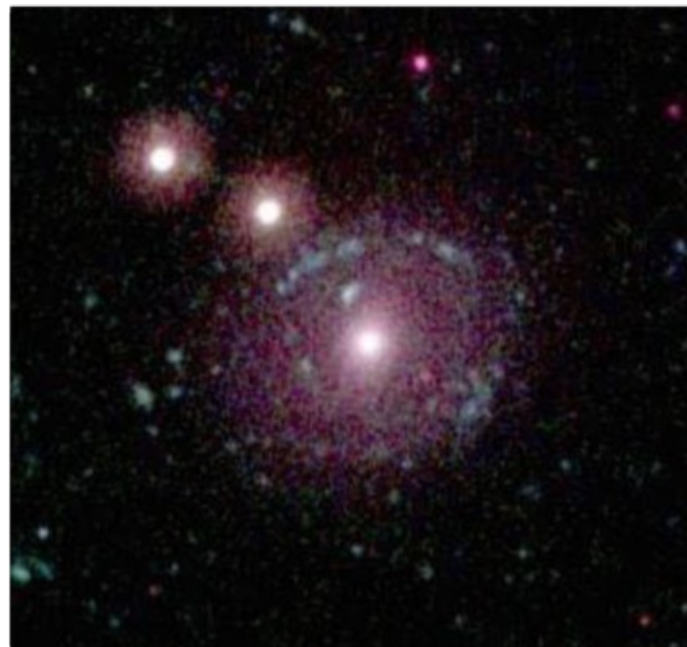
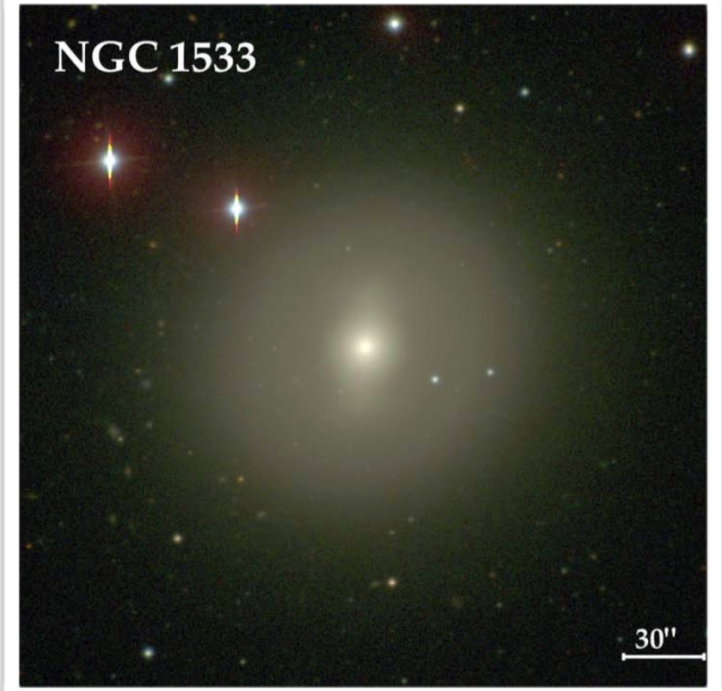


Direct K_s -band ($\lambda \sim 2.15 \mu\text{m}$) image from NTT, image is in units of mag arcsec^{-2} and is displayed from $\mu_{K_s} = 12.0$ to $22.0 \text{ mag arcsec}^{-2}$.
FoV = $4' \times 4'$

Laurikainen et al. 2006

du Pont telescope image, stacked image from Johnson B and V and Kron-Cousins R and I filters.
FoV = $4'.8 \times 4'.8$

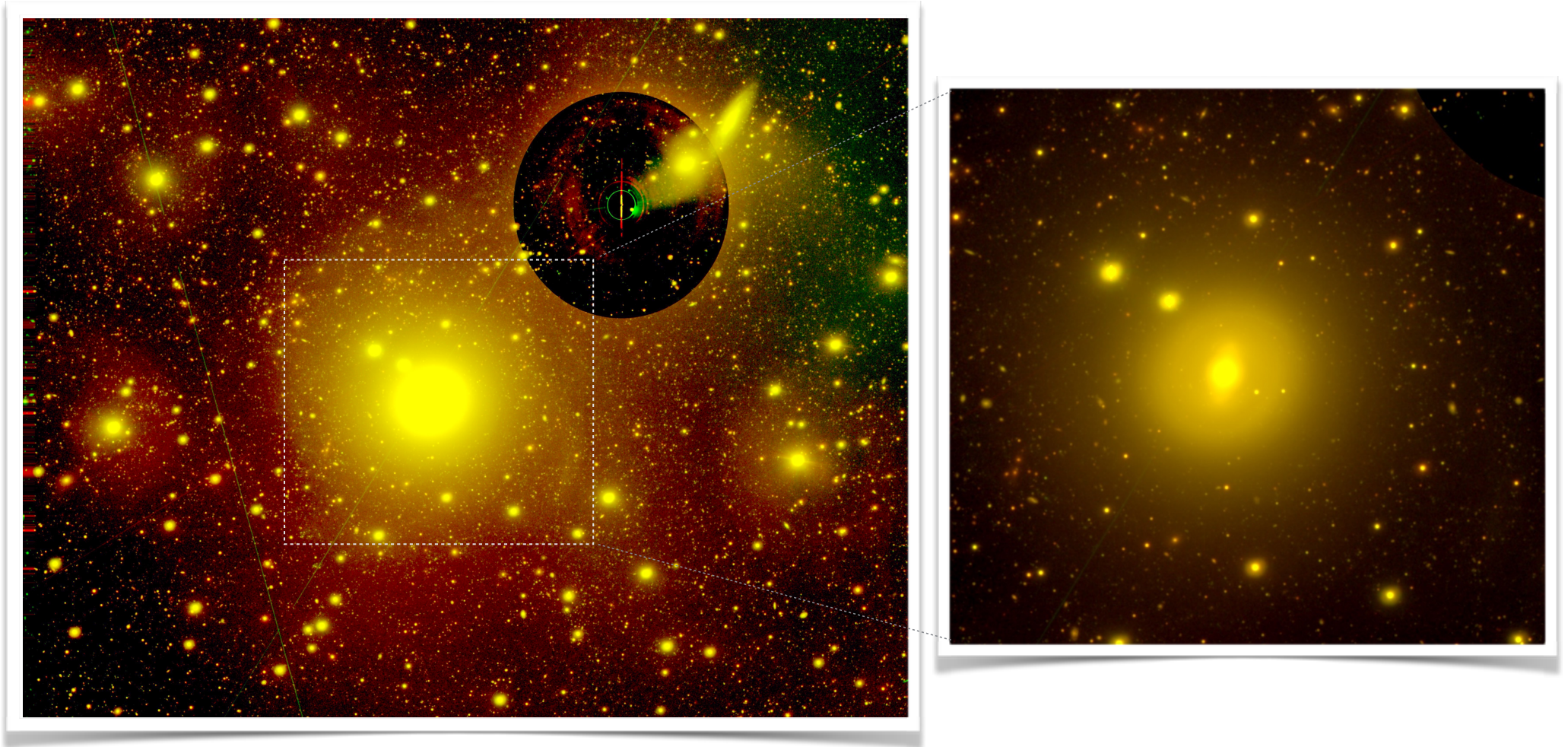
Ho et al. 2011



Swift-UVOT image, color composite image in the W2 (blue), M2 (green) and W1 (red) filters. FoV = $5' \times 5'$

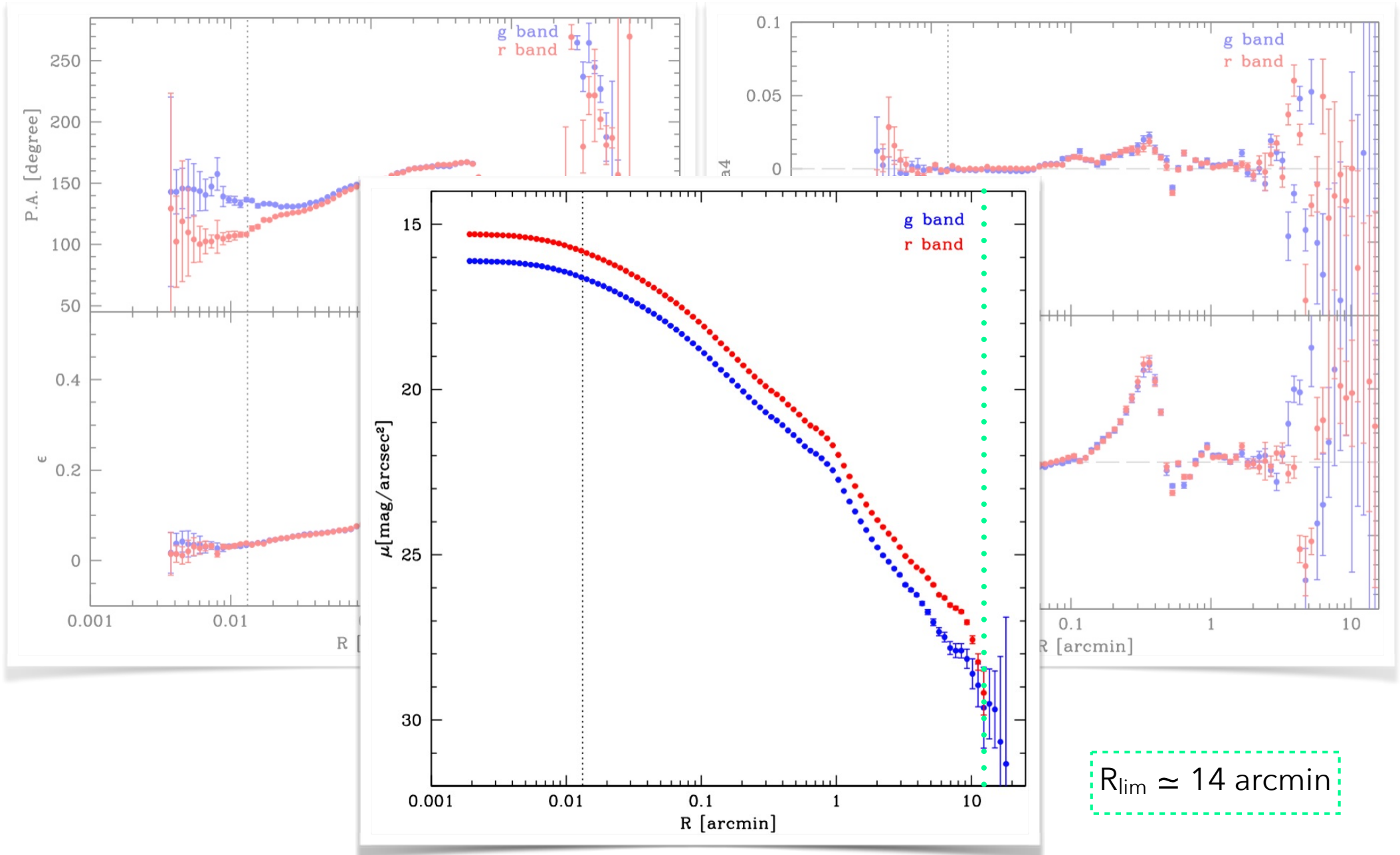
Rampazzo et al. 2017

Imaging with VST

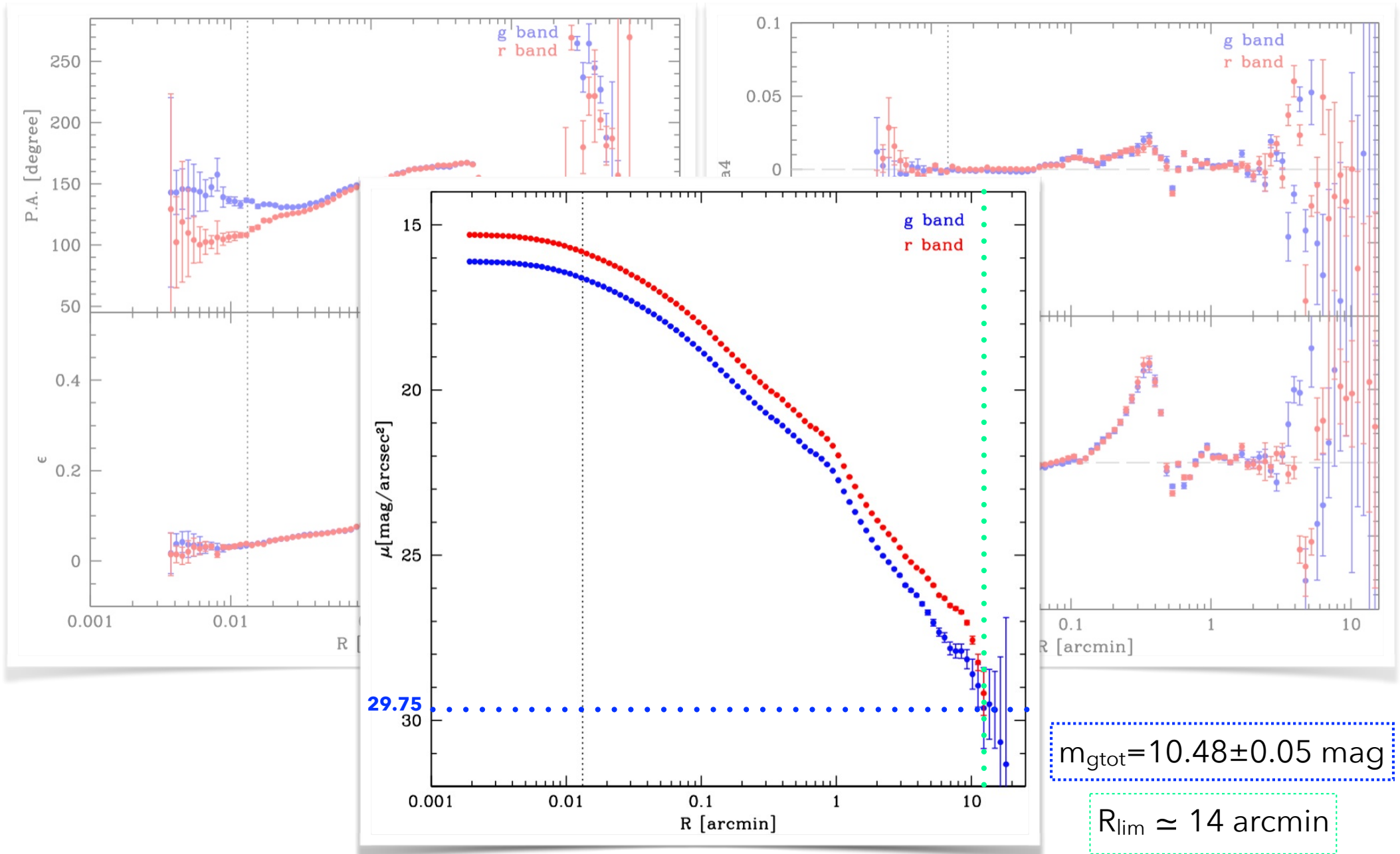


Colour composite image from g (green channel) and r (red channel) band VST image,
24.15x18.9 arcmin.

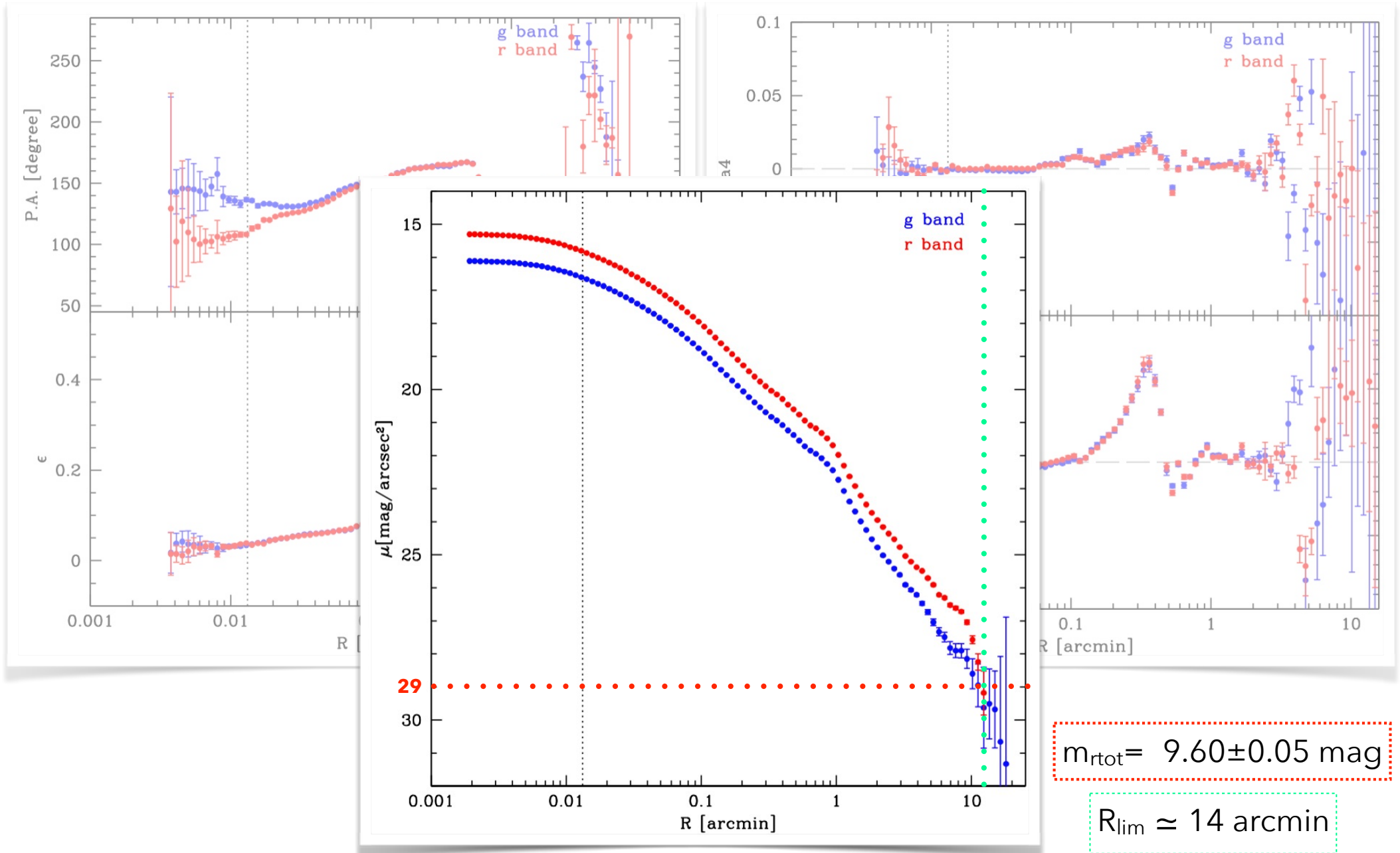
Photometry - Surface Brightness Profile



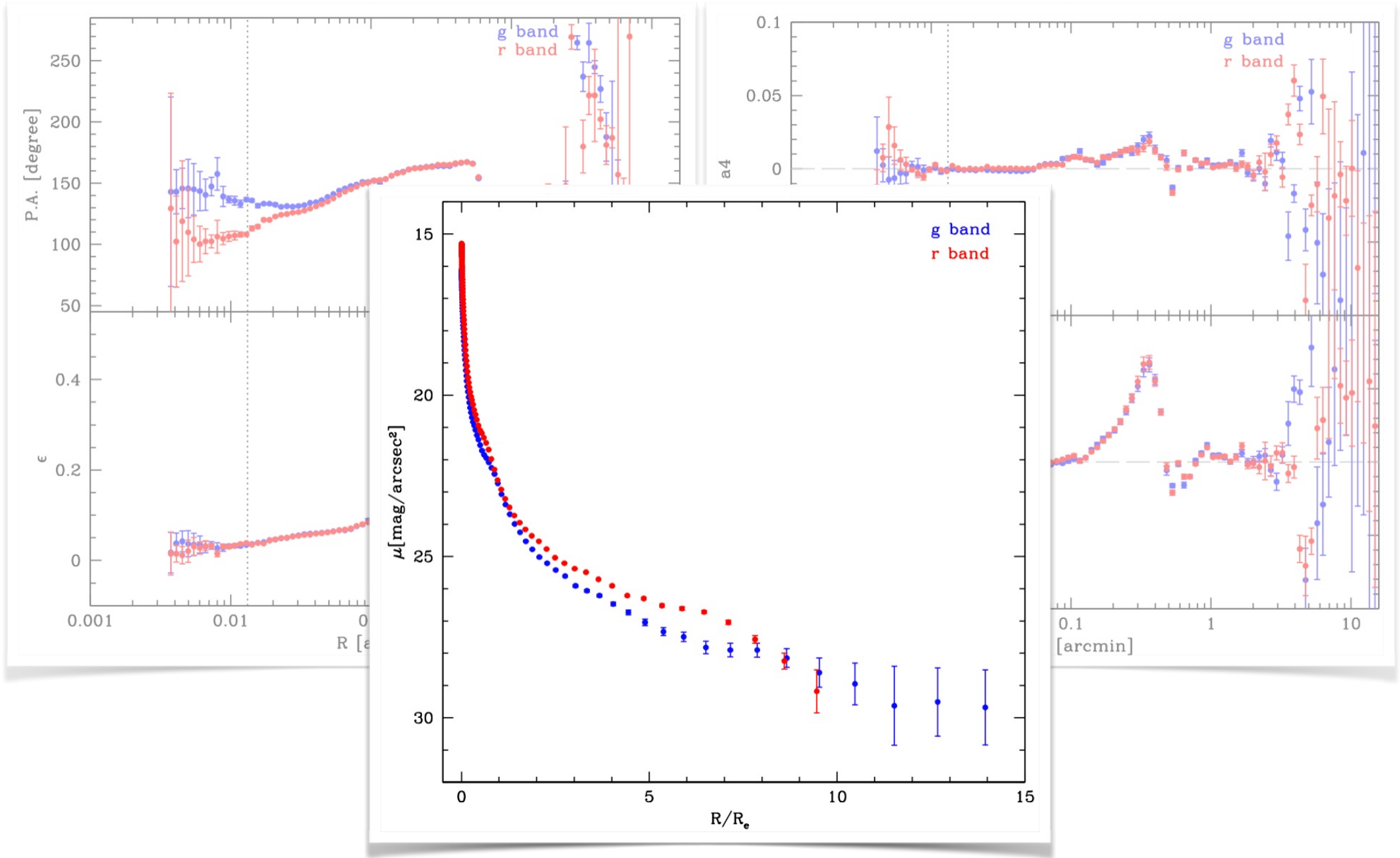
Photometry - Surface Brightness Profile



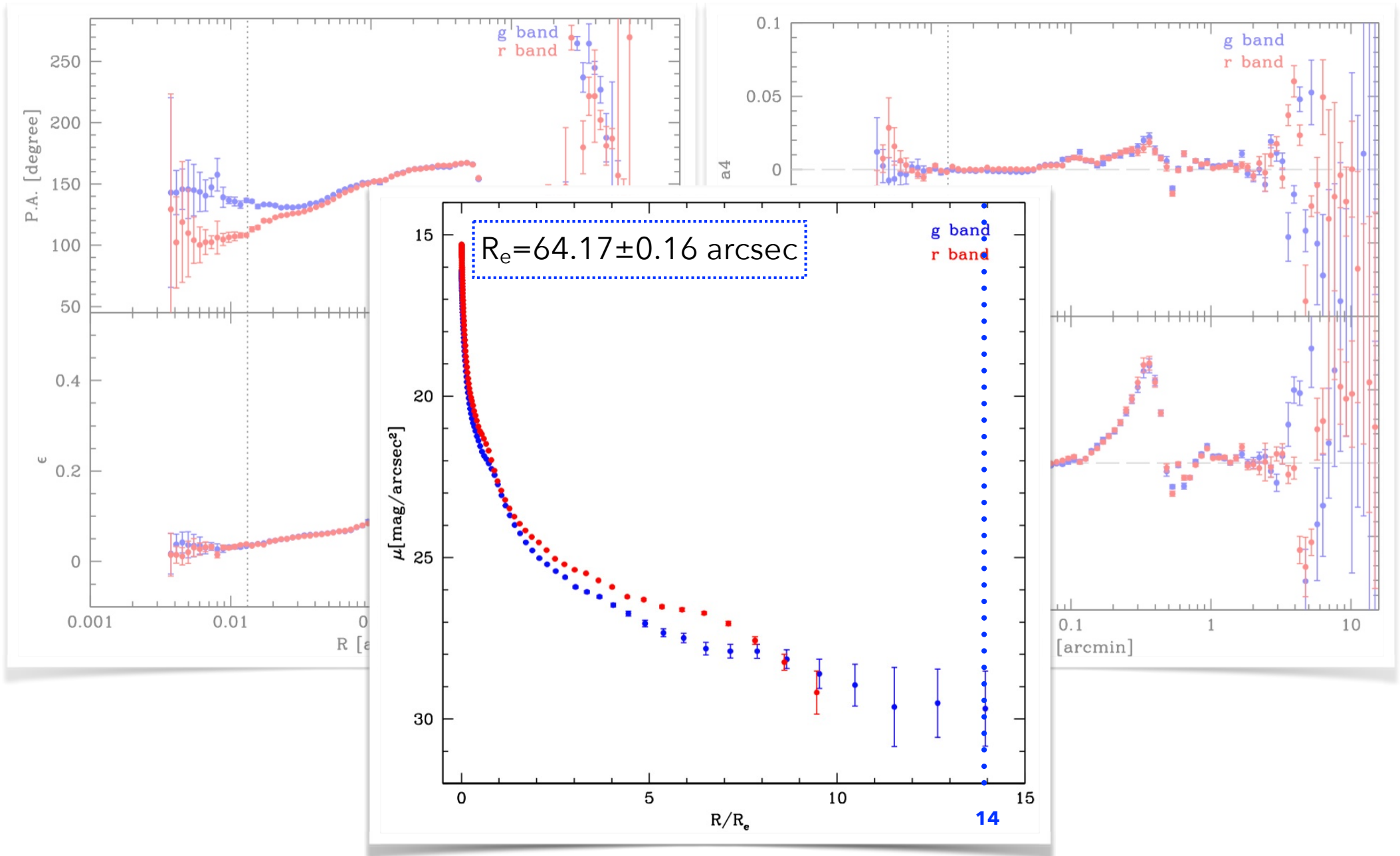
Photometry - Surface Brightness Profile



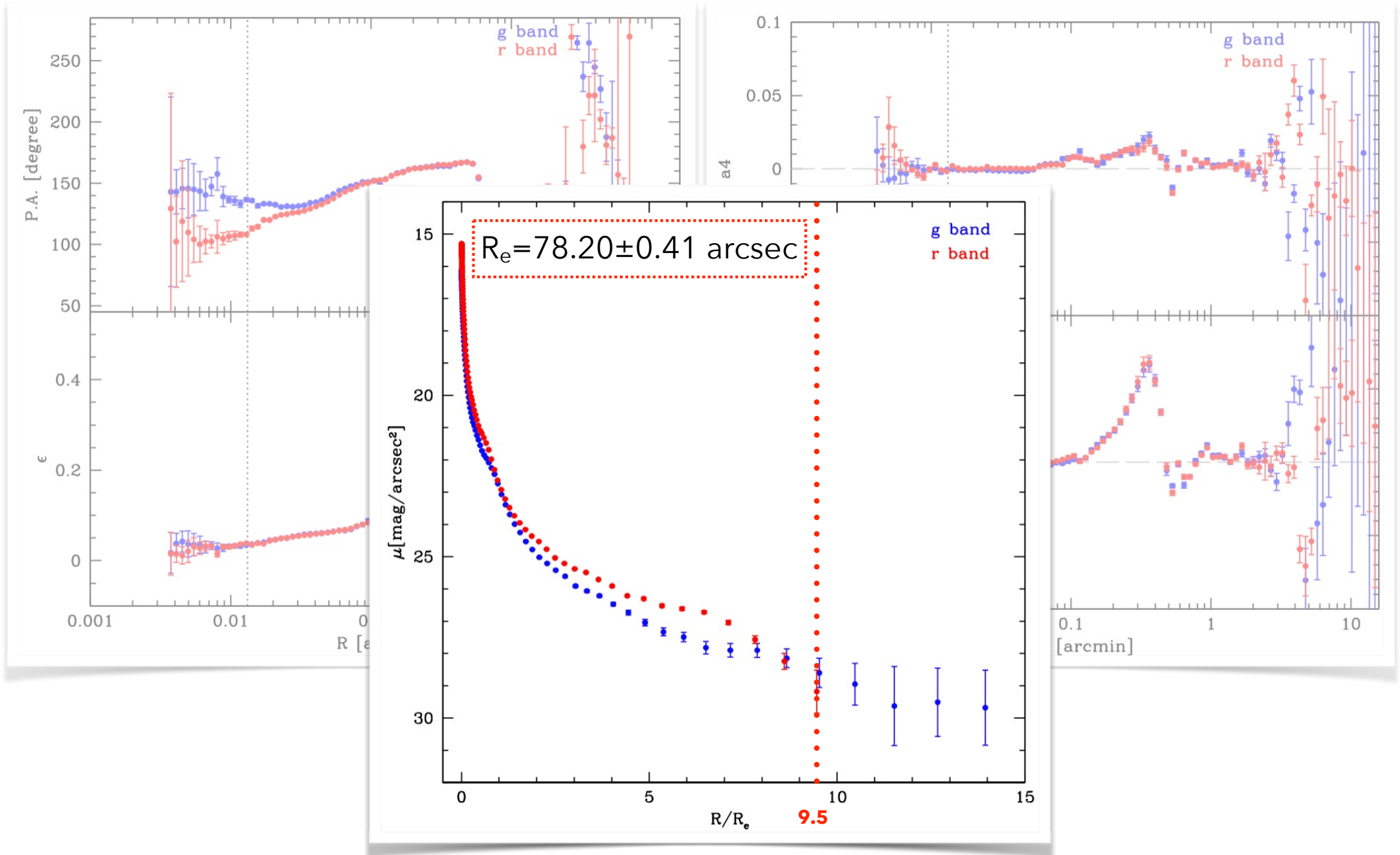
Photometry - Surface Brightness Profile



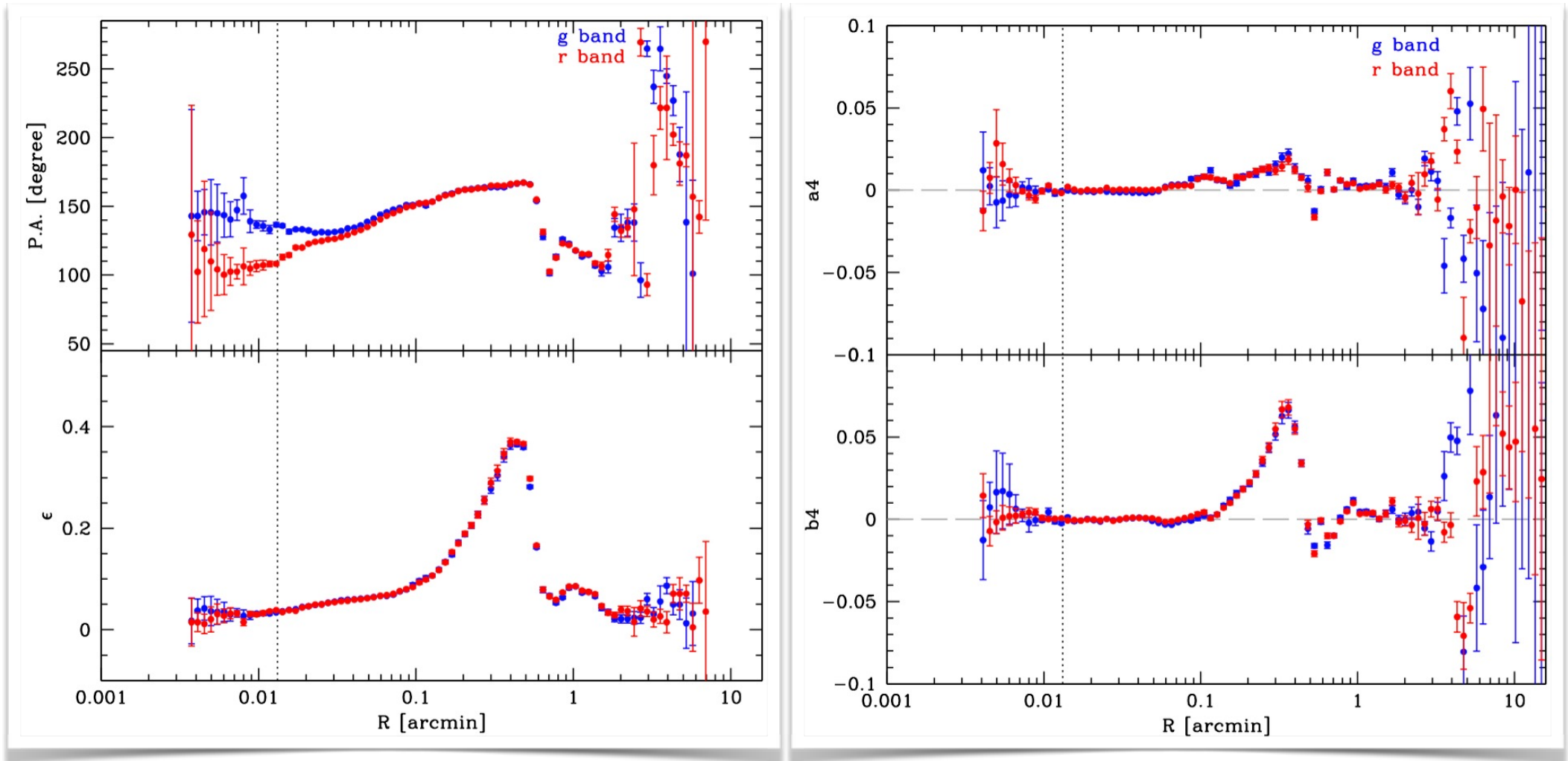
Photometry - Surface Brightness Profile



Photometry - Surface Brightness Profile

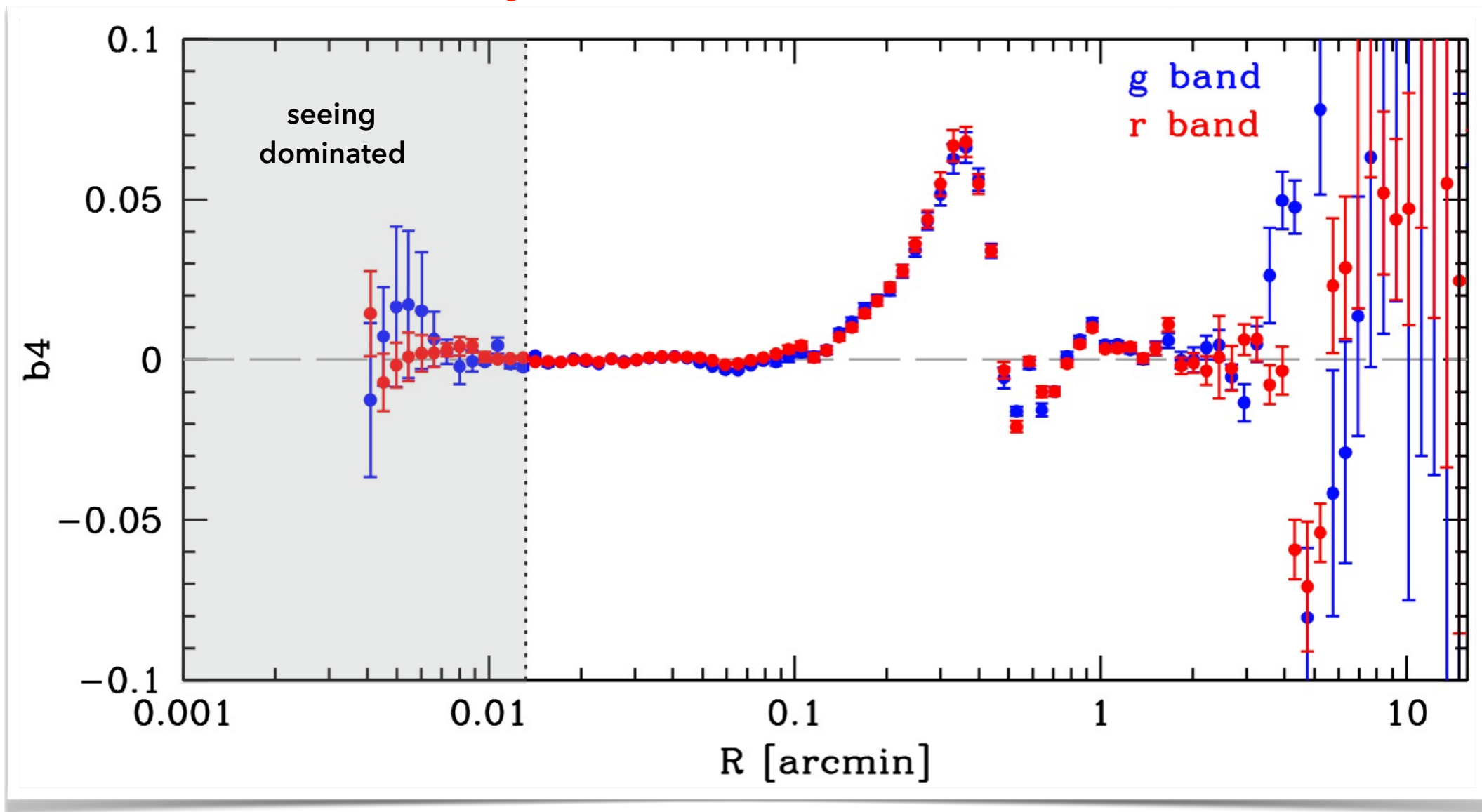


Photometry - Geometrical Parameters



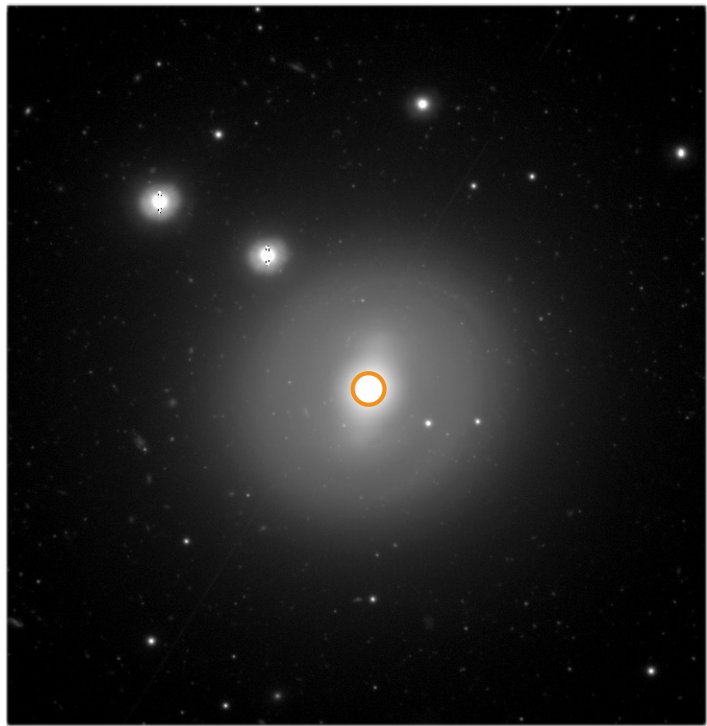
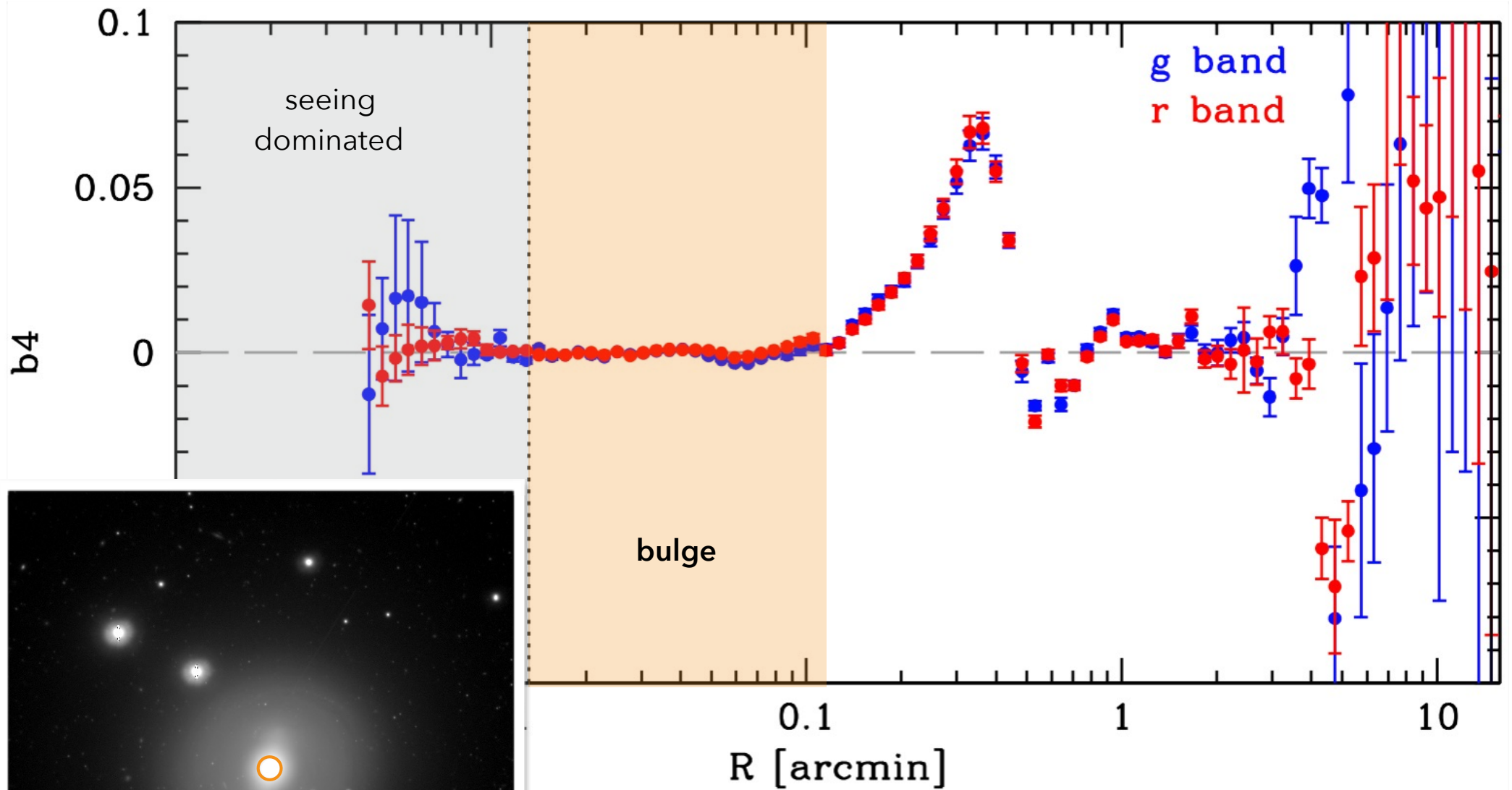
Jedrzejewski, 1987:
$$I(\alpha, \vartheta) = I_0 + \sum_k \left[a_k \sin(k\vartheta) + b_k \cos(k\vartheta) \right]$$

Photometry - Geometrical Parameters



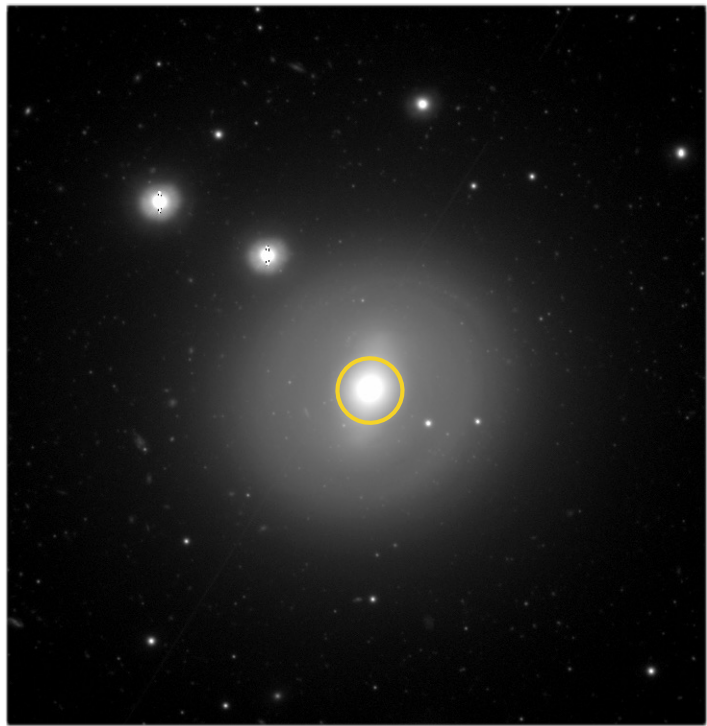
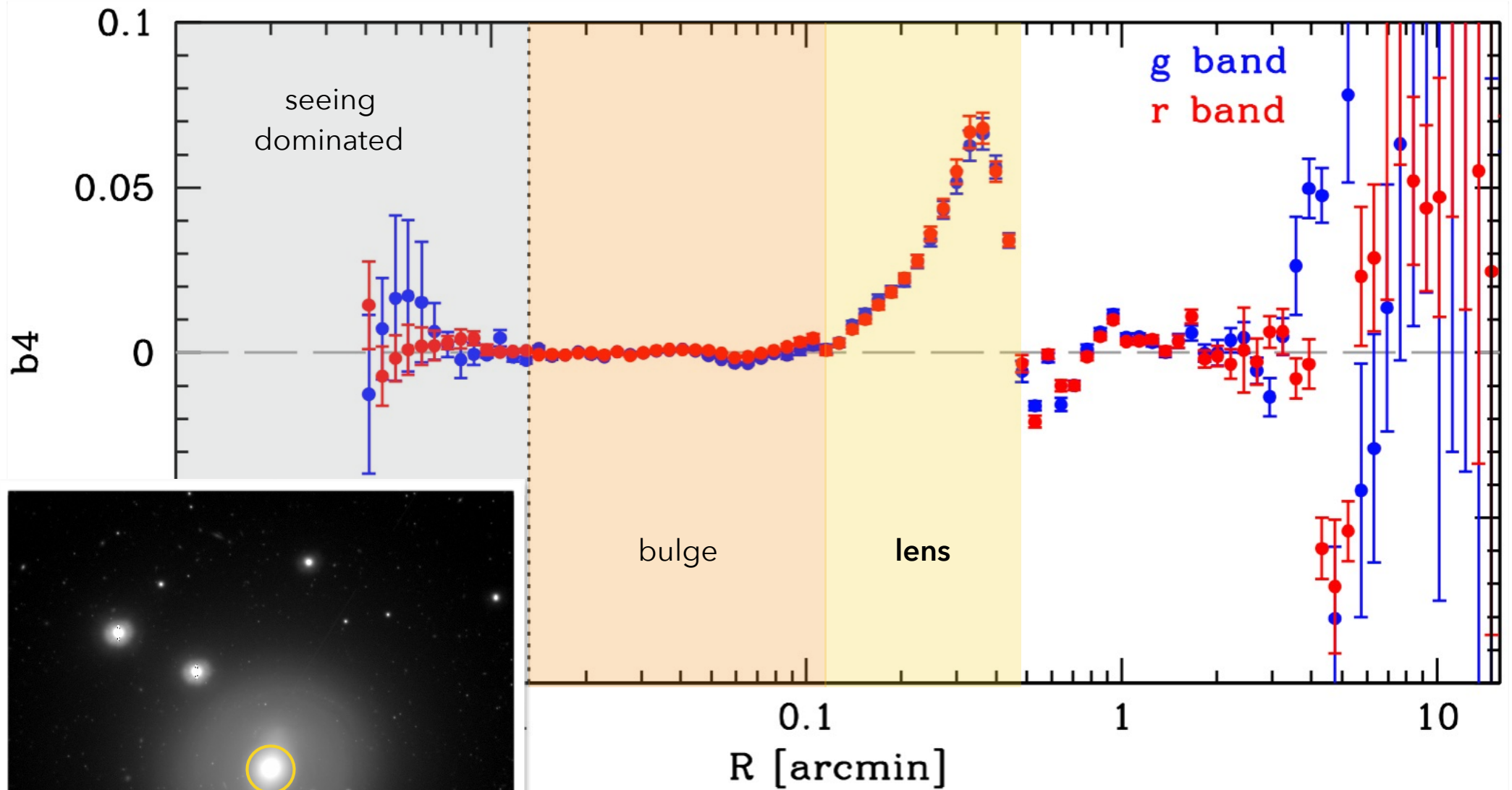
$R \lesssim 0.79$ arcsec

Photometry - Geometrical Parameters



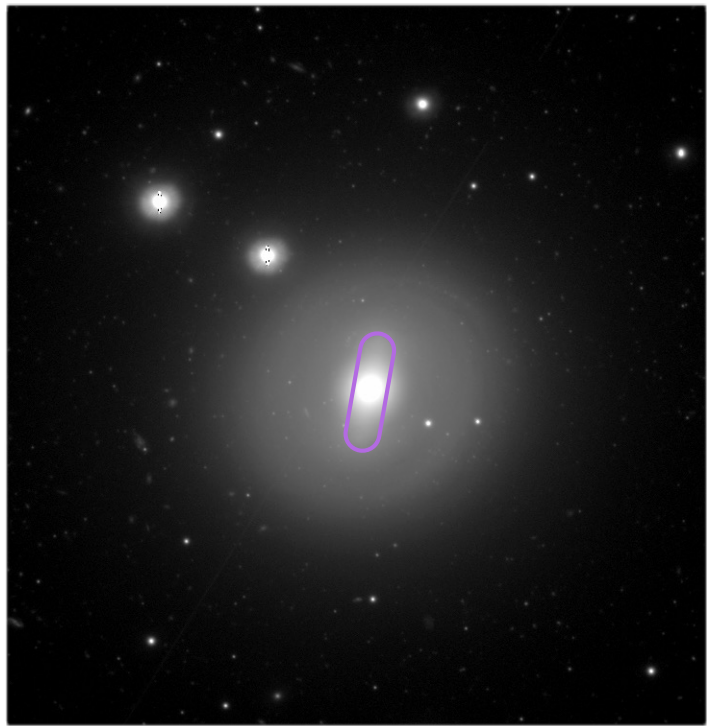
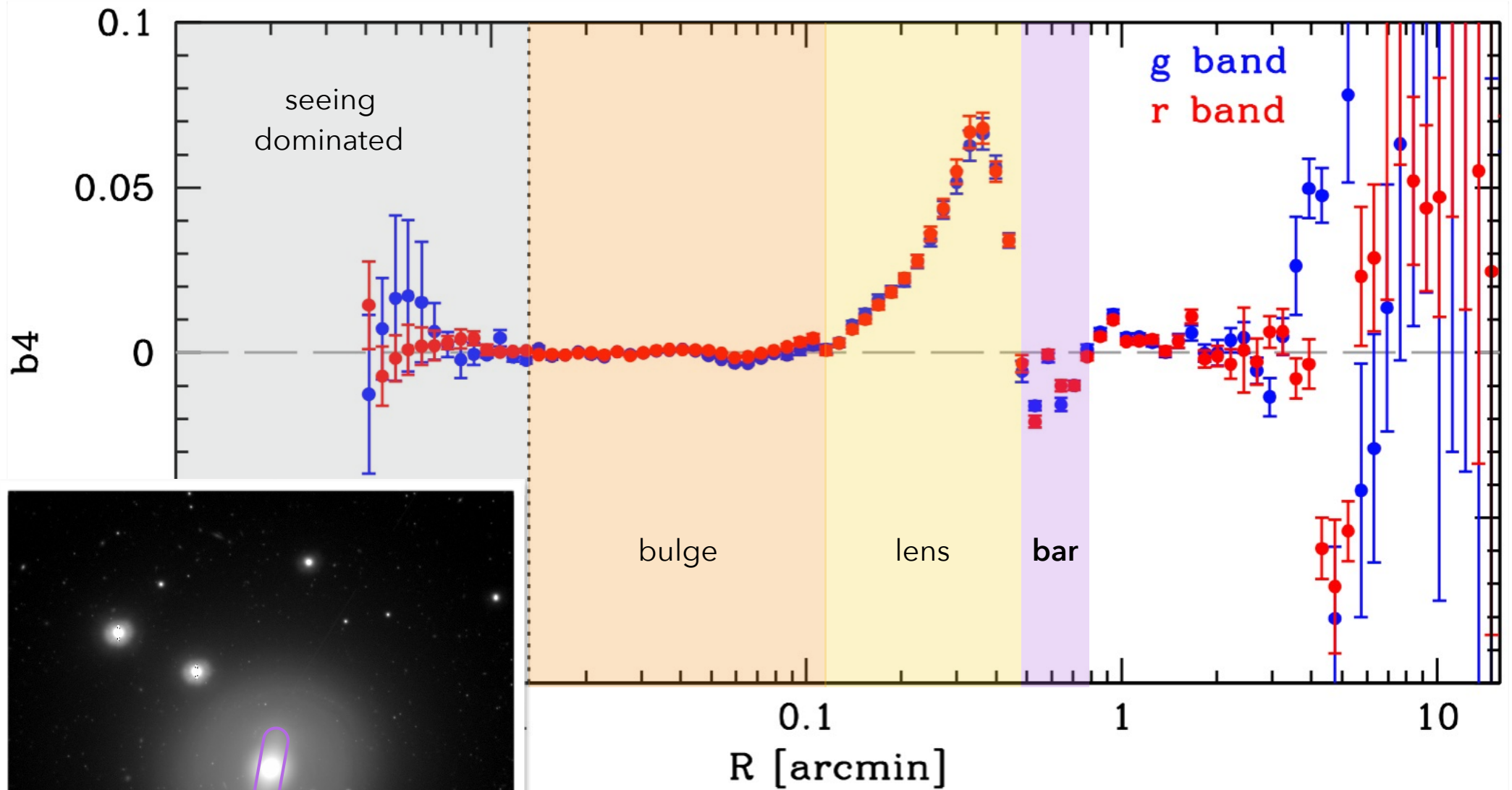
$$0.79 \lesssim R \lesssim 6.95 \text{ arcsec}$$

Photometry - Geometrical Parameters



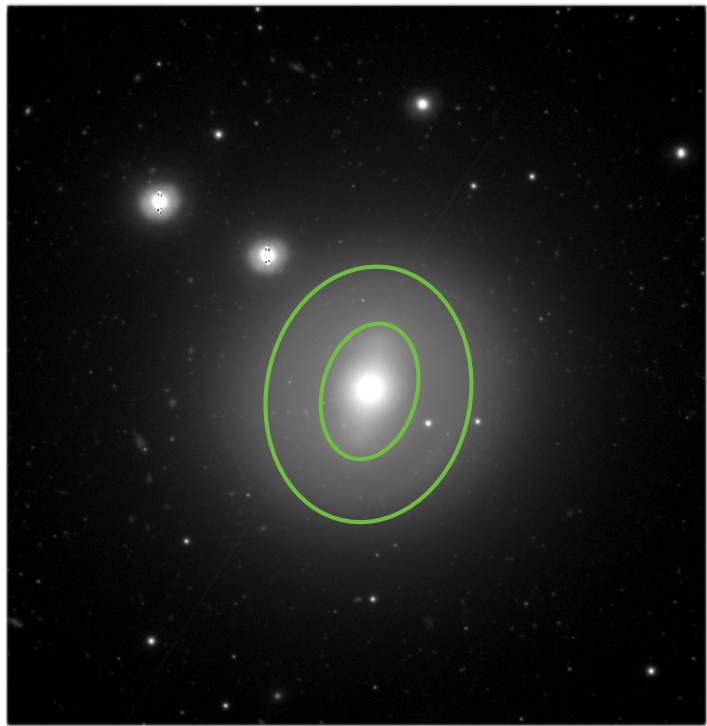
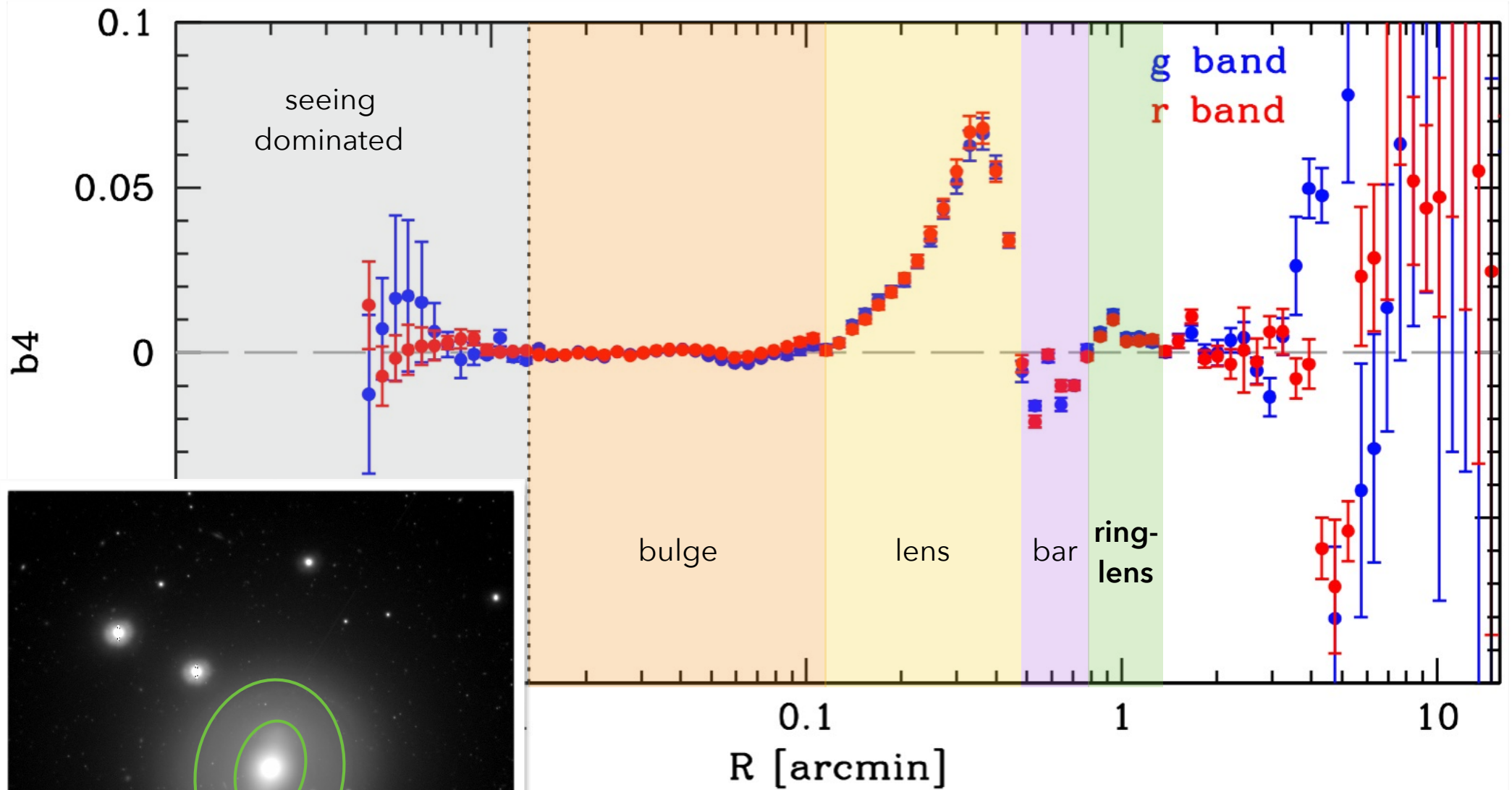
$$6.95 \lesssim R \lesssim 29.00 \text{ arcsec}$$

Photometry - Geometrical Parameters



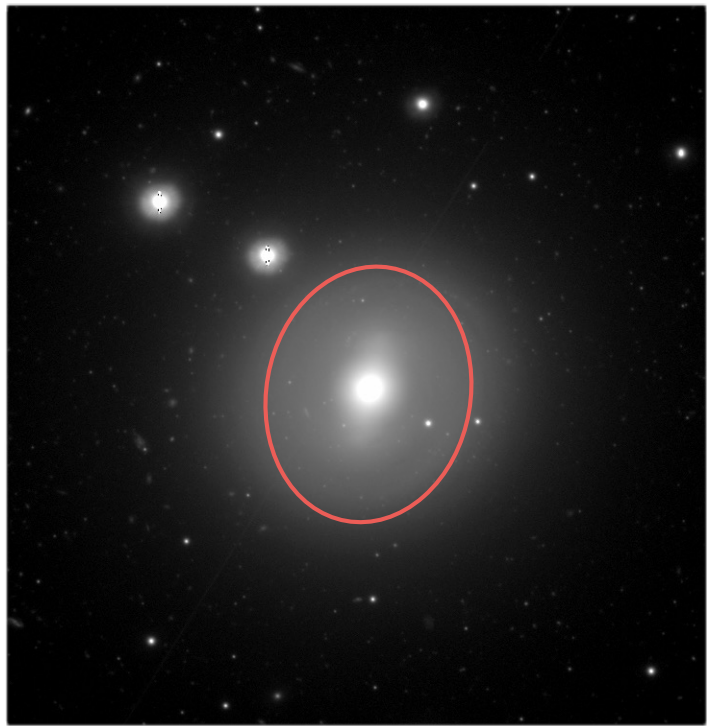
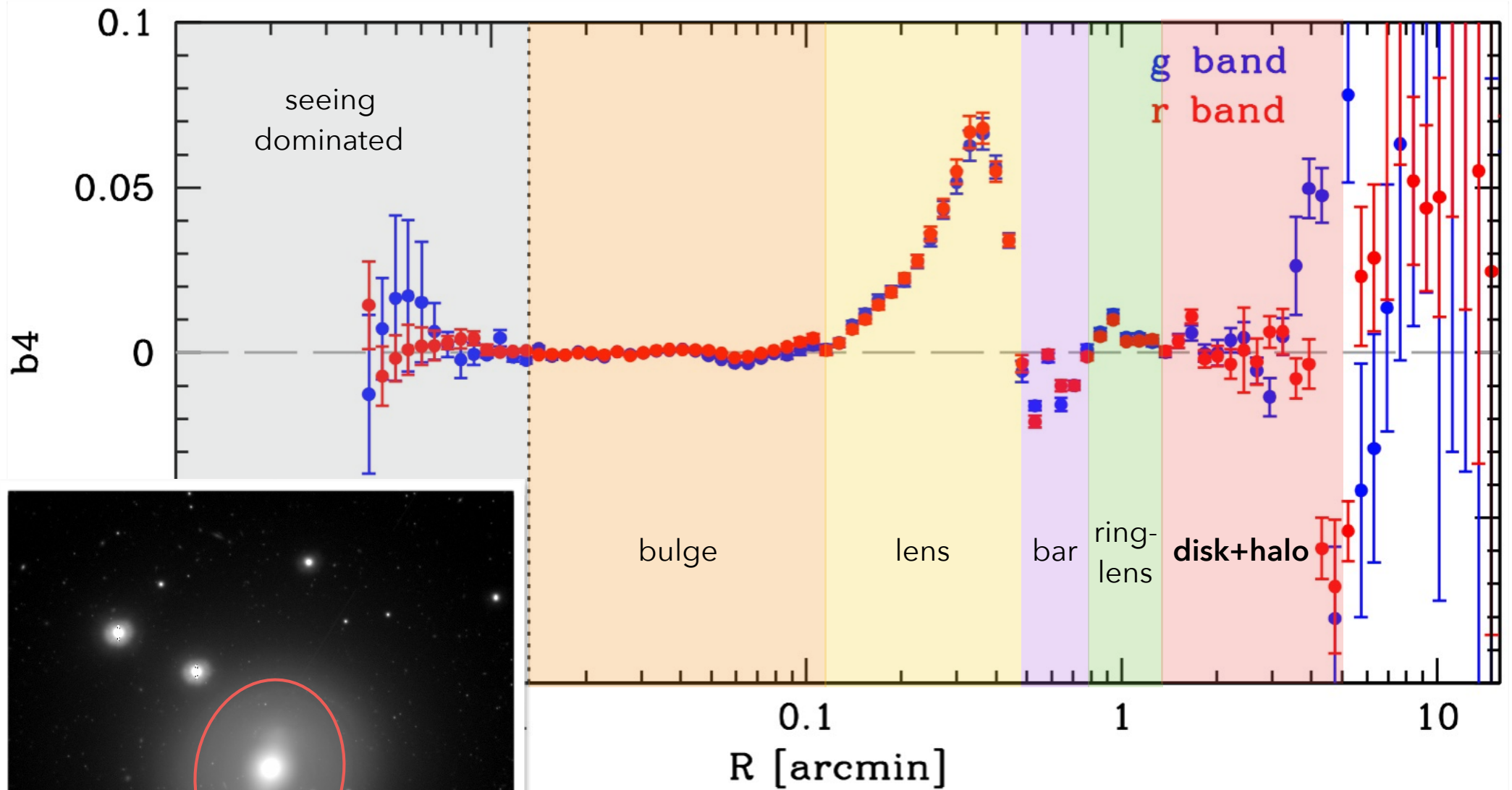
$$29.00 \lesssim R \lesssim 46.70 \text{ arcsec}$$

Photometry - Geometrical Parameters



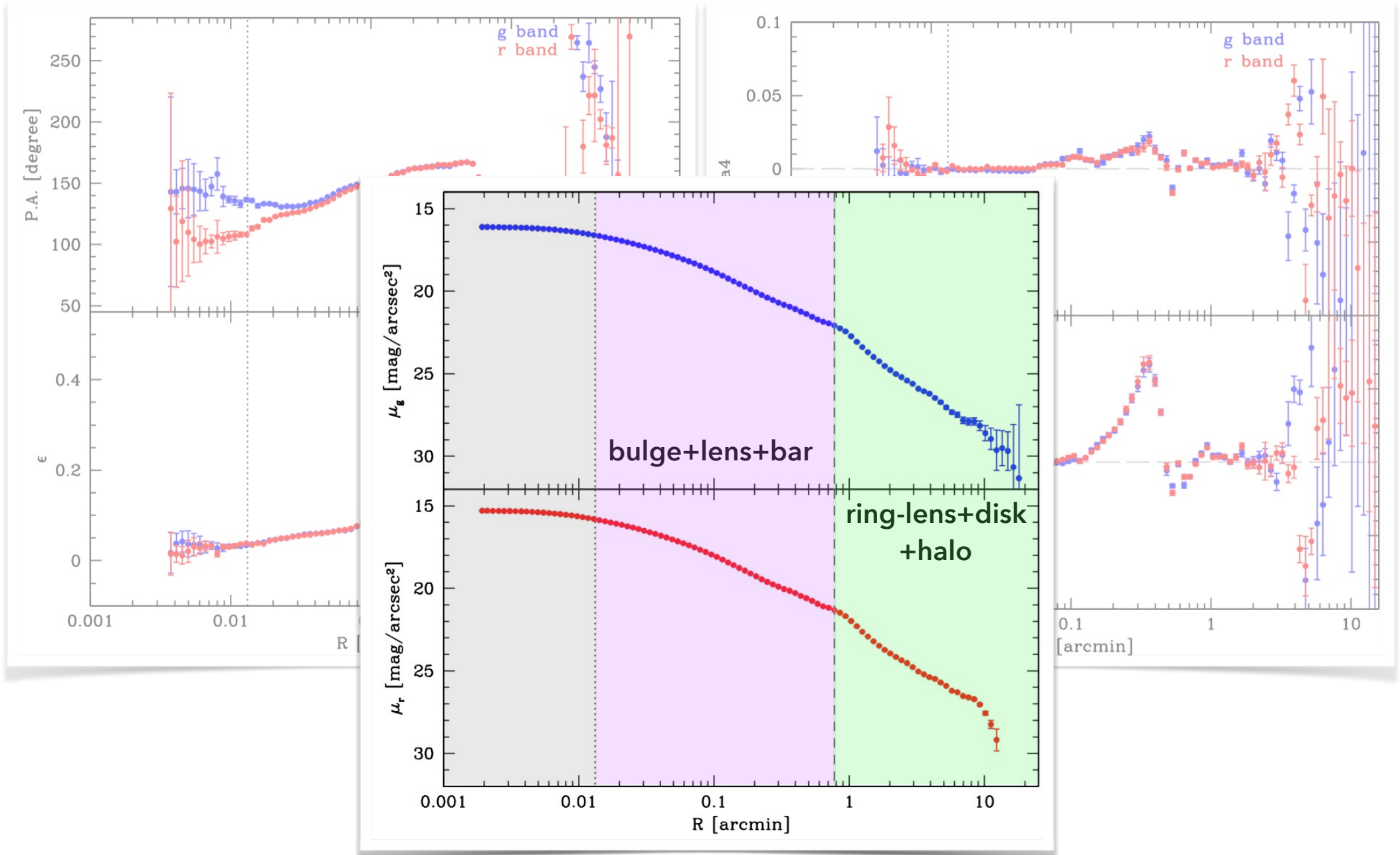
$$46.70 \lesssim R \lesssim 82.58 \text{ arcsec}$$

Photometry - Geometrical Parameters

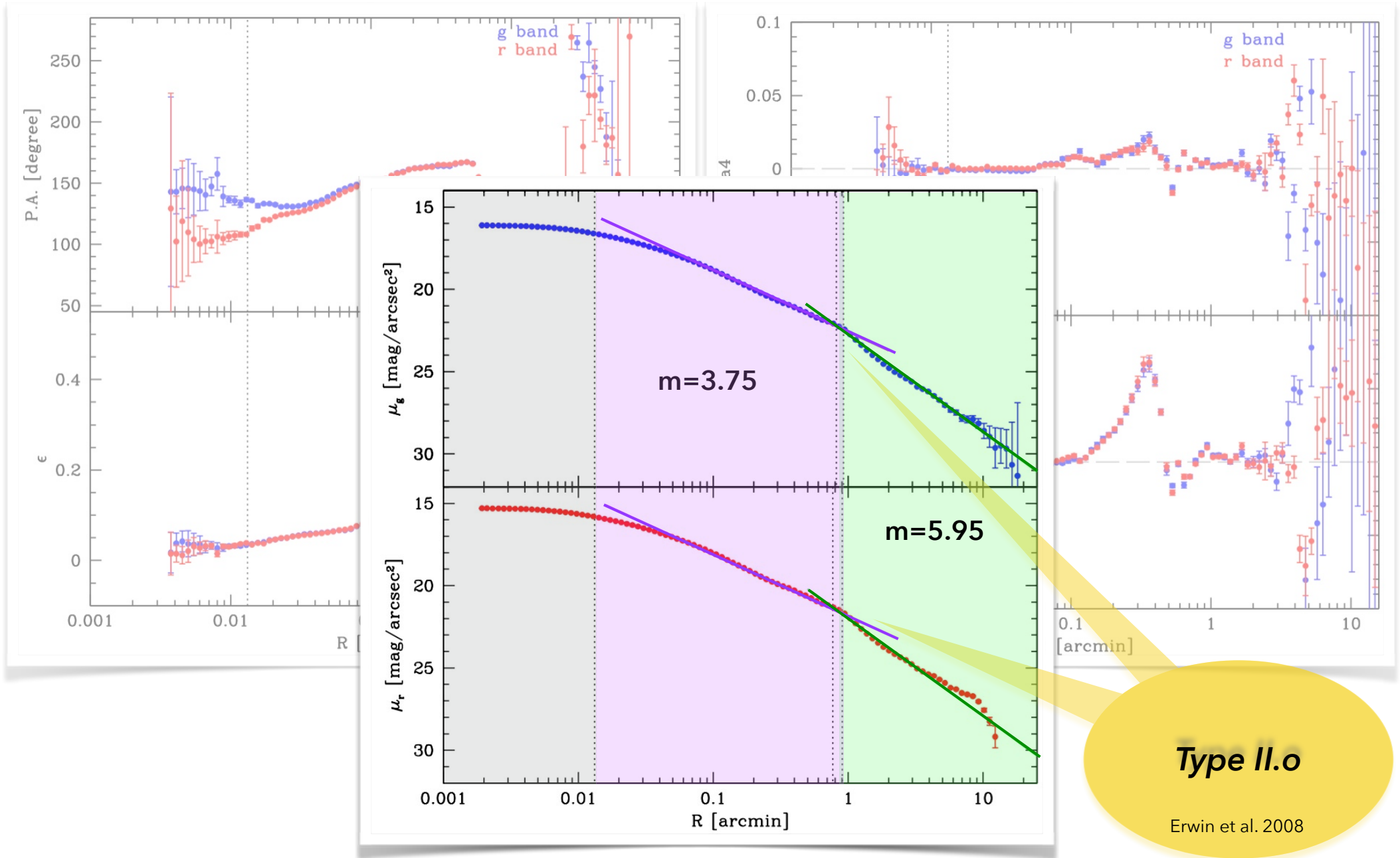


$$82.58 \lesssim R \lesssim 300 \quad \text{arcsec}$$

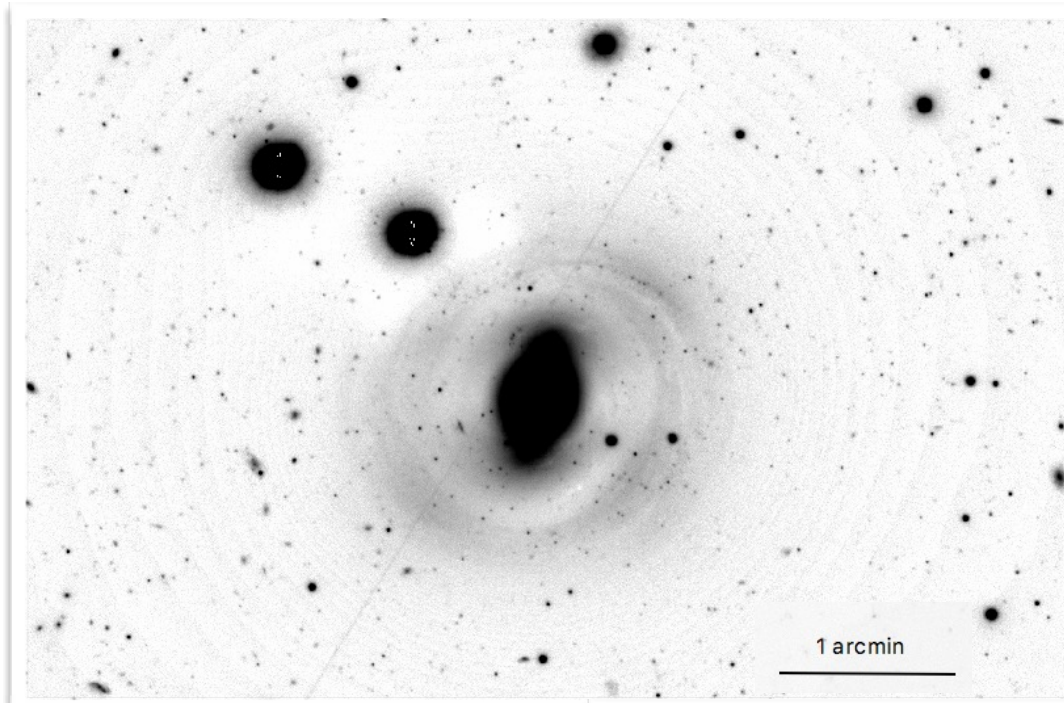
Photometry - Surface Brightness Profile



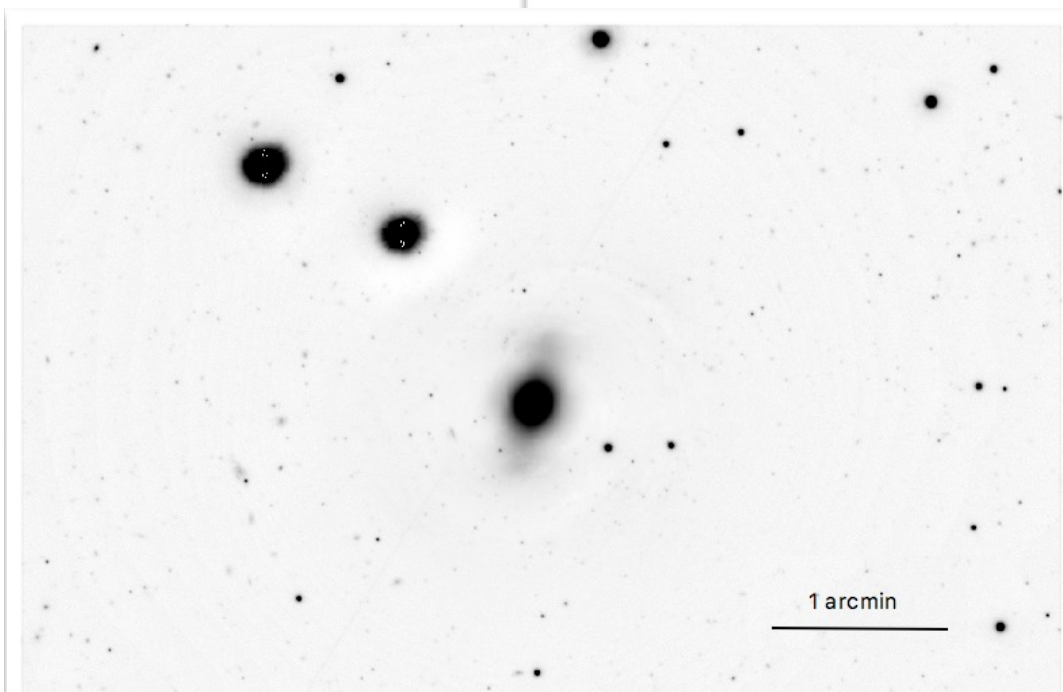
Photometry - Surface Brightness Profile



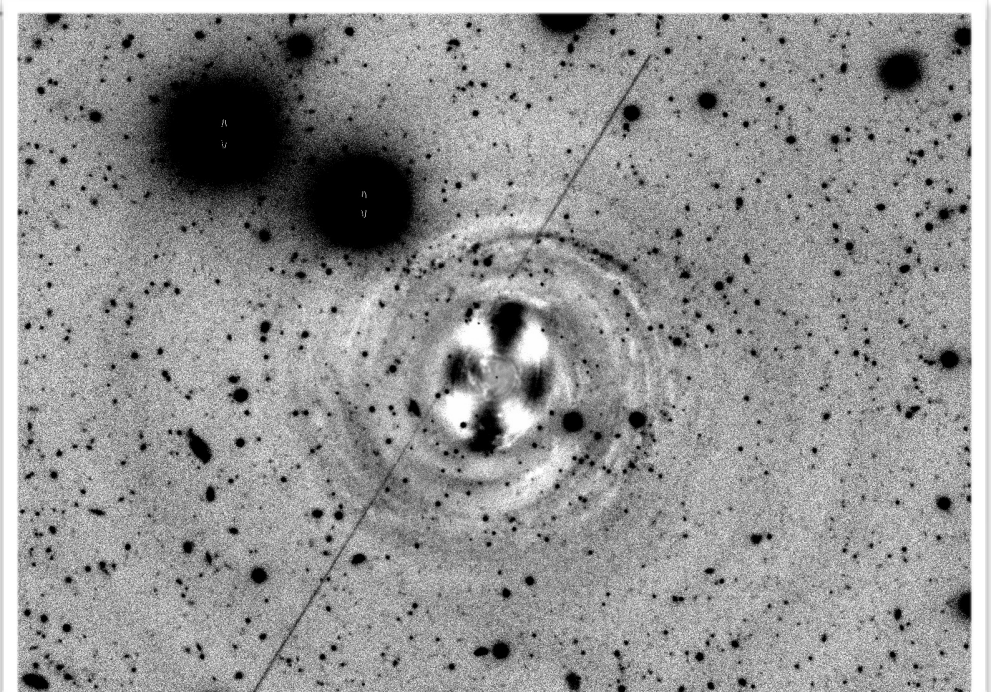
Photometry - Structures



High frequency image with
2D window of 300x300 px

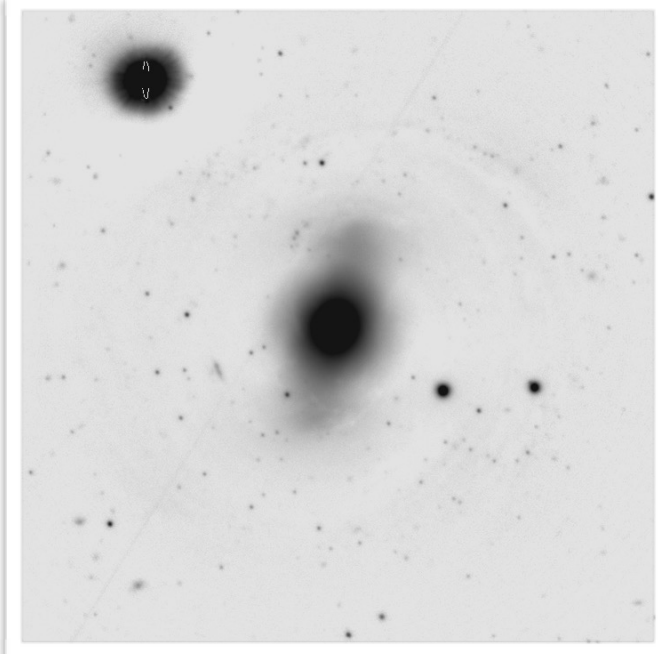
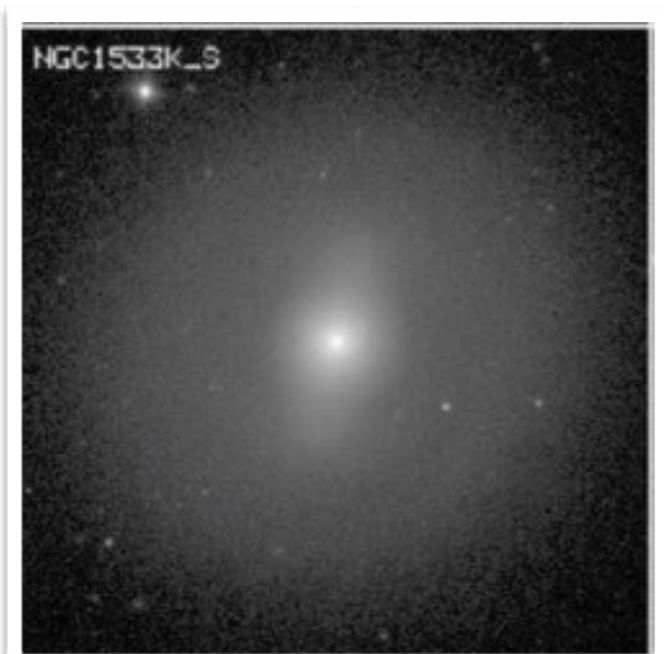


High frequency image with 2D window of 150x150 px

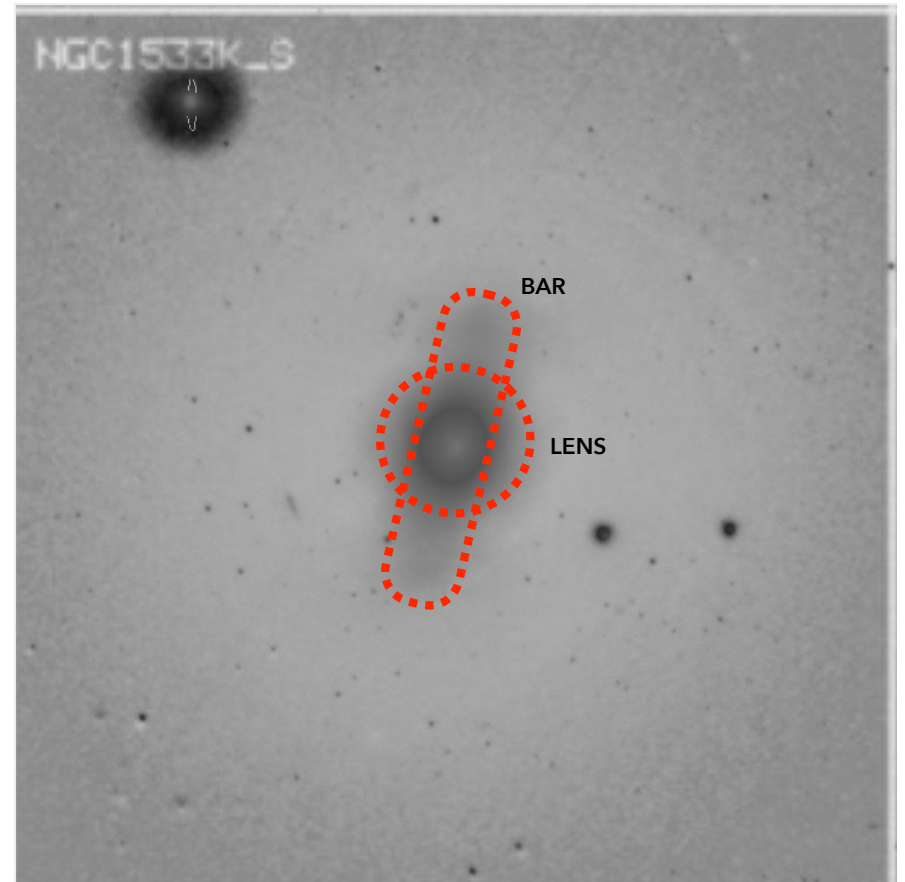


Residual image from 2D model subtraction

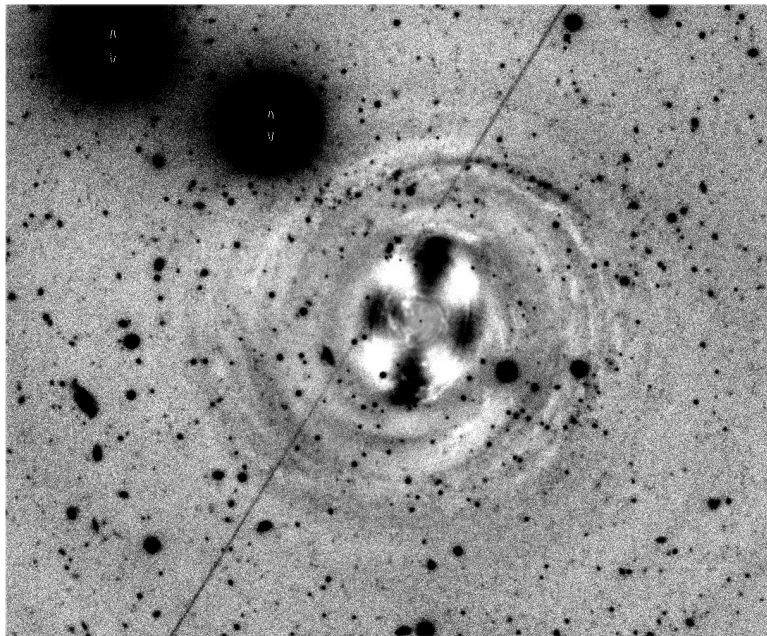
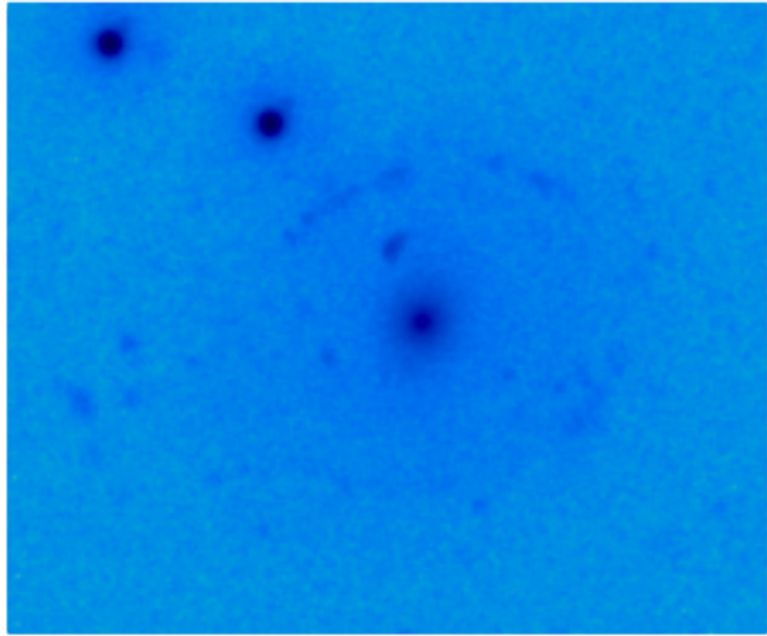
Photometry - Structures



NTT K_s image
overlapped by **high frequency image** with 2D window of 150x150 pxs

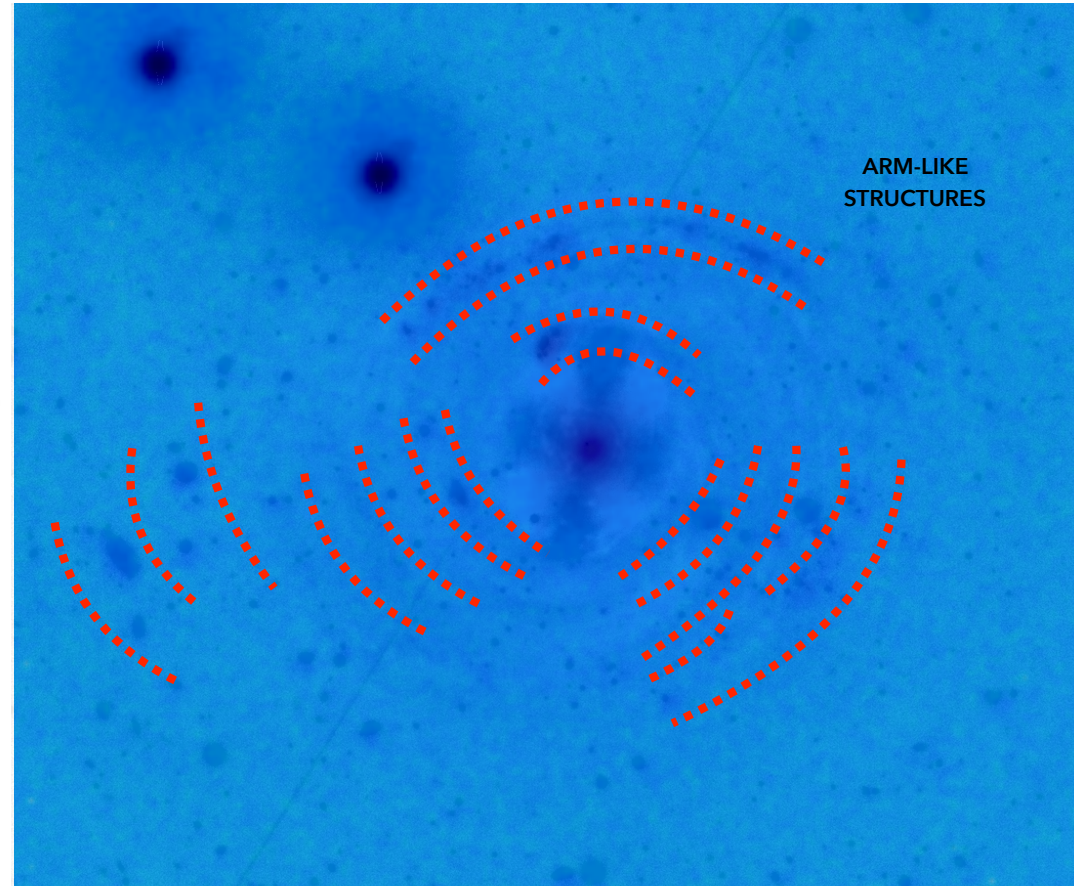


Photometry - Structures



Swift-UVOT W2 image

overlapped by **residual g-band image** from subtraction of 2D model

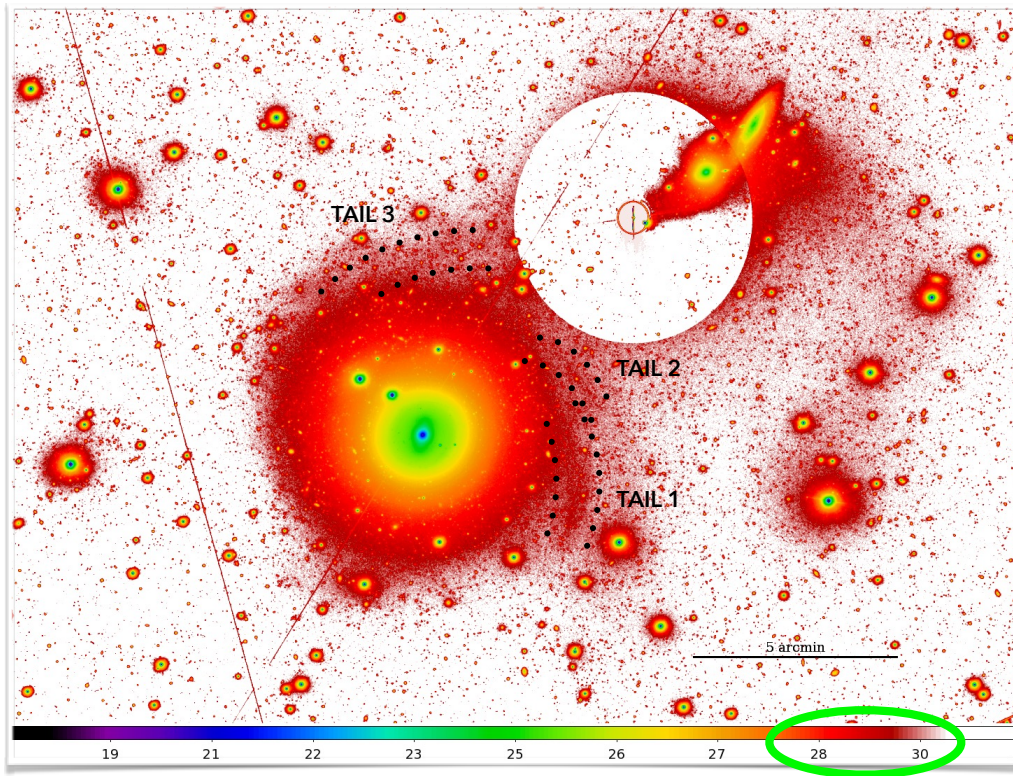


ARM-LIKE
STRUCTURES

Photometry - Structures

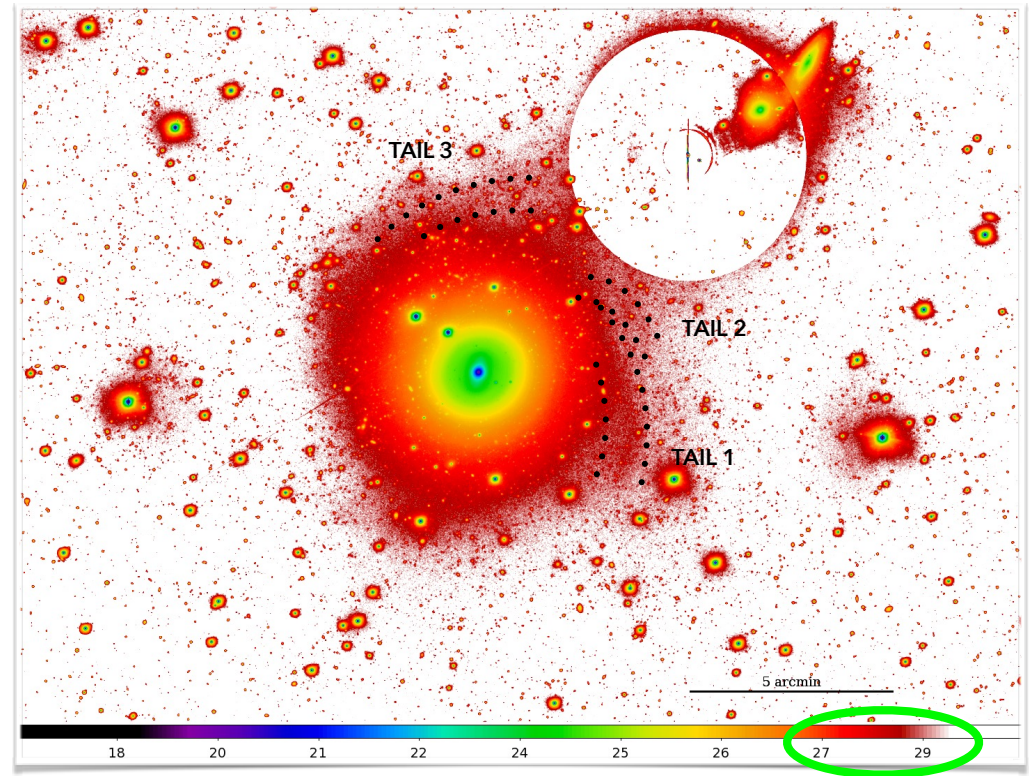
g band

image in units of magnitude, with sky subtraction and subtracted star by 2D model



r band

image in units of magnitude, with sky subtraction and subtracted star by 2D model

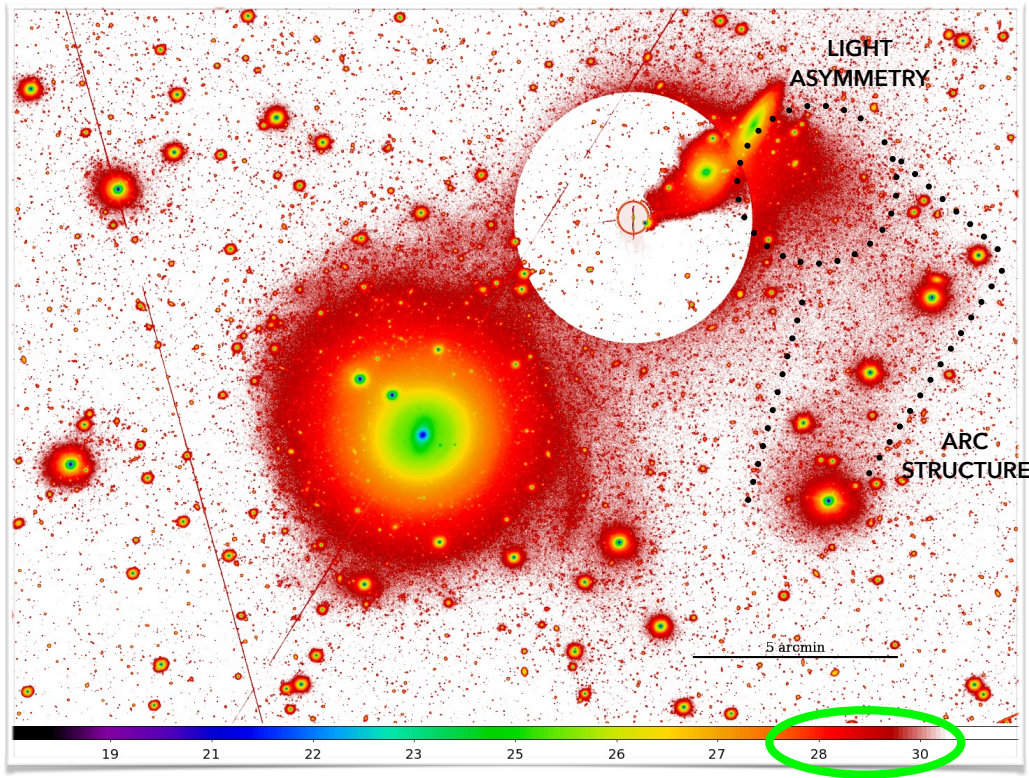


<i>Tail</i>	<i>Centre distance</i> [arcsec]
1	229.27
2	237.02
3	220.34

Photometry - Structures

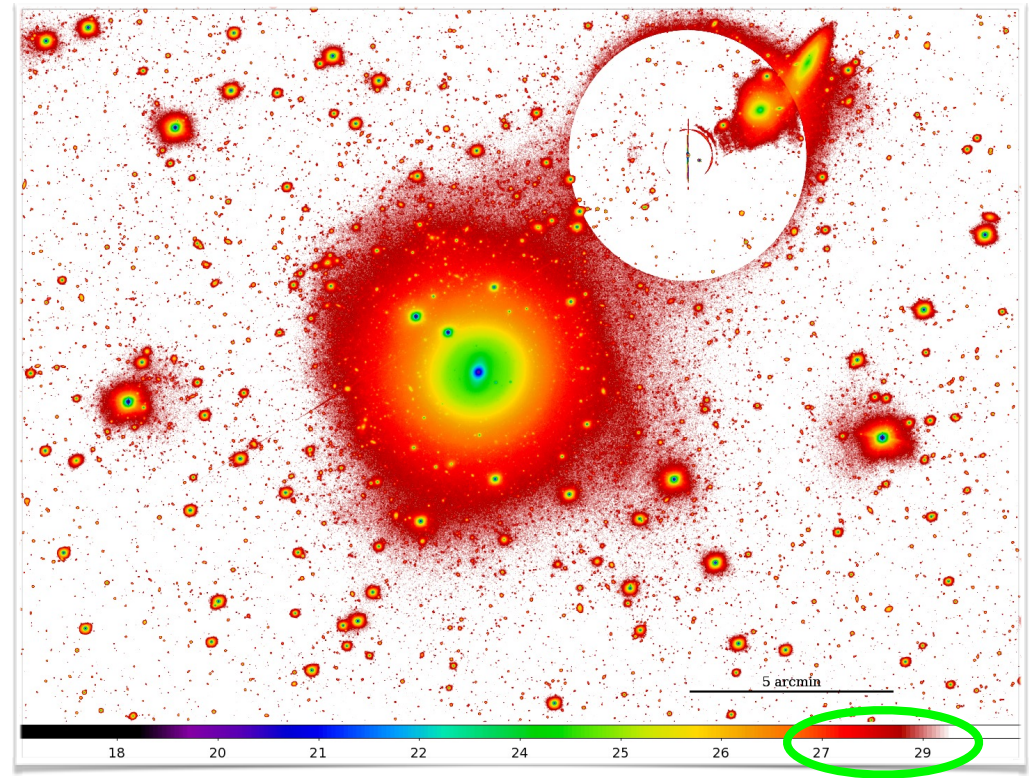
g band

image in units of magnitude, with sky subtraction and subtracted star by 2D model

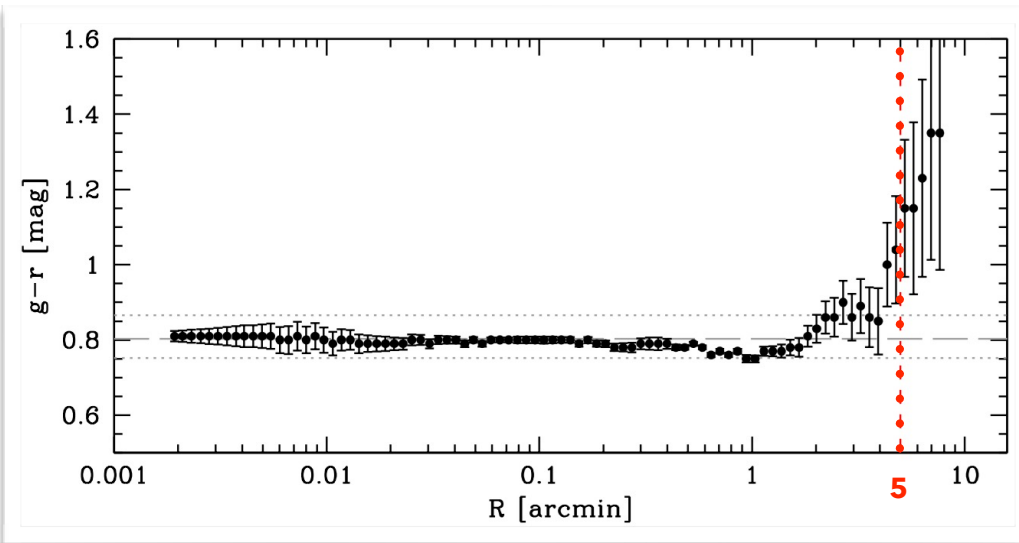


r band

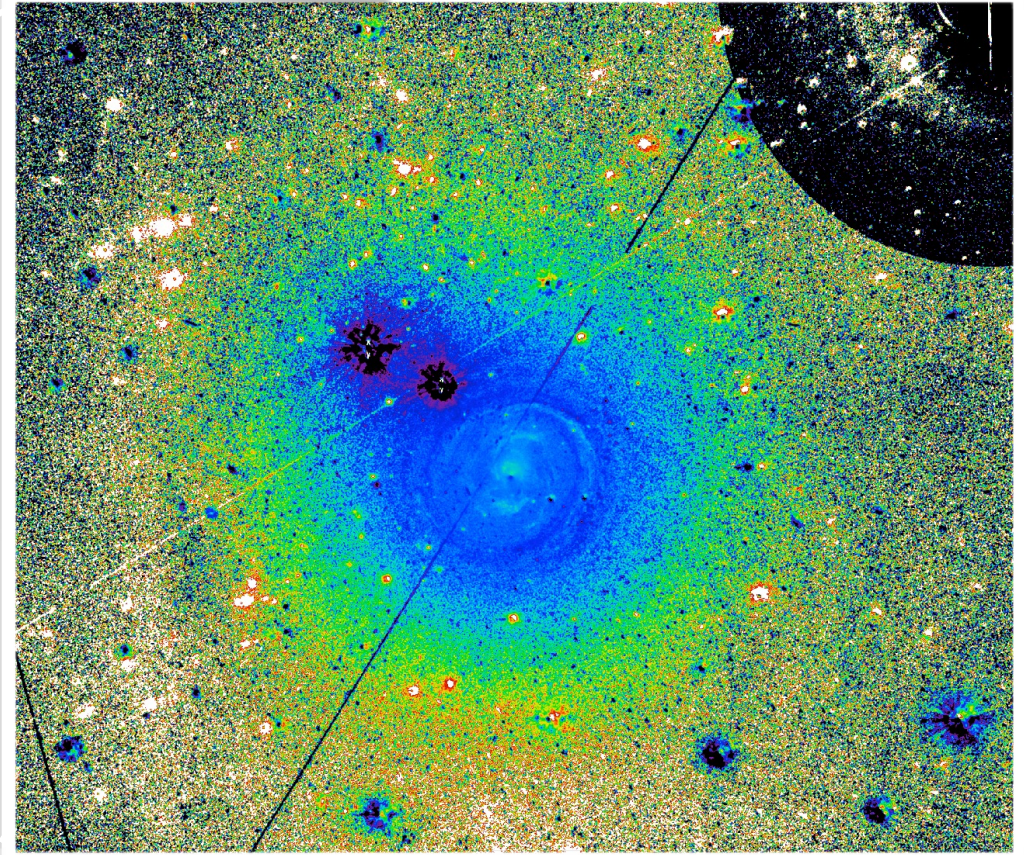
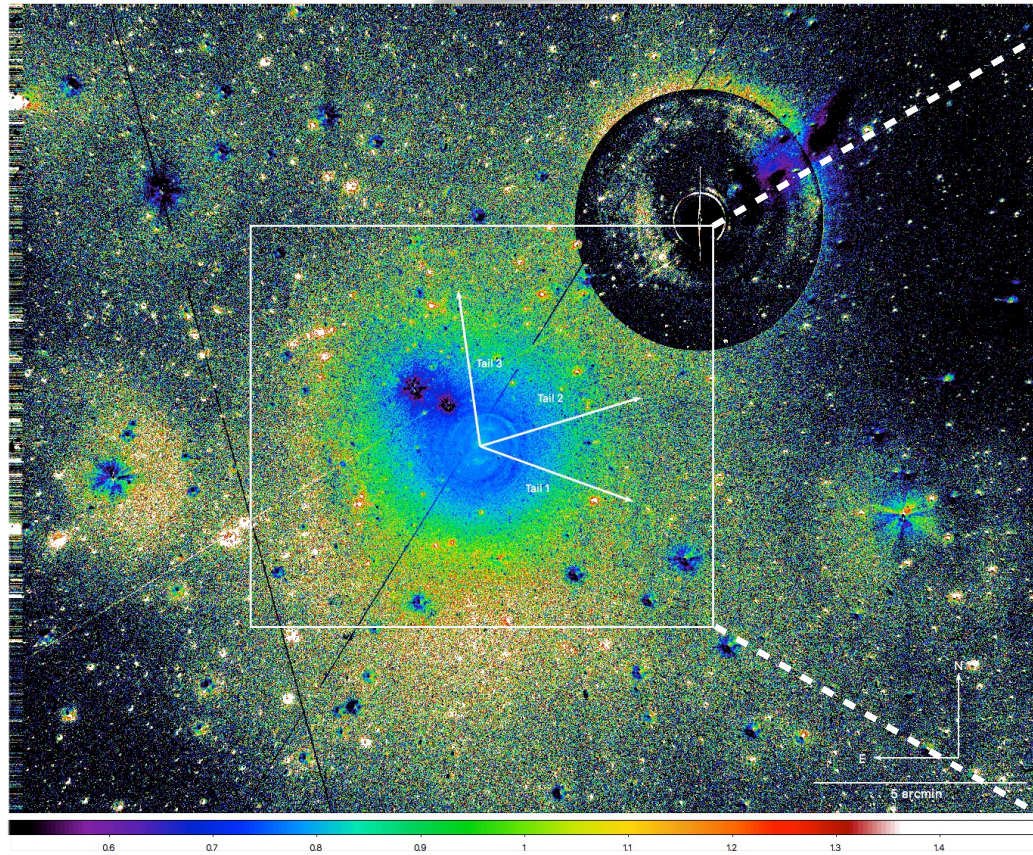
image in units of magnitude, with sky subtraction and subtracted star by 2D model



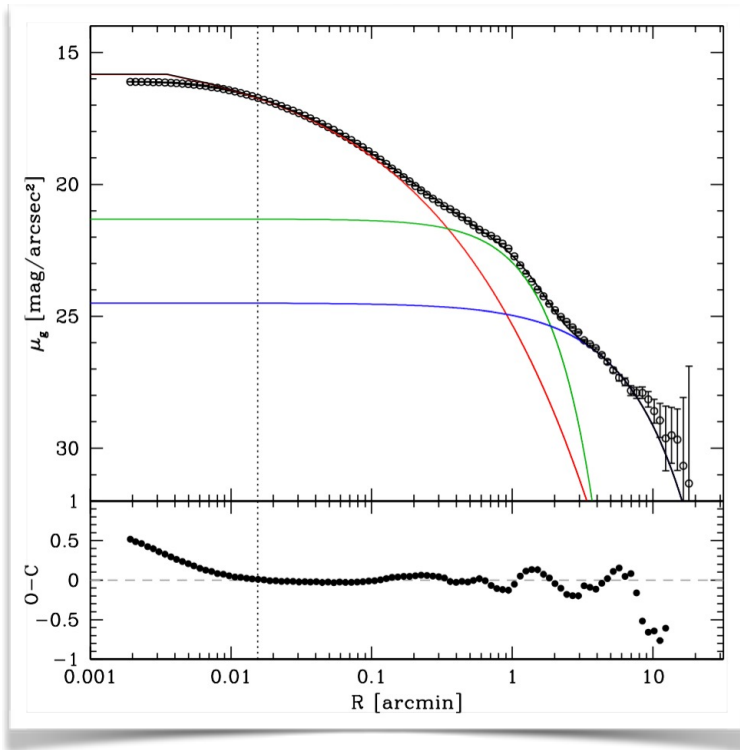
Photometry - Colour profile



$(g-r) = 0.809 \pm 0.057$ mag



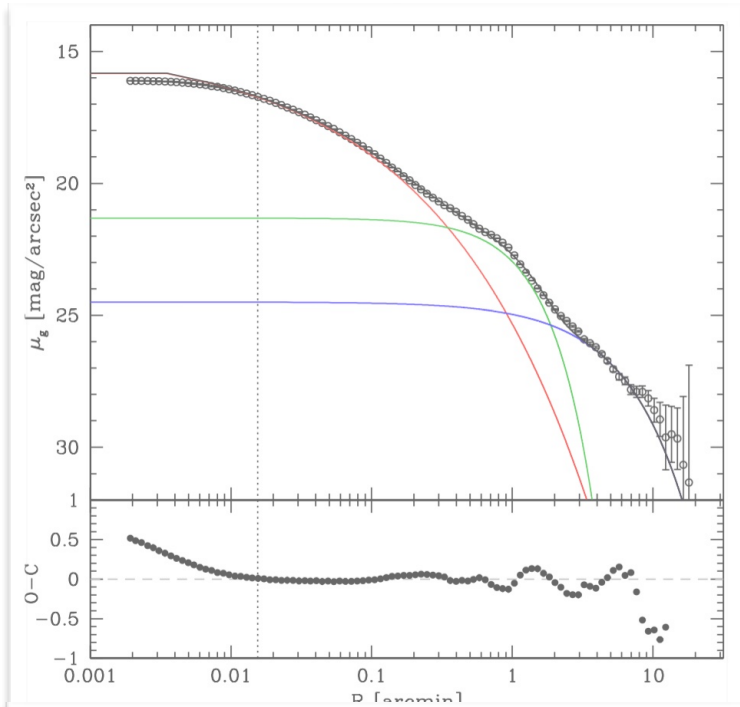
Decomposition



1D decomposition in g band

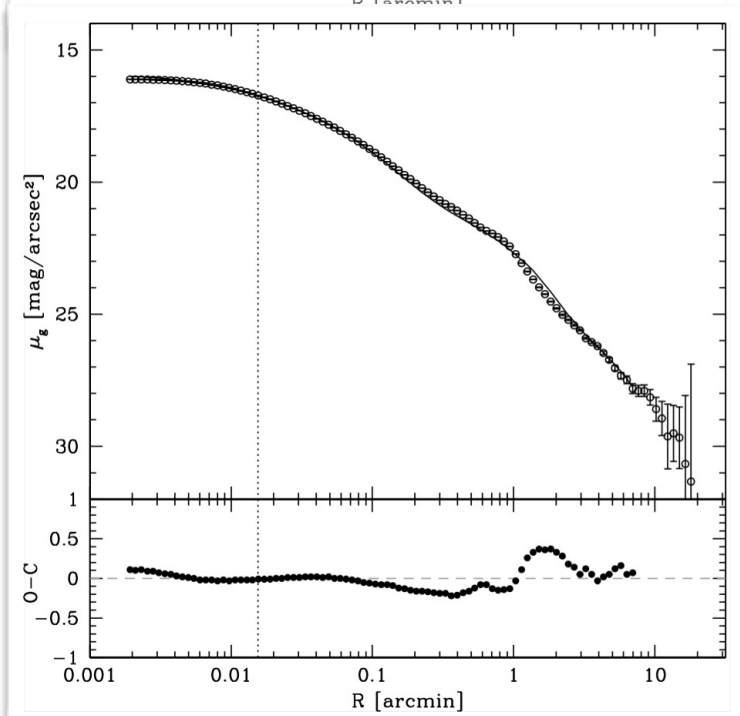
Function	Index	[arcsec]	[mag arcsec ⁻²]
Sérsic	2.5	$r_e=9.5$	$\mu_e=19.8$
Sérsic	0.7	$r_e=47.0$	$\mu_e=22.48$
Exponential		$r_0=140.0$	$\mu_0=24.5$

Decomposition



1D decomposition in g band

Function	Index	[arcsec]	[mag arcsec ⁻²]
Sérsic	2.5	$r_e=9.5$	$\mu_e=19.8$
Sérsic	0.7	$r_e=47.0$	$\mu_e=22.48$
Exponential		$r_0=140.0$	$\mu_0=24.5$



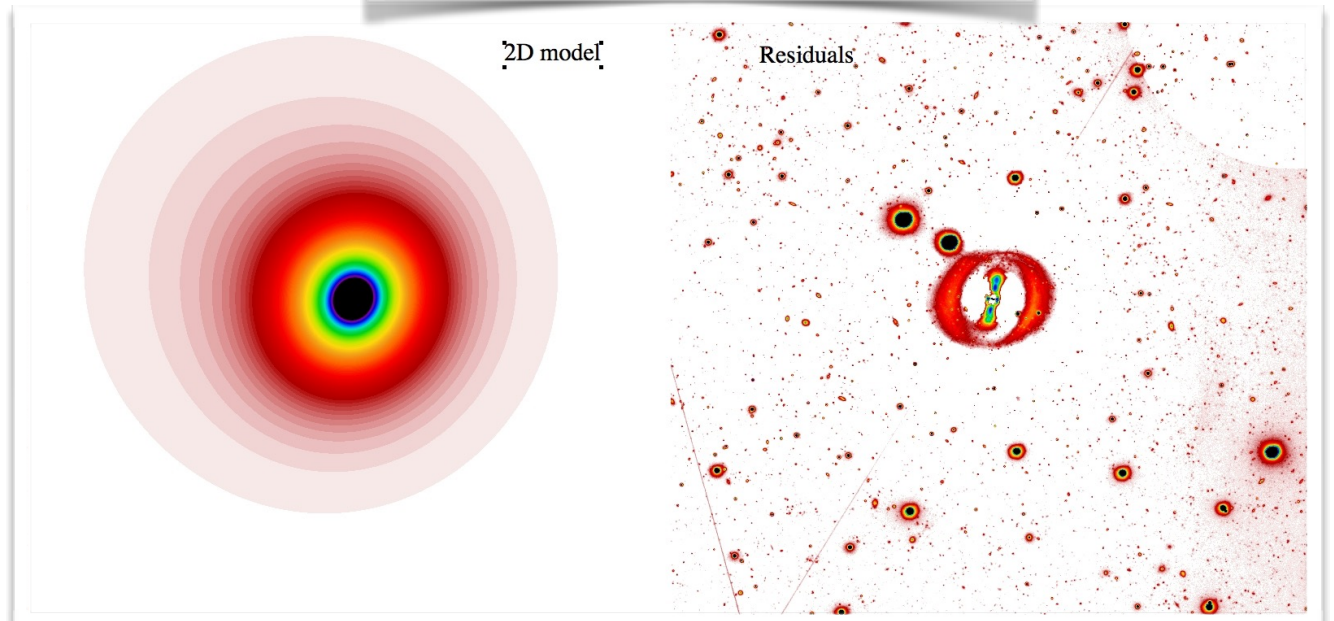
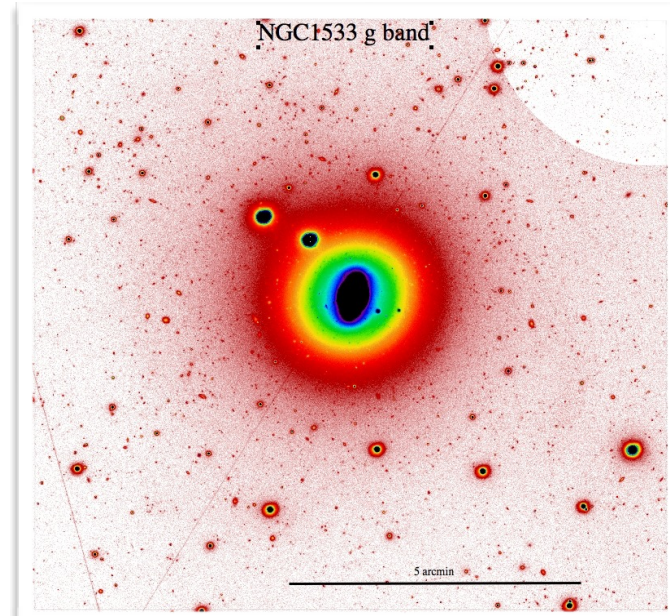
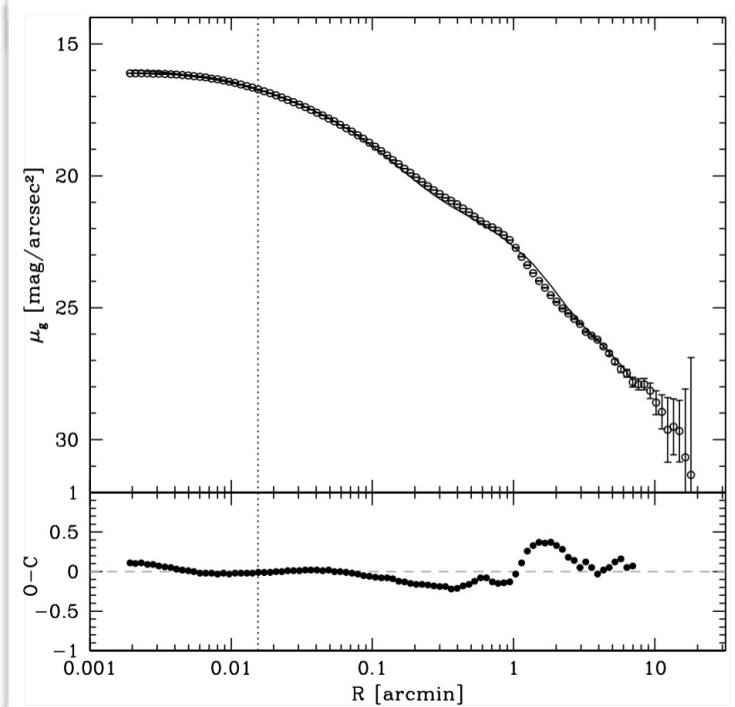
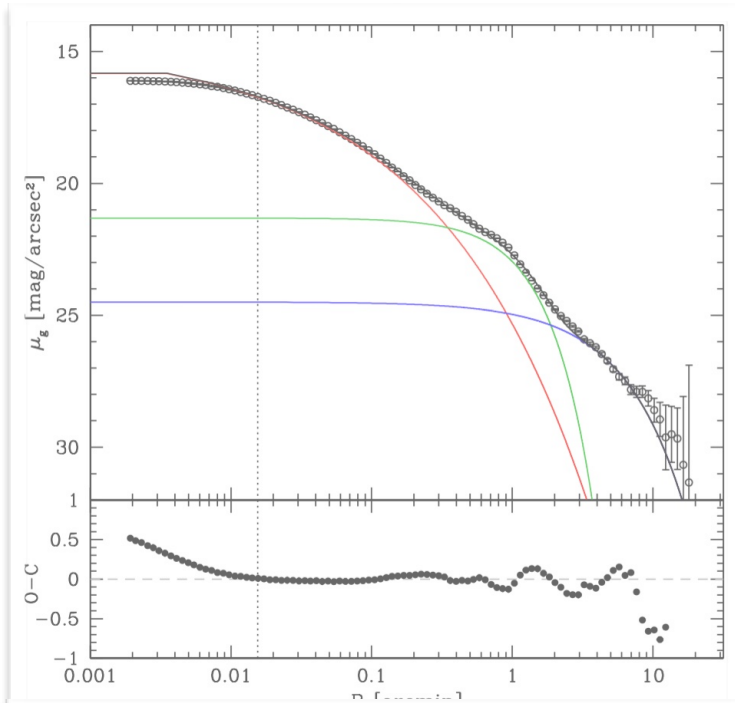
2D decomposition in g band using GALFIT

Function	Index	[arcsec]	[mag]
Sérsic	1.7	$r_e=5.76$	$m_e=12.31$
Exponential		$r_0=30.32$	$m_0=11.32$
Exponential (fix)		$r_0=140.00$	$m_0=11.77$

Using a mask and considering the mean value of the residual sky-subtraction fluctuations

Decomposition

2D decomposition in g band using GALFIT



Decomposition

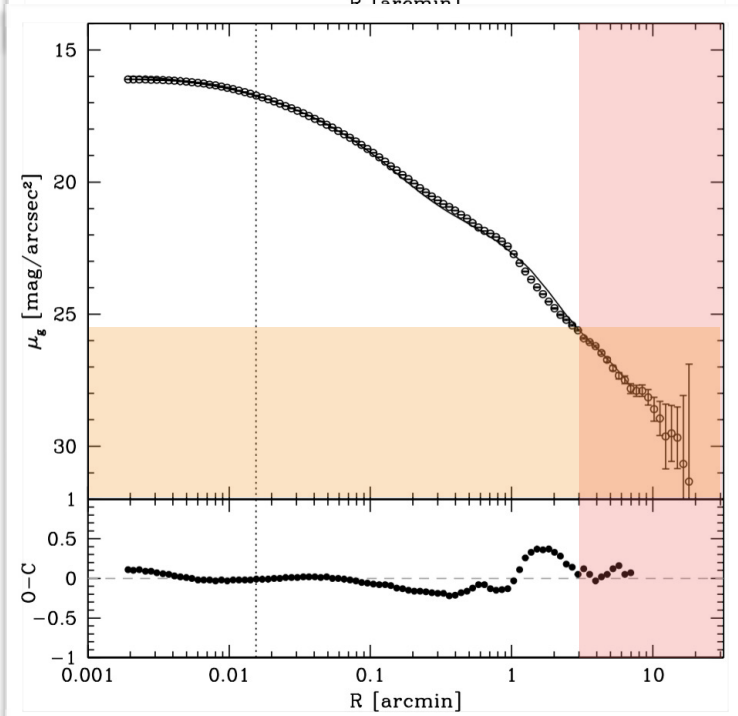
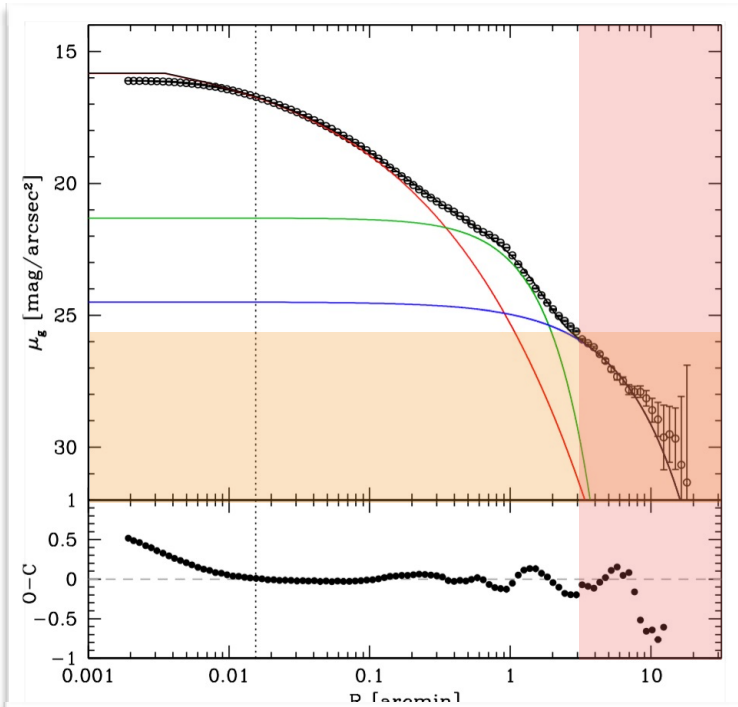
1D decomposition in g band

Function	Index	[arcsec]	[mag arcsec ⁻²]
Sérsic	2.5	$r_e=9.5$	$\mu_e=19.8$
Sérsic	0.7	$r_e=47.0$	$\mu_e=22.48$
Exponential		$r_0=140.0$	$\mu_0=24.5$

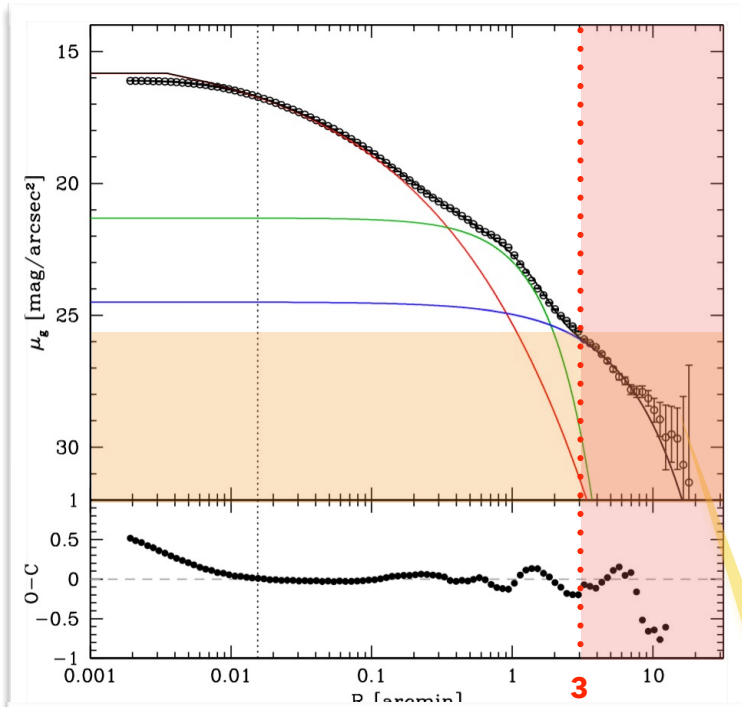
2D decomposition in g band using GALFIT

Function	Index	[arcsec]	[mag]
Sérsic	1.7	$r_e=5.76$	$m_e=12.31$
Exponential		$r_0=30.32$	$m_0=11.32$
Exponential (fix)		$r_0=140.00$	$m_0=11.77$

Using a mask and considering the mean value of the residual sky-subtraction fluctuations

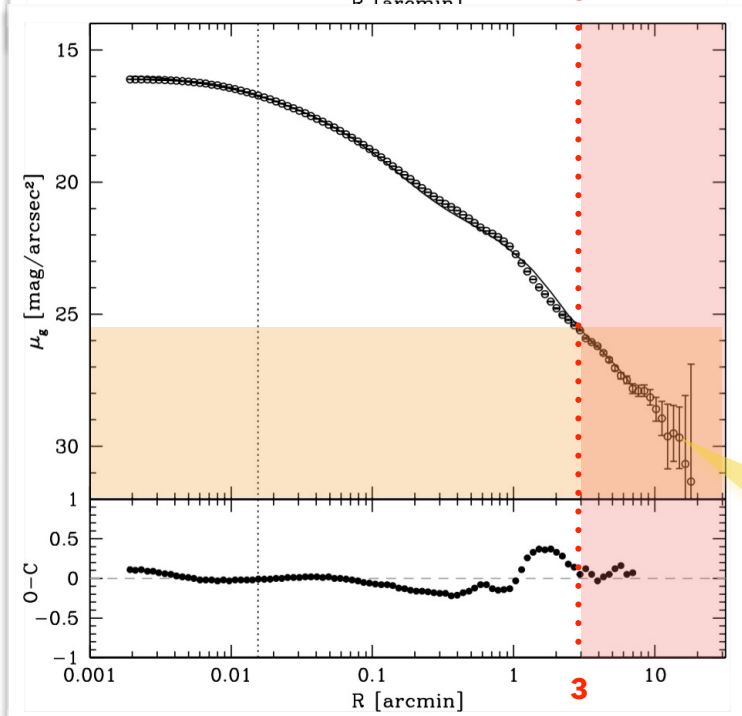


Decomposition



1D decomposition in g band

Function	Index	[arcsec]	[mag arcsec ⁻²]
Sérsic	2.5	$r_e=9.5$	$\mu_e=19.8$
Sérsic	0.7	$r_e=47.0$	$\mu_e=22.48$
Exponential		$r_0=140.0$	$\mu_0=24.5$



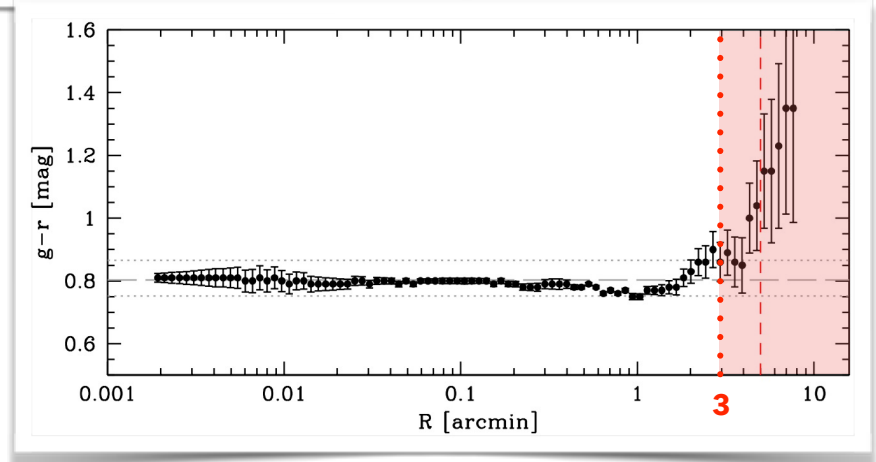
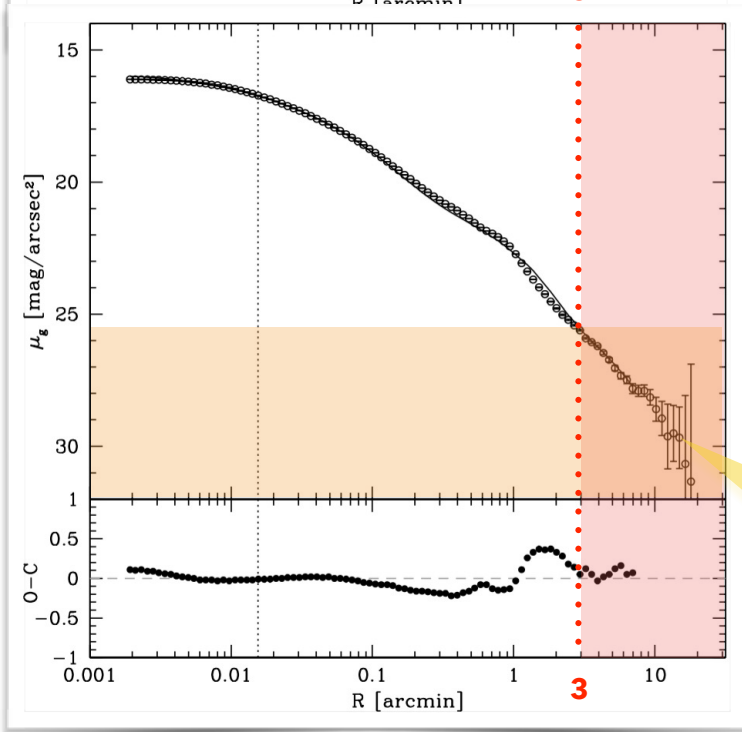
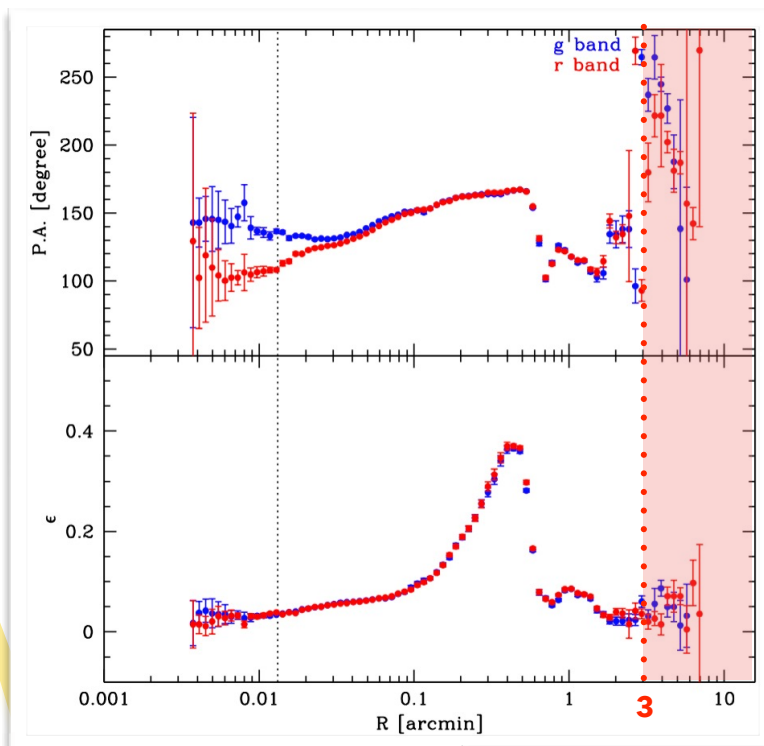
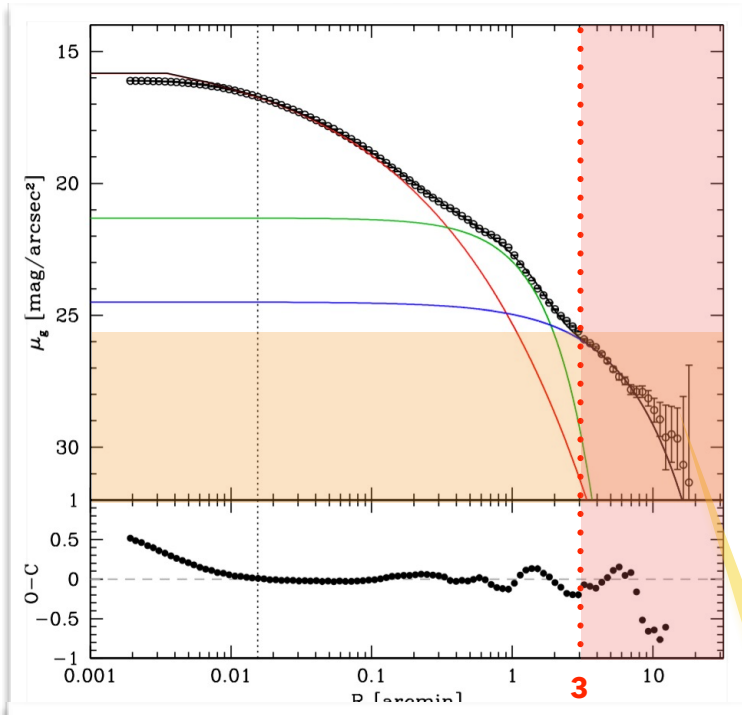
2D decomposition in g band using GALFIT

Function	Index	[arcsec]	[mag]
Sérsic	1.7	$r_e=5.76$	$m_e=12.31$
Exponential		$r_0=30.32$	$m_0=11.32$
Exponential (fix)		$r_0=140.00$	$m_0=11.77$

Using a mask and considering the mean value of the residual sky-subtraction fluctuations

Stellar halo component!
Iodice et al. 2016

Decomposition

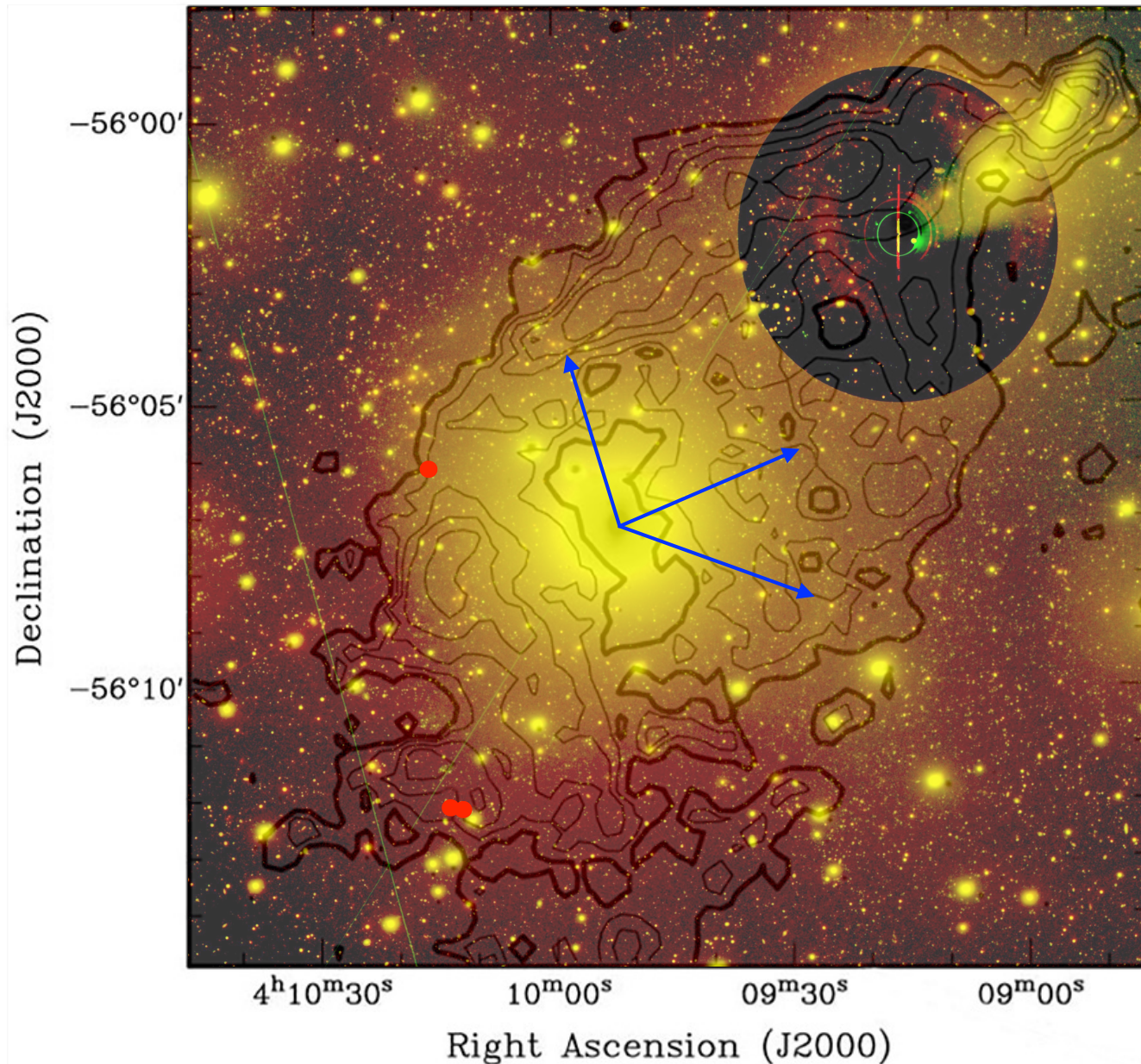


Stellar halo component!
Iodice et al. 2016



~~Type II-o~~ Type II+III-s
Erwin et al. 2008

Conclusion - Colour composite and HI map



- NGC 1533 imaged in 21-cm with the ATCA
- HI associates with IC2038 (northern companion)
- NW and SE cloud
- Total HI mass of the system is $7 \times 10^9 M_{\odot}$
- Radius of HI ring is from 2' to 11.7' from the optical center of NGC 1533
- 3 confirmed $H\alpha$ very small isolated emission line regions in SE part (red dots); from SINGG

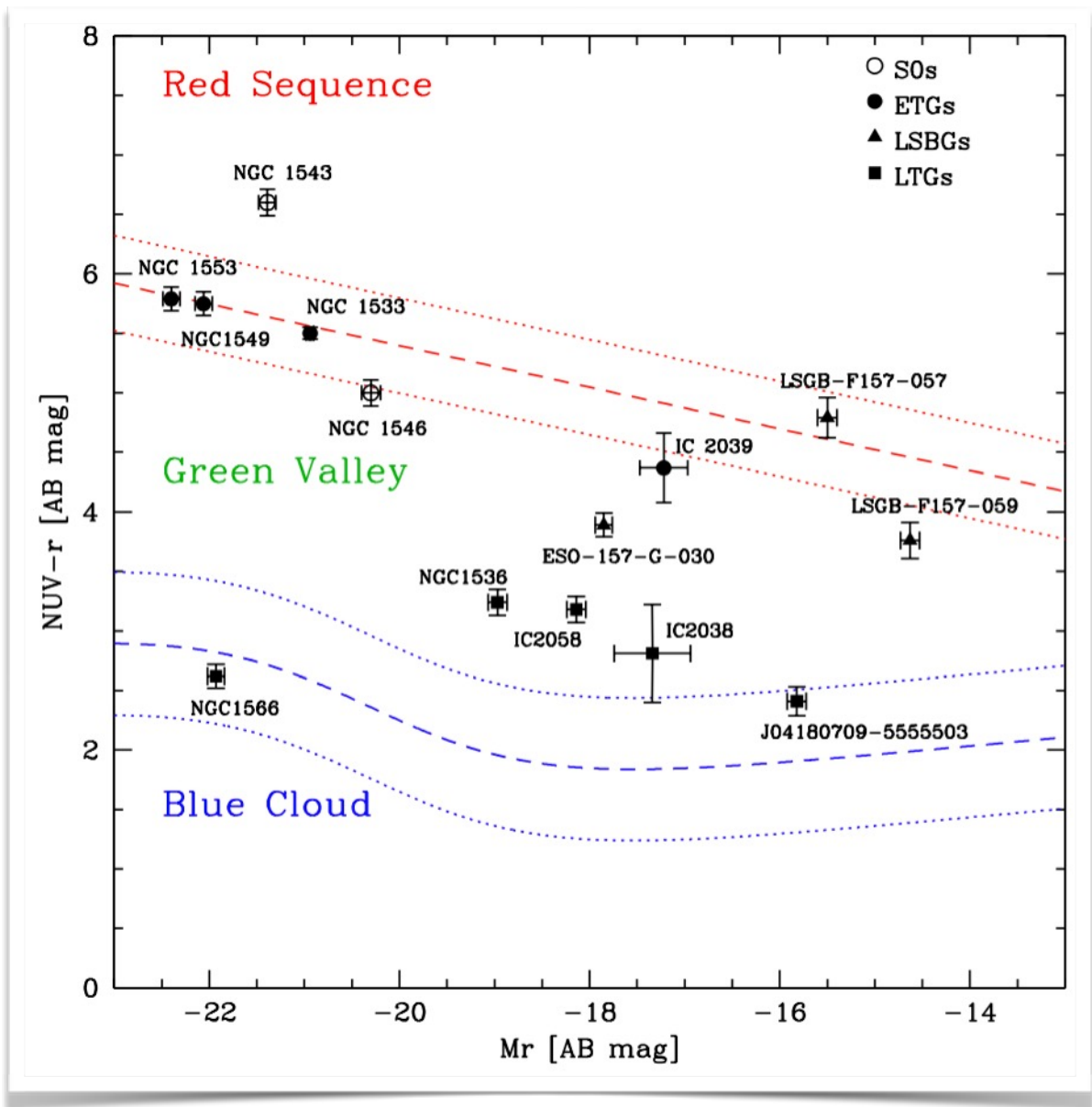
**Galactic recycling:
the HI ring around NGC 1533**

Ryan-Weber, Webster & Bekki, 2003

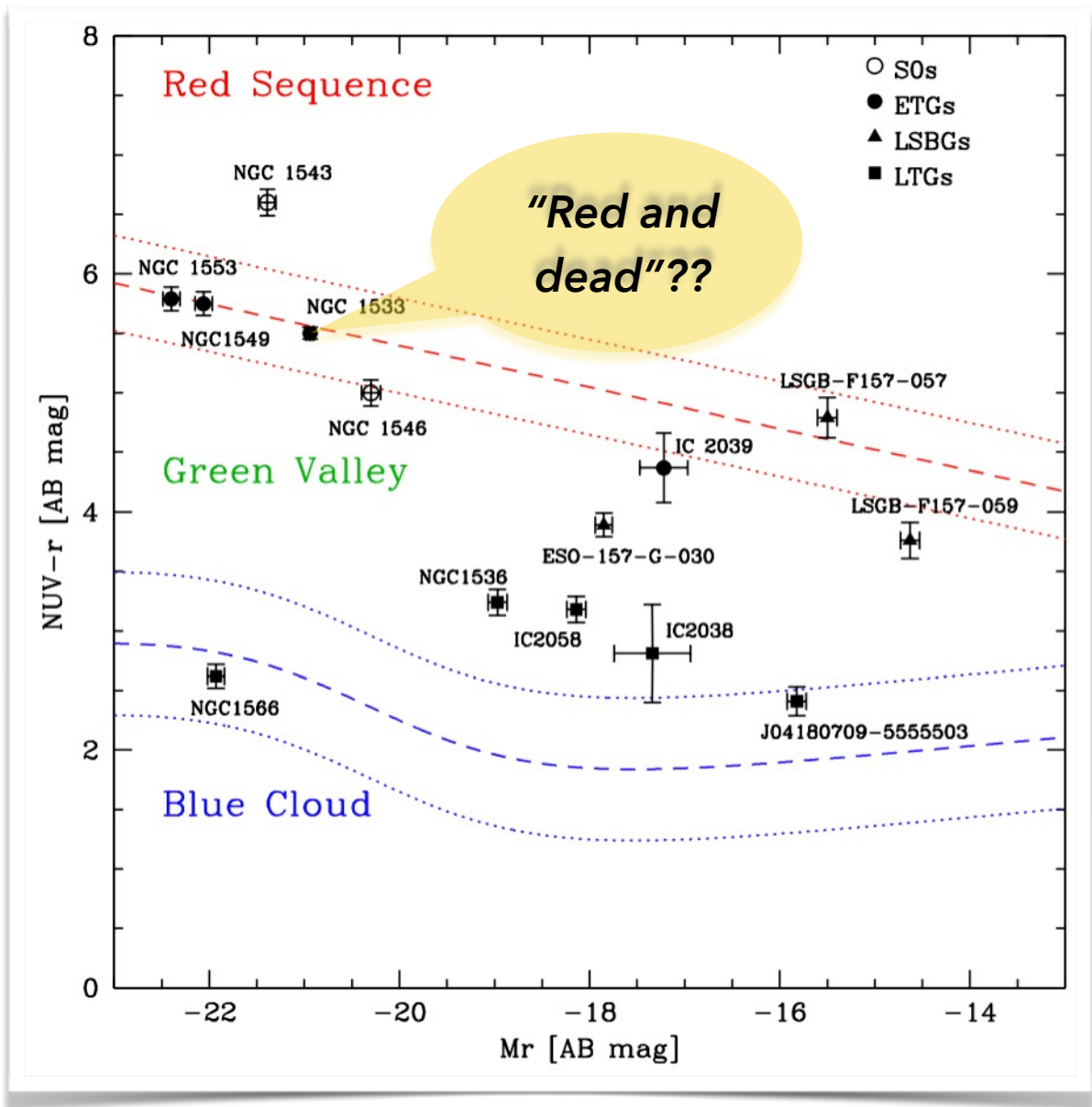
ATCA HI contours are 1.0 (bold), 1.5, 2.0, 2.5 and $3.0 \times 10^{20} \text{ cm}^{-2}$ and have a resolution of about 1'

Werk et al, 2008

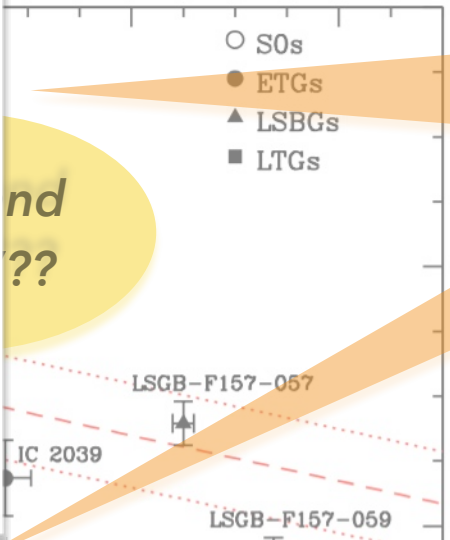
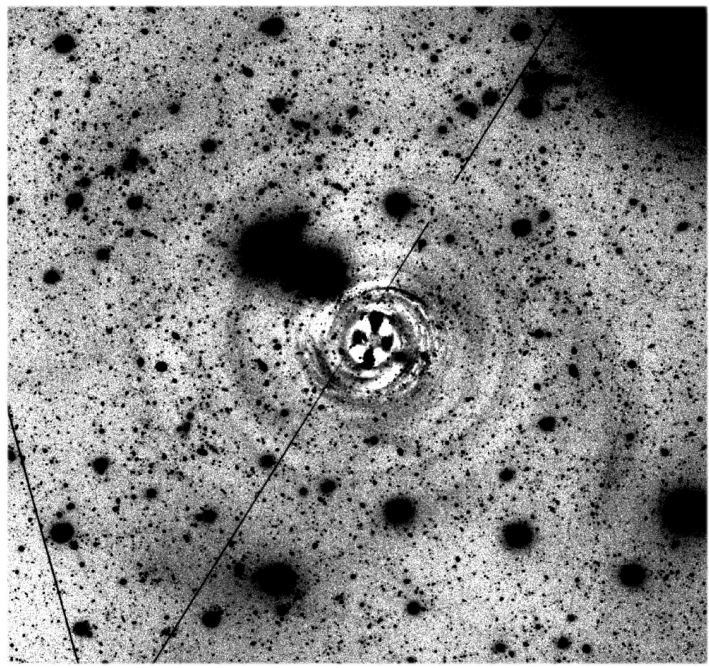
Conclusion - Colour Magnitude Diagram



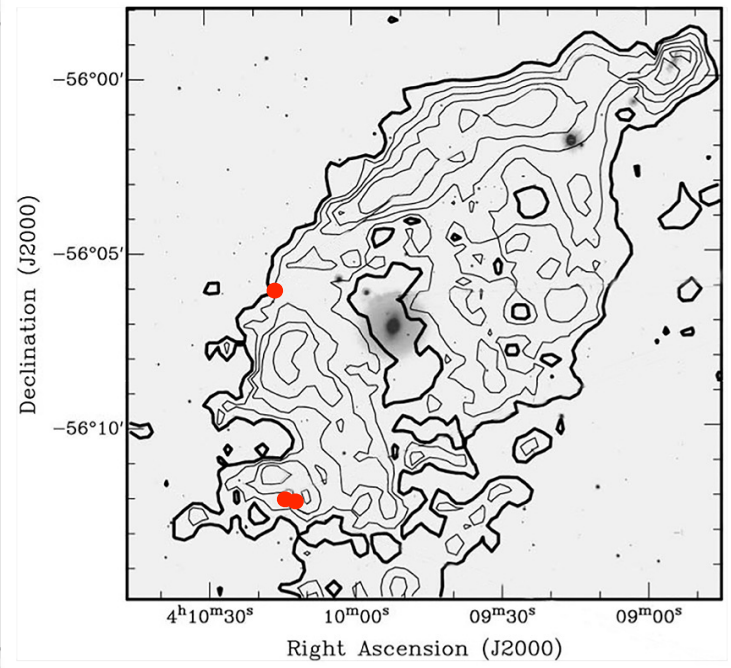
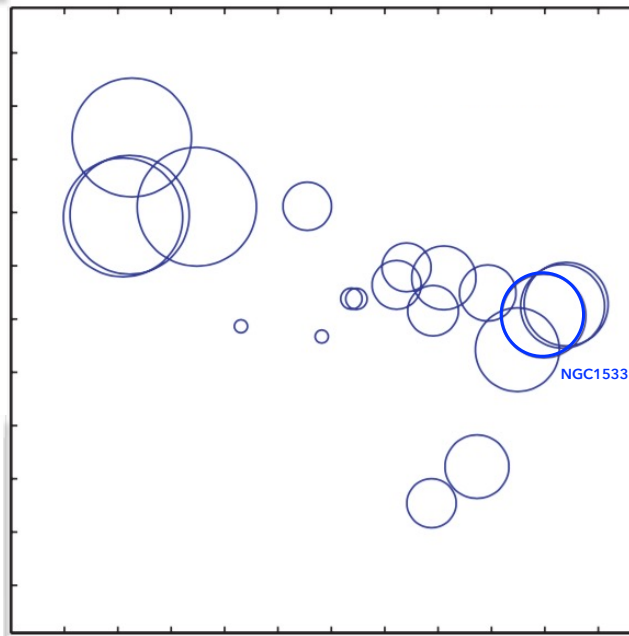
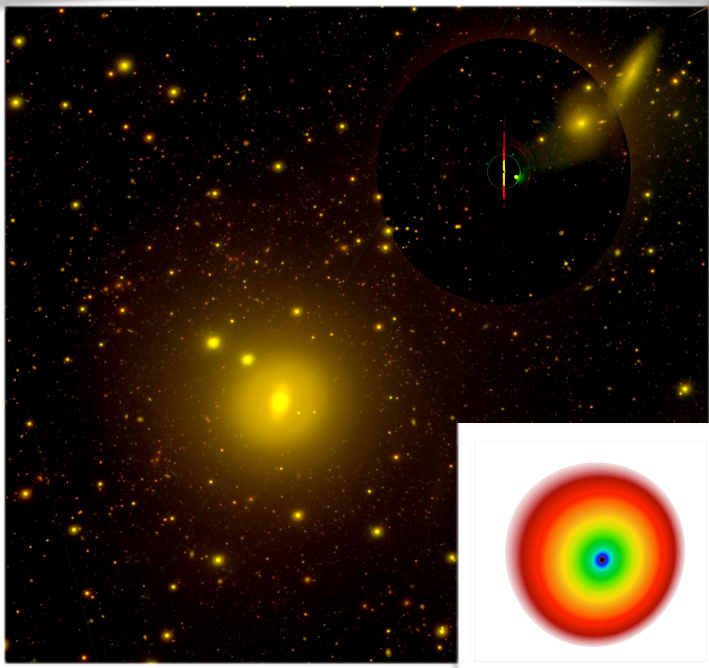
Conclusion - Colour Magnitude Diagram



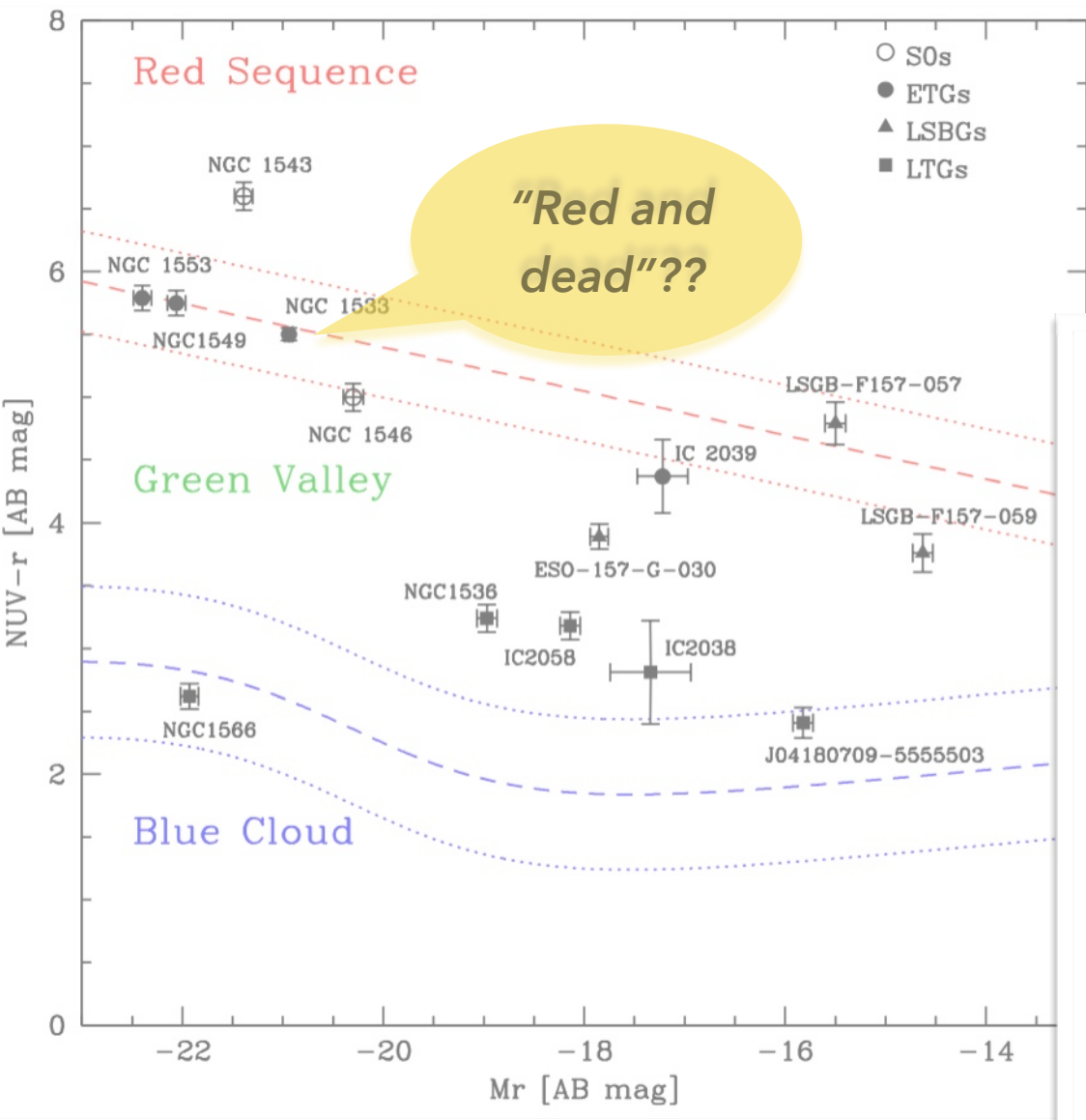
Conclusion - Colour Magnitude Diagram



- Light asymmetries
- Faint spiral-like structures
- UV emission regions
- HI ring
- Connection with IC2038

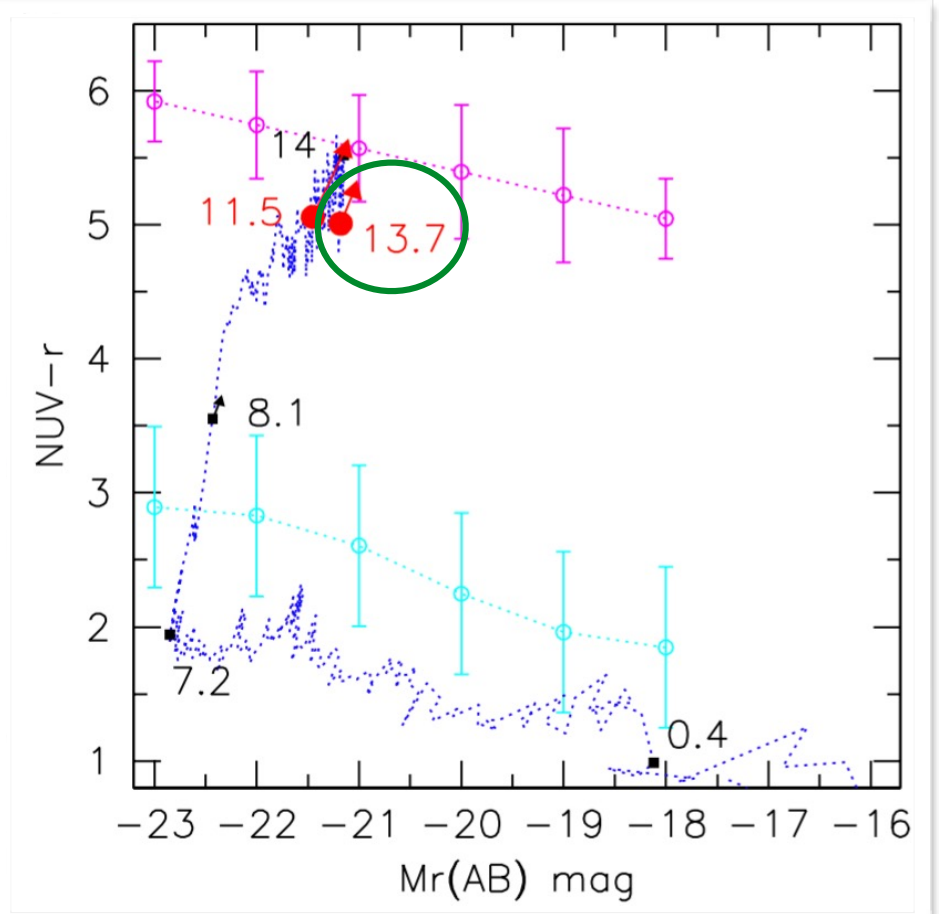


Conclusion - Colour Magnitude Diagram

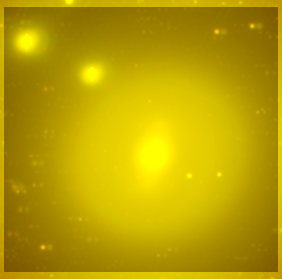
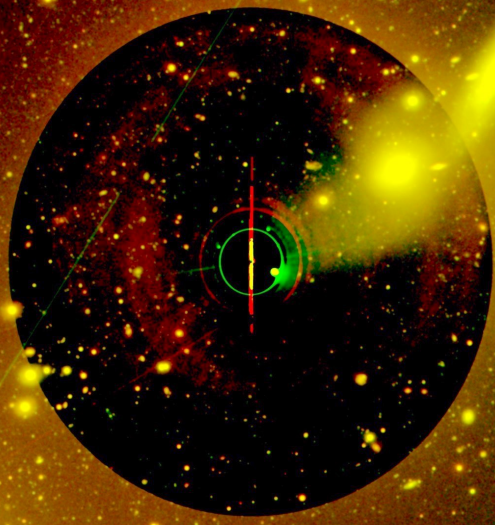


Catching Spiral-S0 transition in groups?
 Insights from SPH simulations with
 chemo-photometric implementation

Mazzei et al, 2014



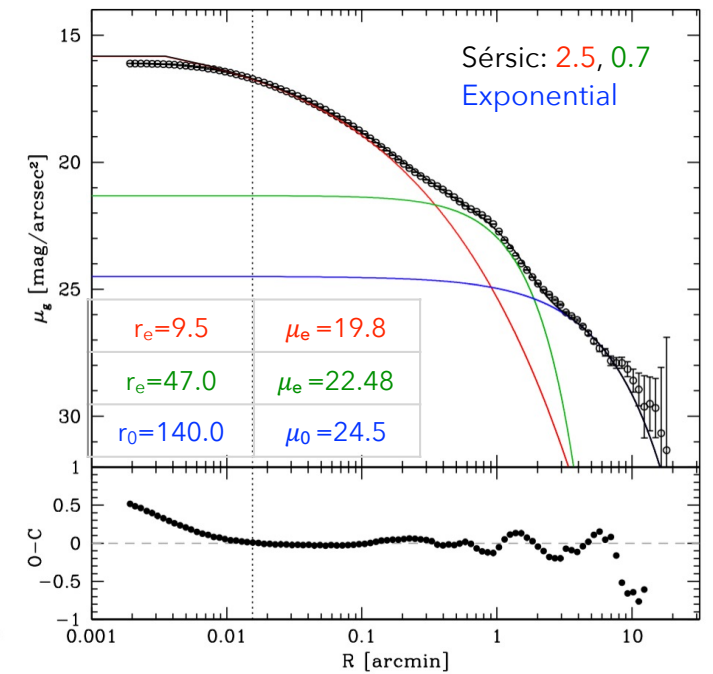
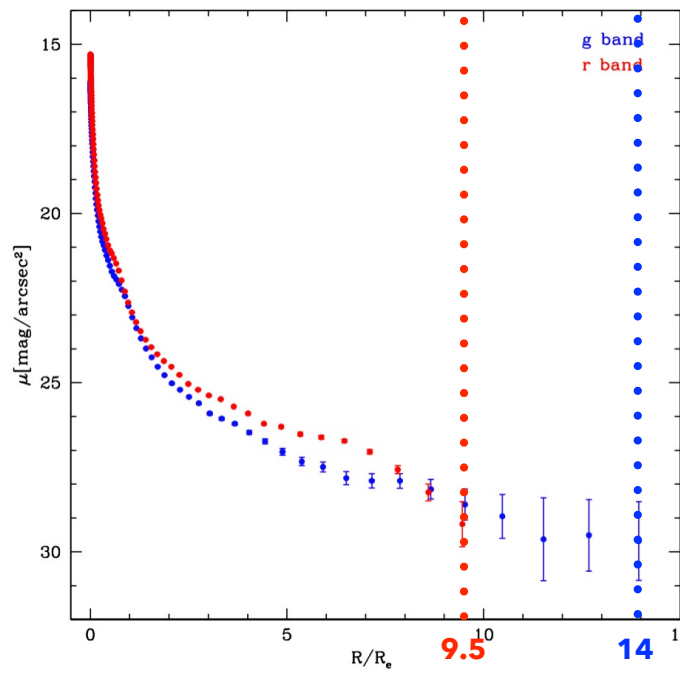
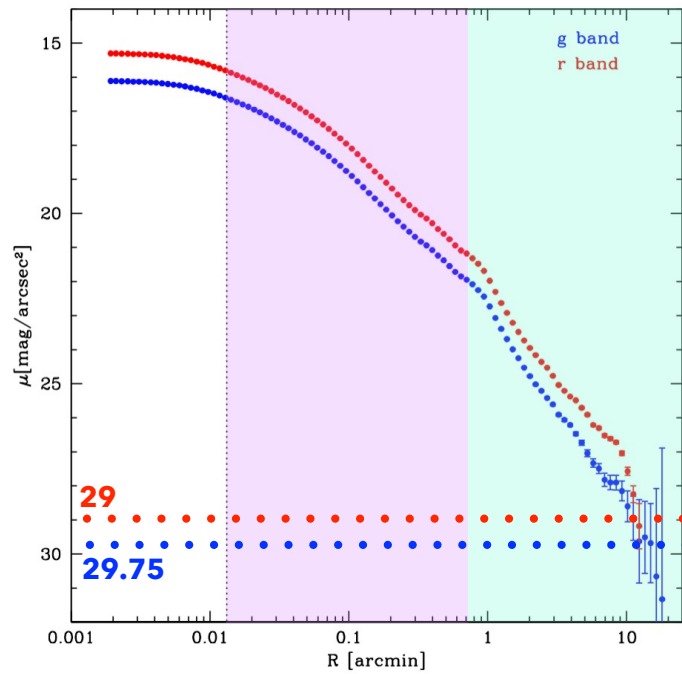
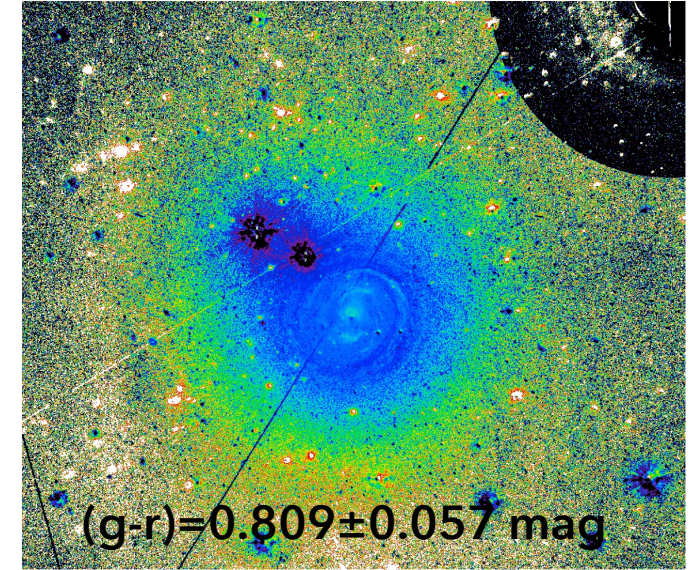
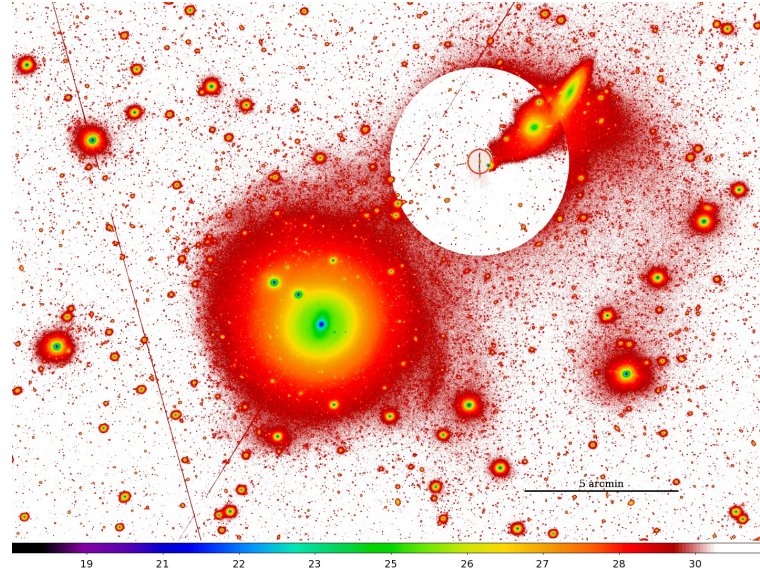
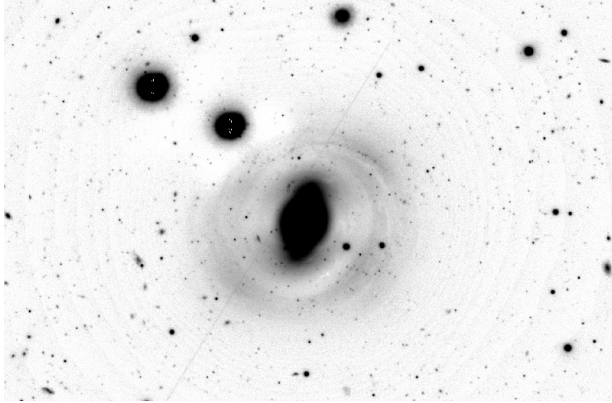
Thanks for



your attention!

Conclusion - Results

(RL)SB0⁰



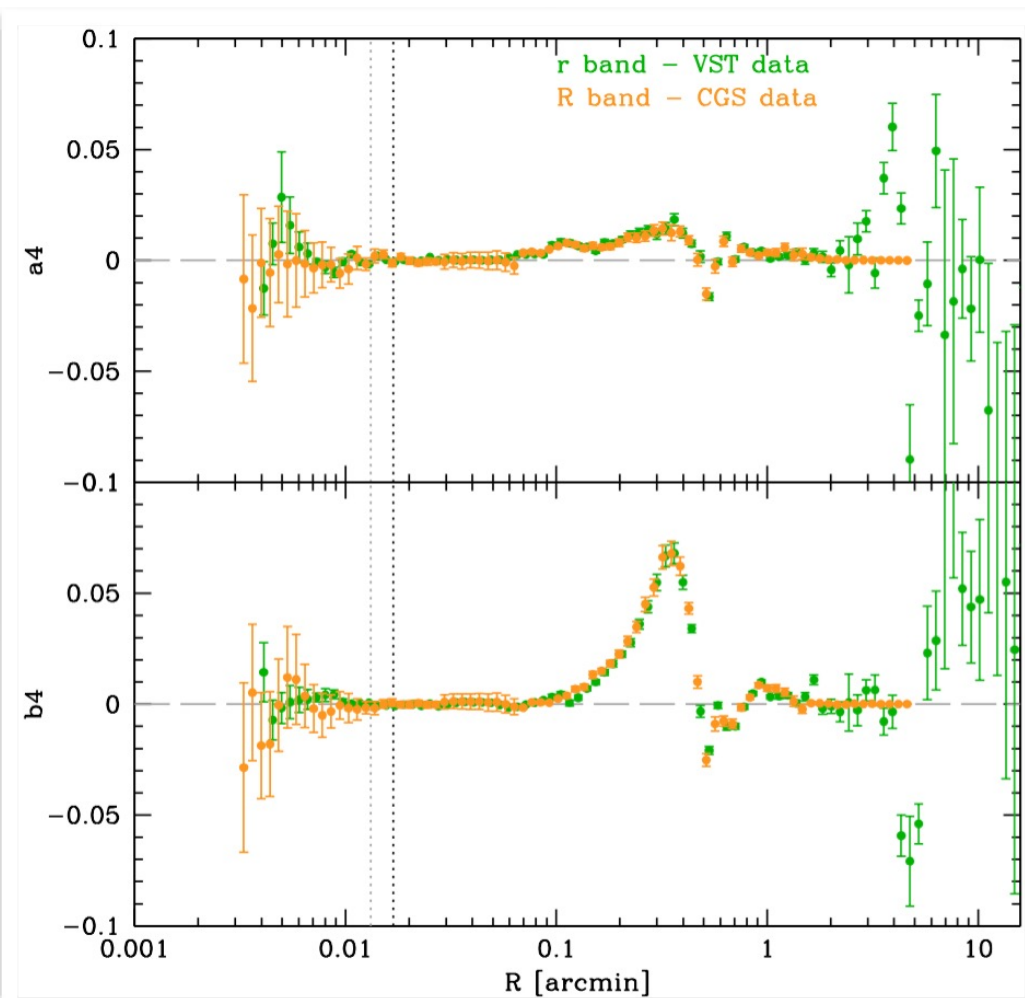
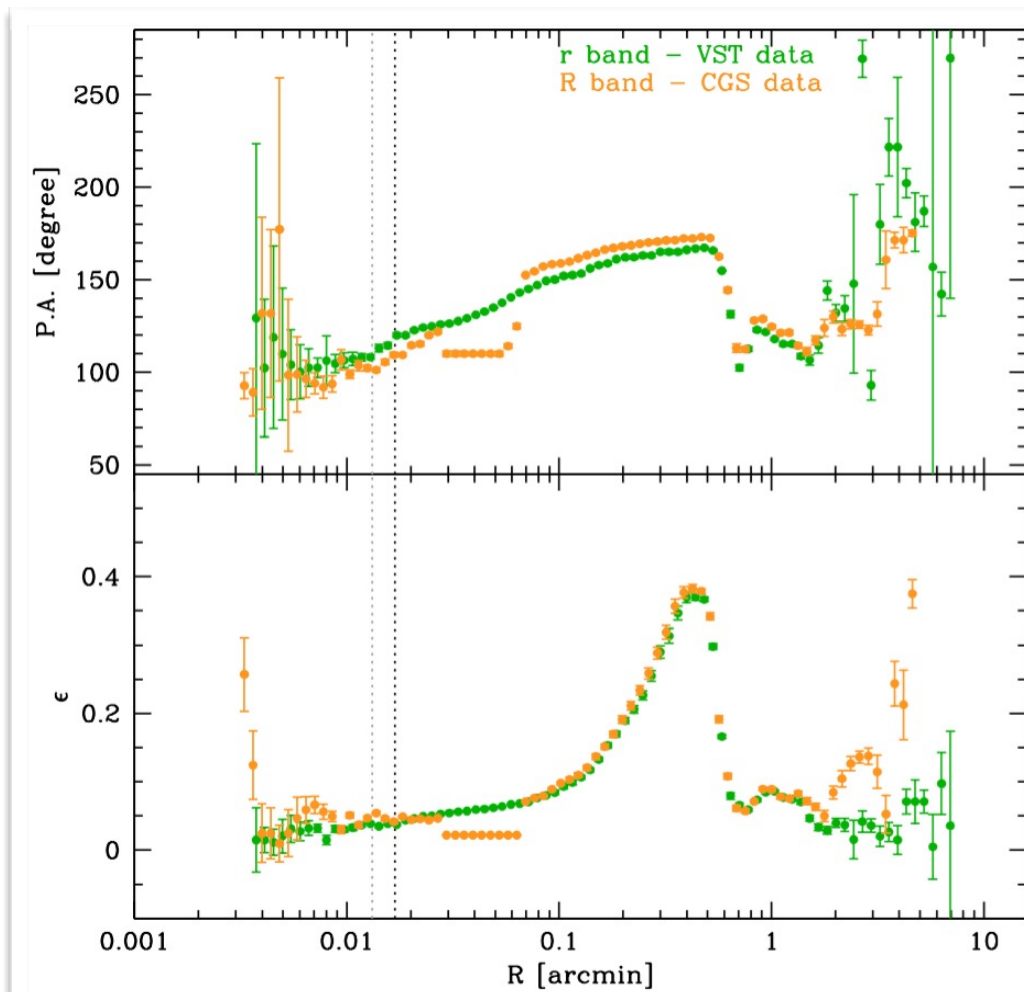
$m_{\text{tot}} = 10.48 \pm 0.05 \text{ mag}$

$m_{\text{tot}} = 9.60 \pm 0.05 \text{ mag}$

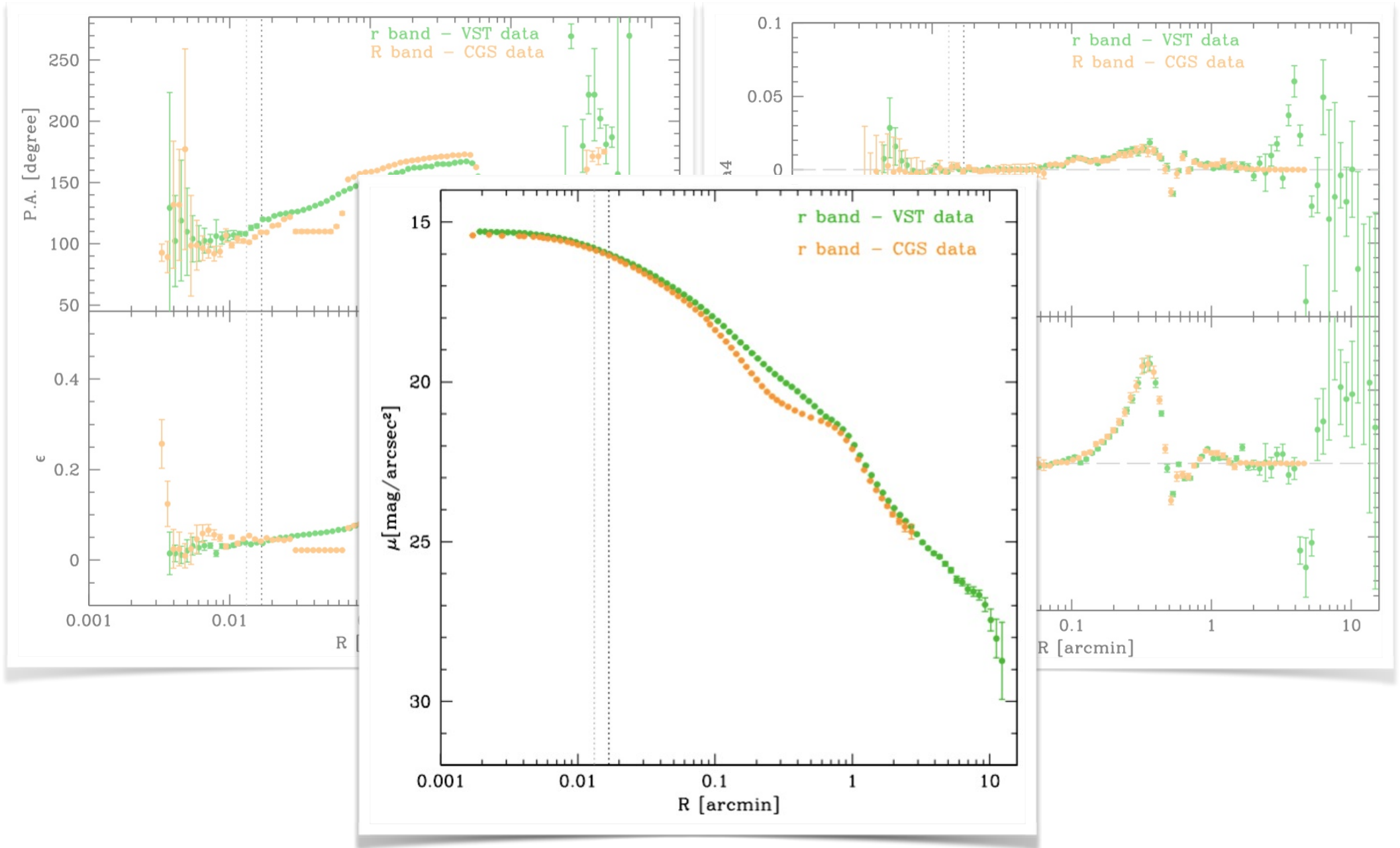
$R_e = 64.17 \pm 0.16 \text{ arcsec}$

$R_e = 78.20 \pm 0.41 \text{ arcsec}$

Photometry - Geometrical Parameters



Photometry - Surface Brightness Profile



Photometry - Surface Brightness Profile

