



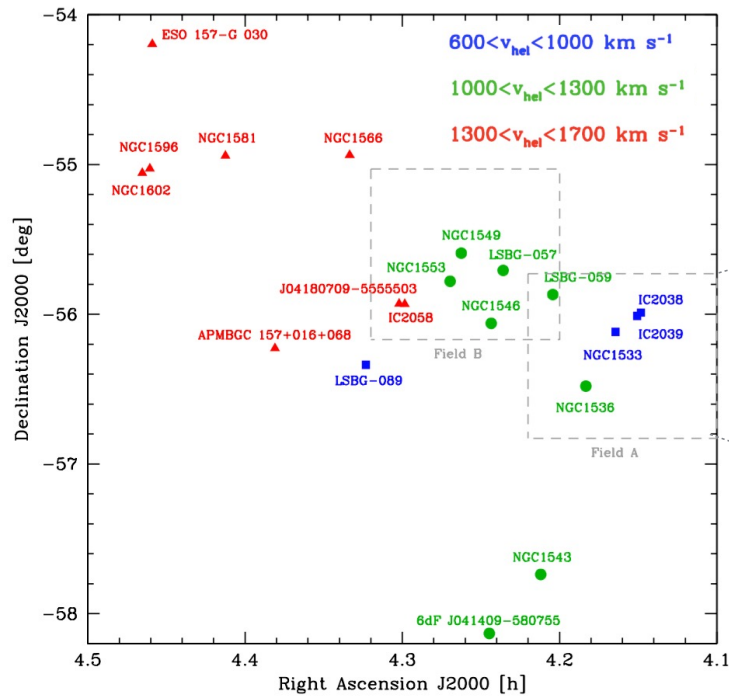
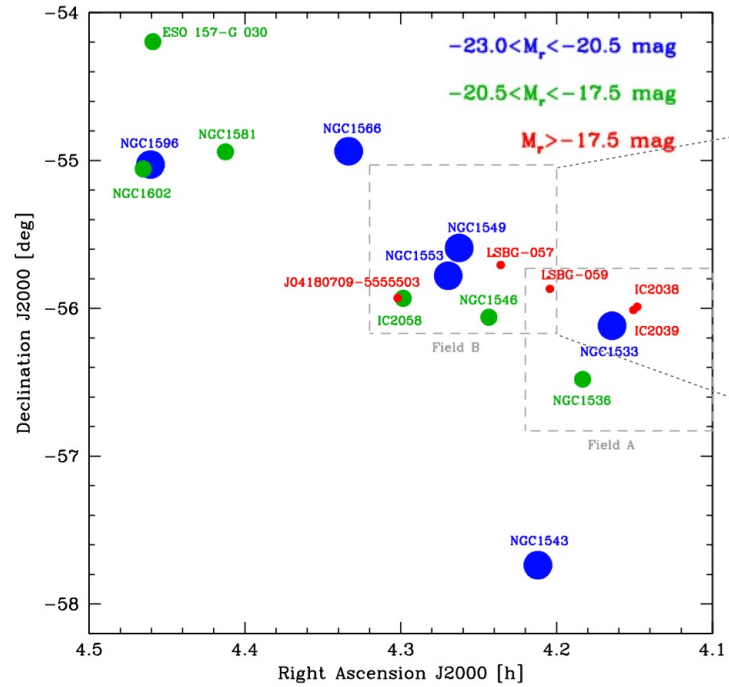
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Title	A Deep Look at NGC1533 in the Dorado Group with VST
Authors	CATTAPAN, ARIANNA, IODICE, ENRICHETTA, RAMPAZZO, Roberto, Ciroi, S., MAZZEI, Paola, GRADO, ANIELLO, LIMATOLA, LUCA, SPAVONE, MARILENA, SCHIPANI, Pietro, Marino, A., HELD, Enrico Valerio
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Handle	http://hdl.handle.net/20.500.12386/27833

A deep look at NGC1533 in the Dorado Group with VST

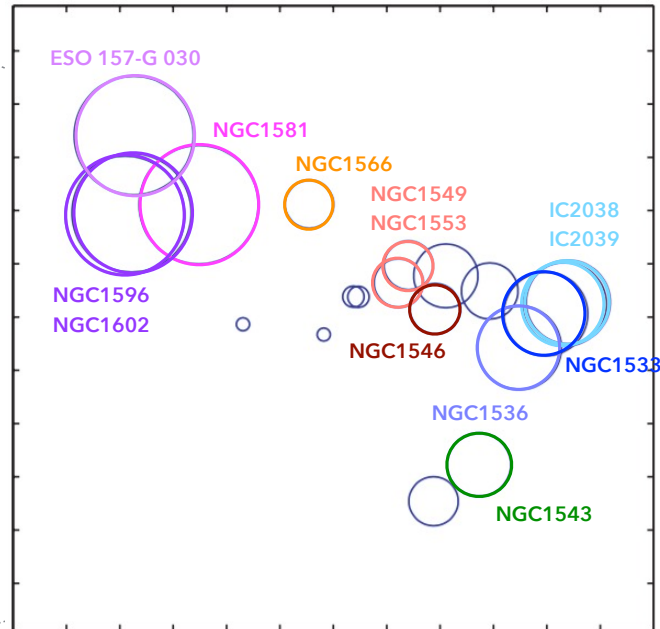
A. Cattapan¹

***E. Iodice², R. Rampazzo³, S. Ciroi¹, P. Mazzei³, A. Grado², L.
Limatola², M. Spavone², P. Schipani², A. Marino³, E. V. Held³***

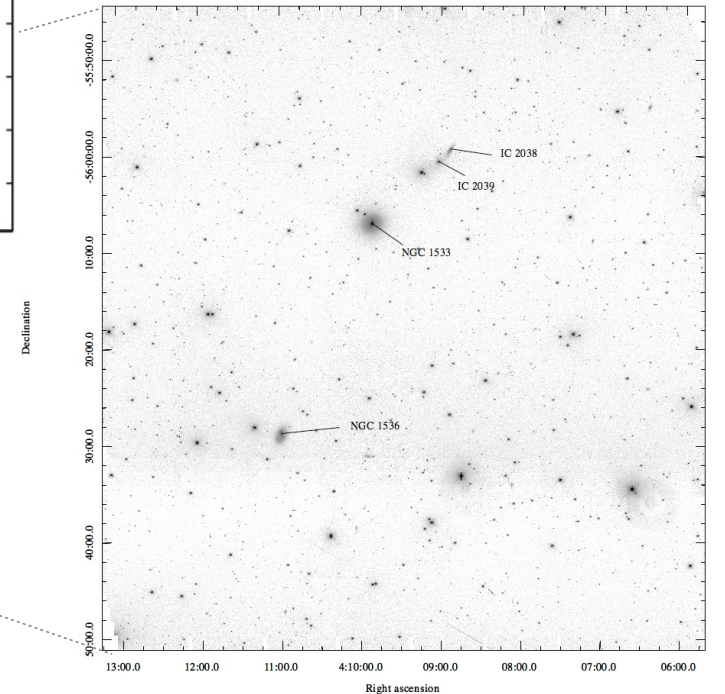
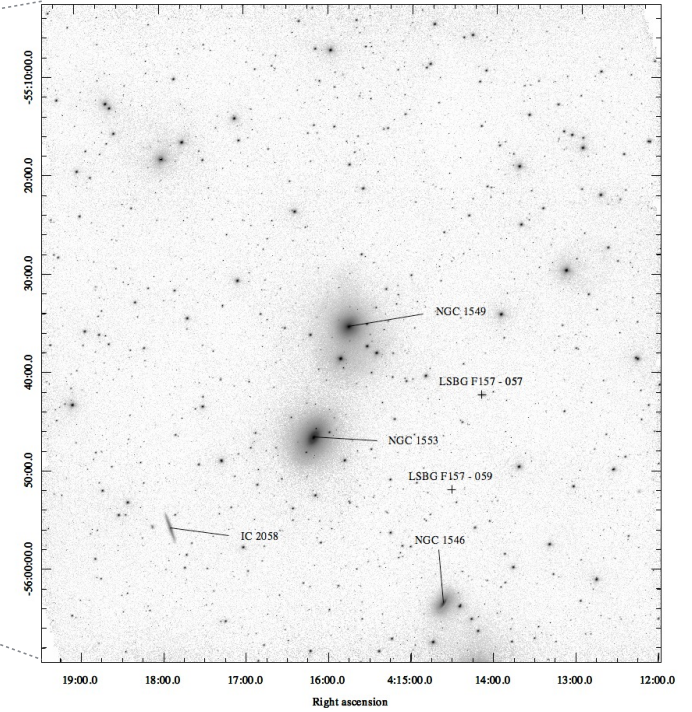
Dorado Group



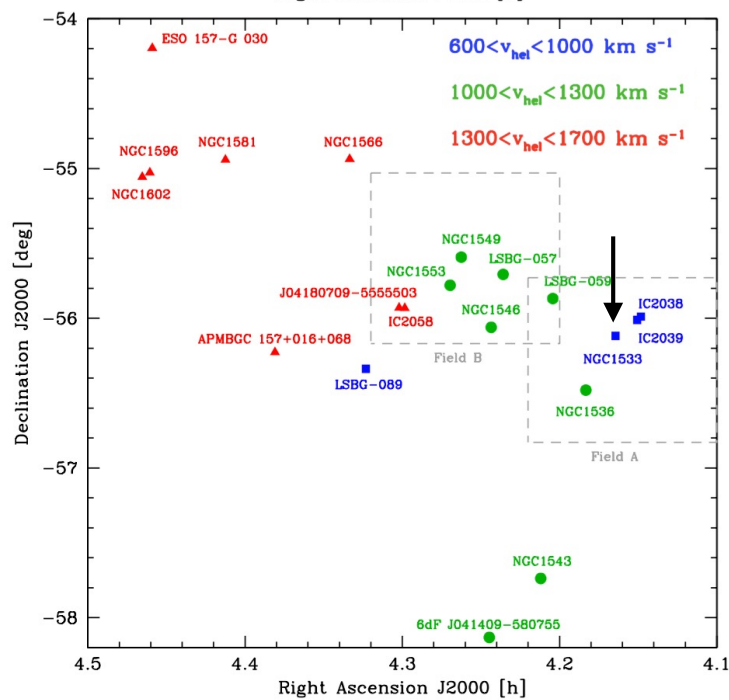
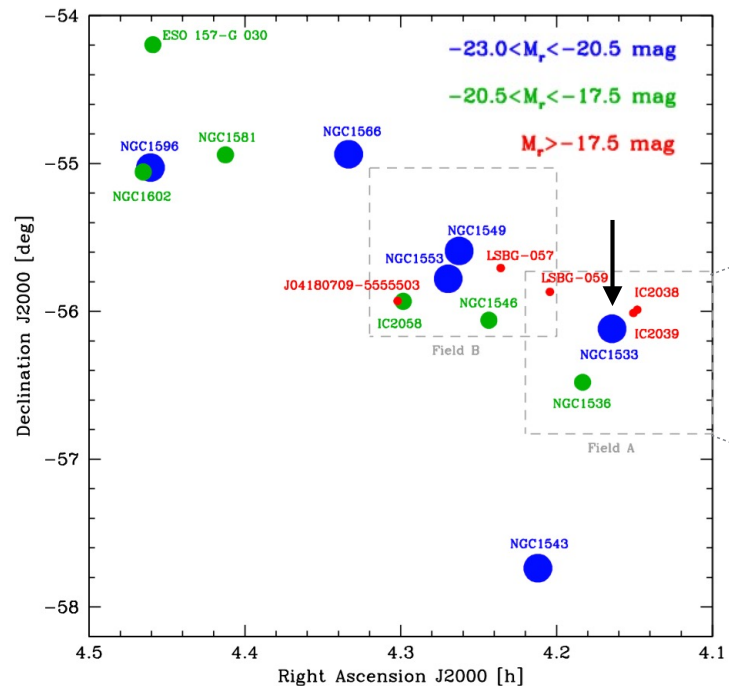
Bubble plots from the Dressler-Shectman test



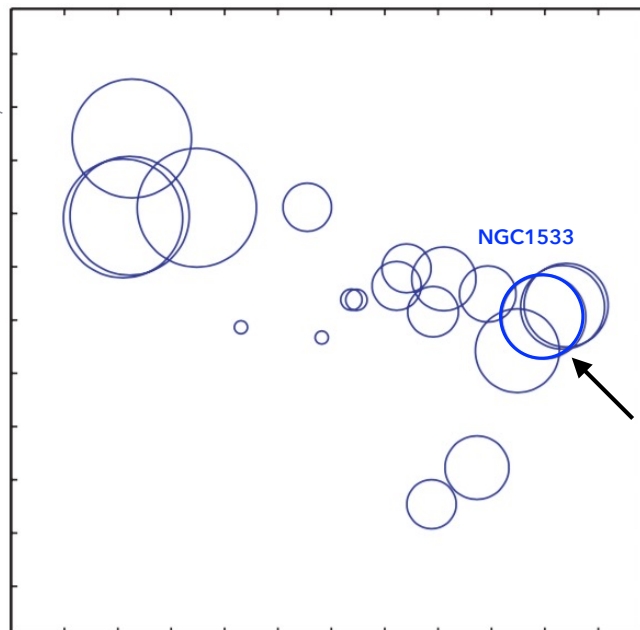
Firth et al. 2006



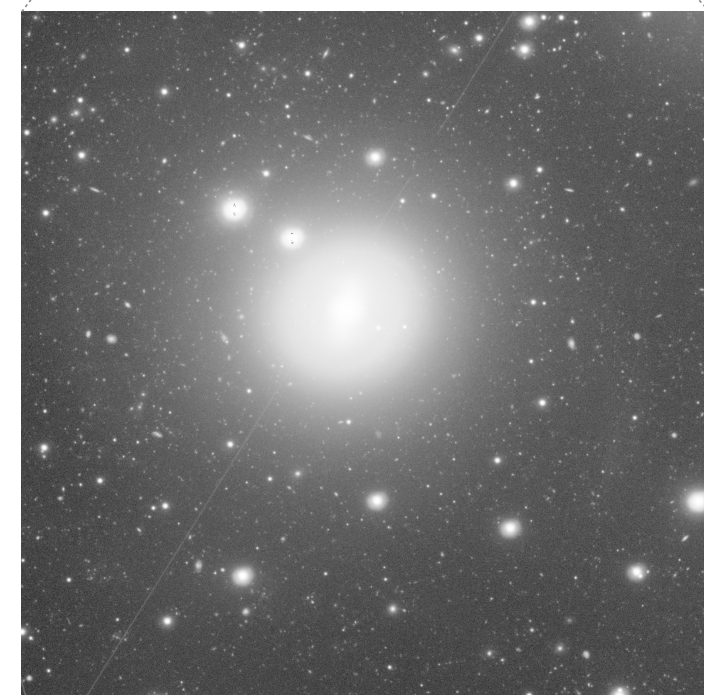
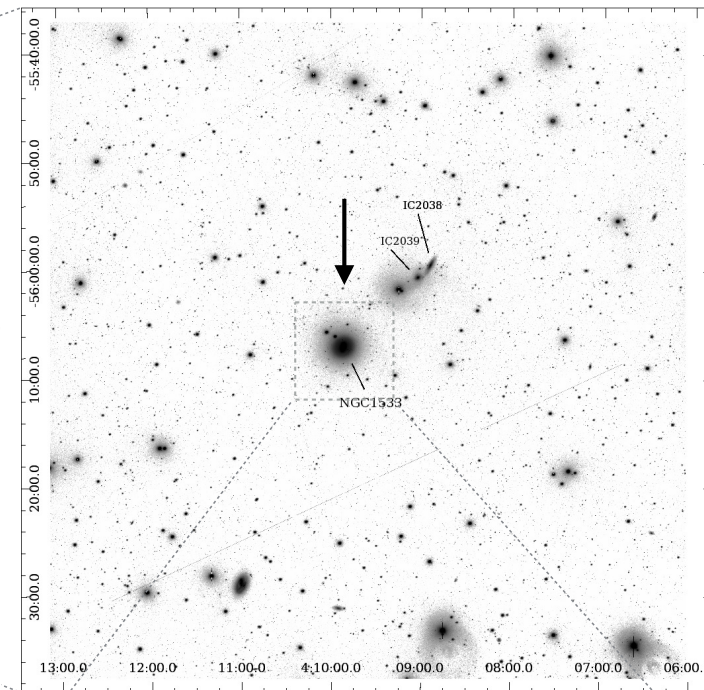
VEGAS target - NGC 1533



Bubble plots from the Dressler-Shectman test



Firth et al. 2006



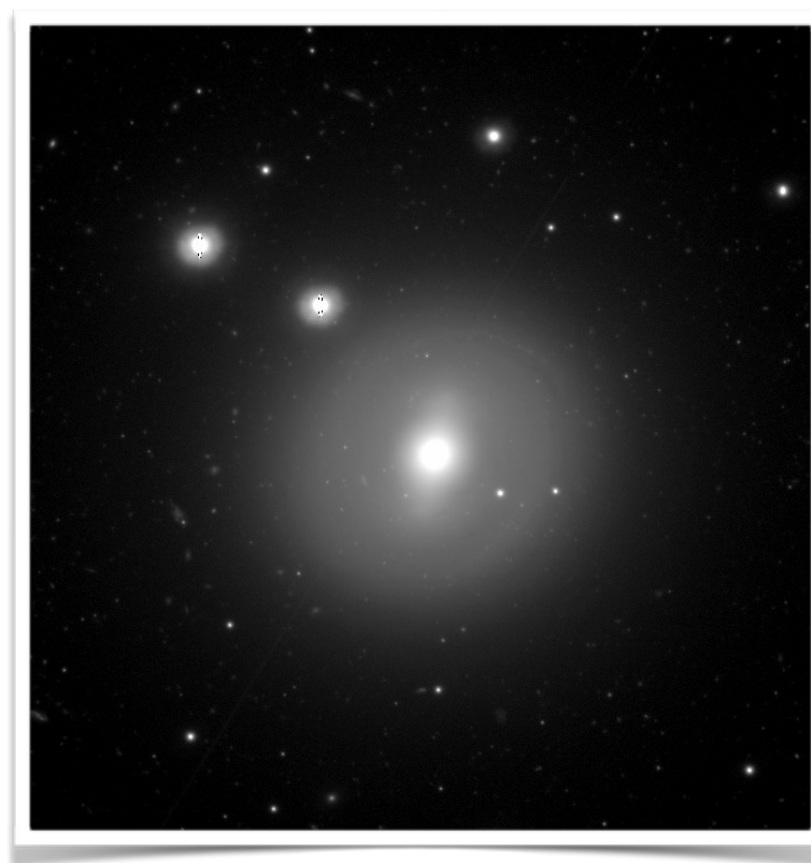
VEGAS target - NGC 1533

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



ARRAKIS classification:

(RL)SB0⁰

Comerón et al. (2014)

g band image from VST

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

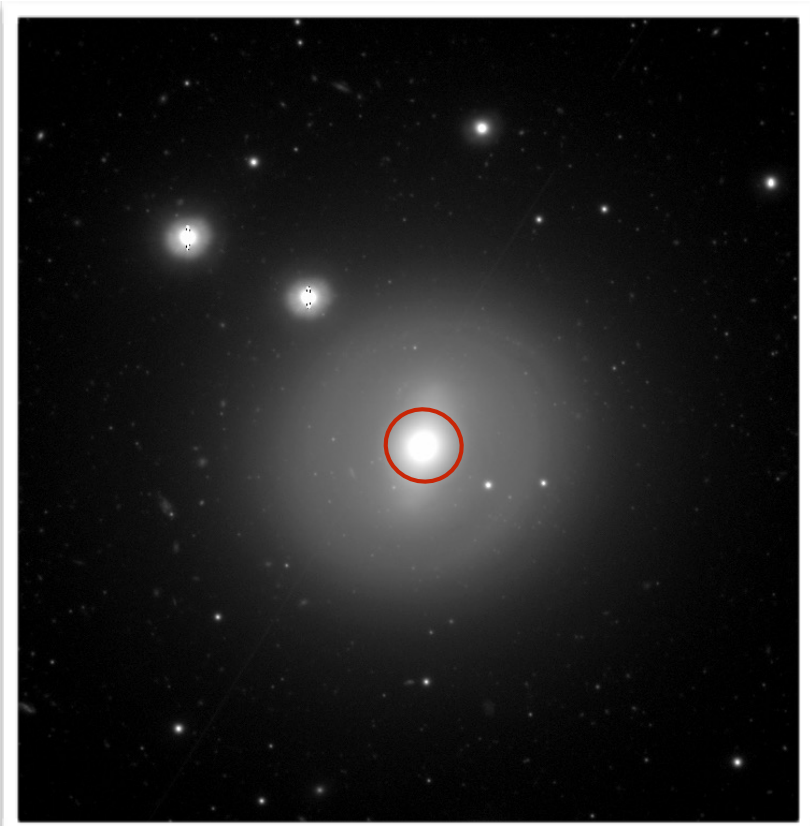
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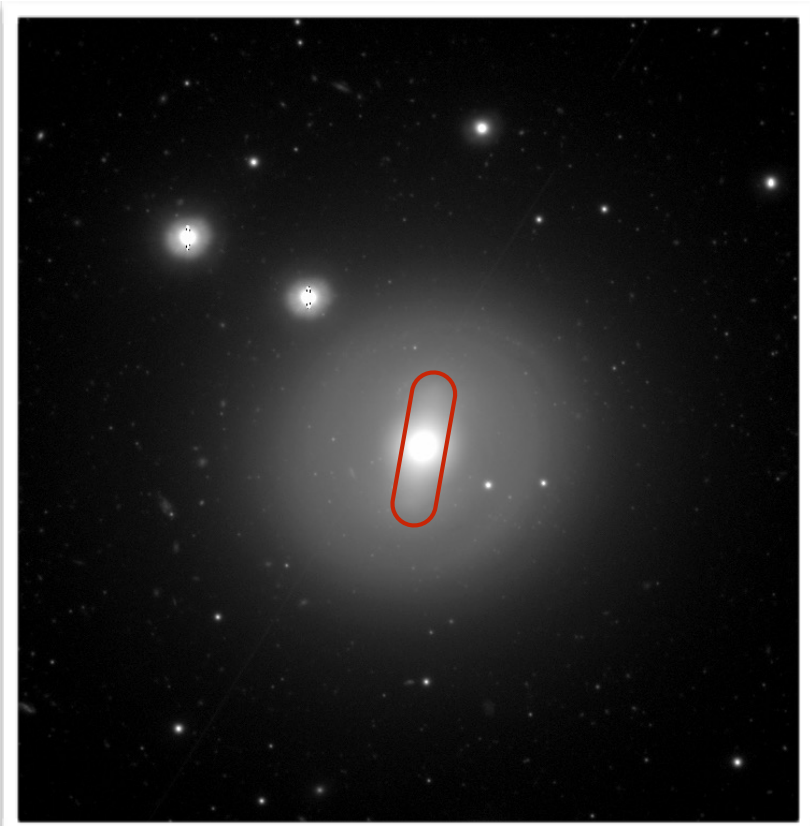
VEGAS target - NGC 1533

RA	Dec	v_{hel}	z
[h:m:s]	[°:':"]	[km s ⁻¹]	
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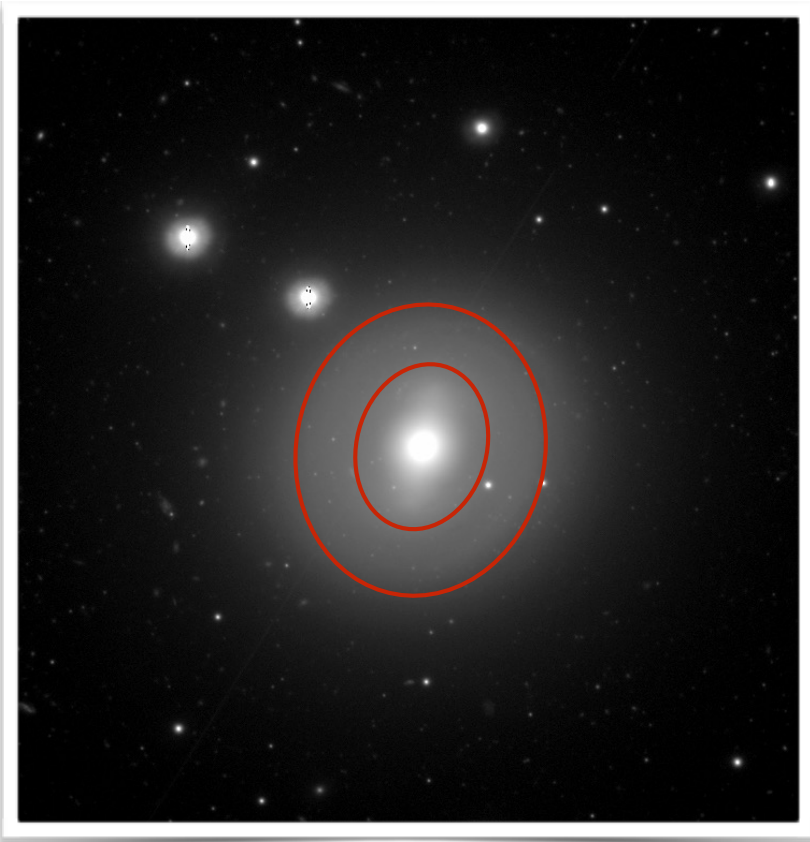
VEGAS target - NGC 1533

RA	Dec	v_{hel}	z
[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:

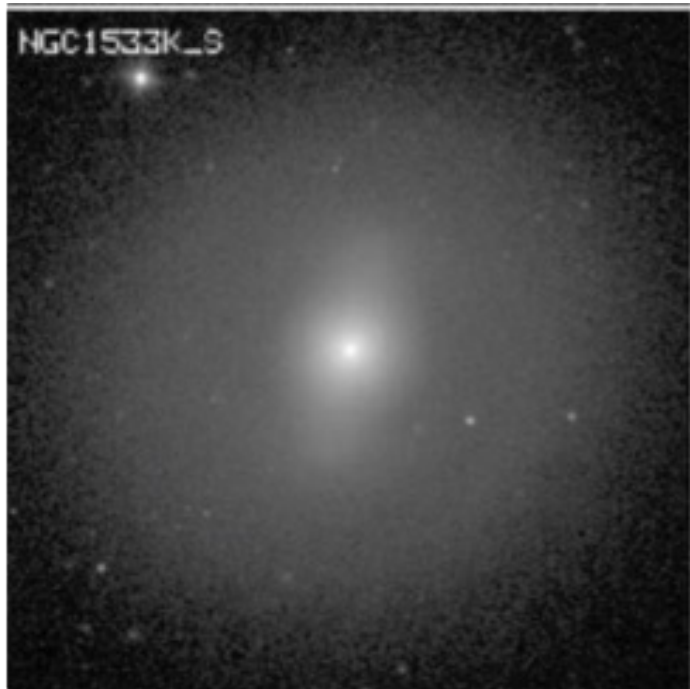
(RL)SB0⁰

Comerón et al. (2014)

g band image from VST

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g	62.444	-56.101	7800	0.7893	26
r	62.289	-56.114	4800	0.7852	16

From imaging previous works

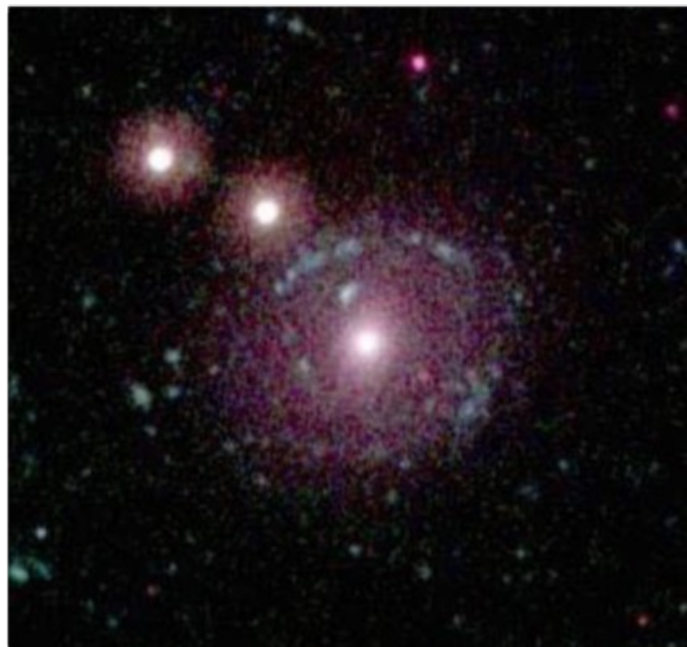
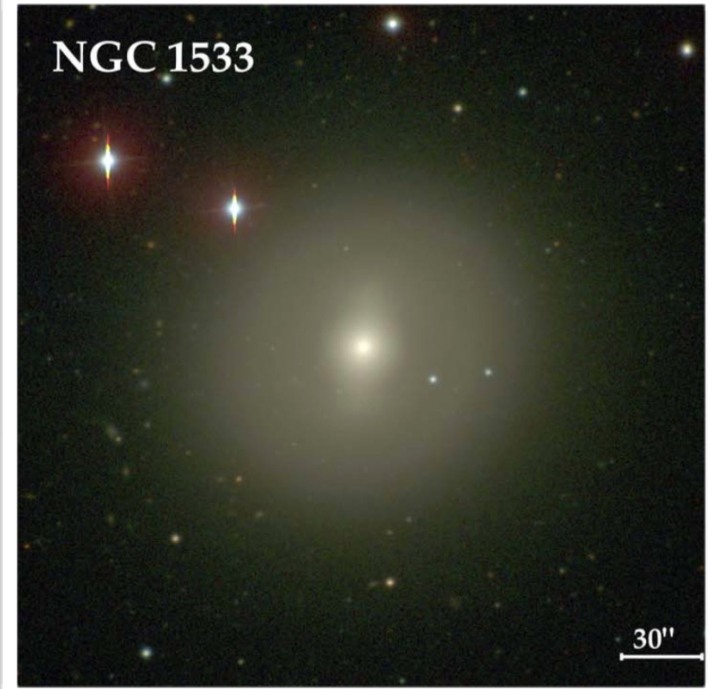


Direct K_s -band ($\lambda \sim 2.15 \mu\text{m}$) image from NTT, image is in units of mag arcsec^{-2} and is displayed from $\mu_{K_s} = 12.0$ to $22.0 \text{ mag arcsec}^{-2}$.
FoV = $4' \times 4'$

Laurikainen et al. 2006

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

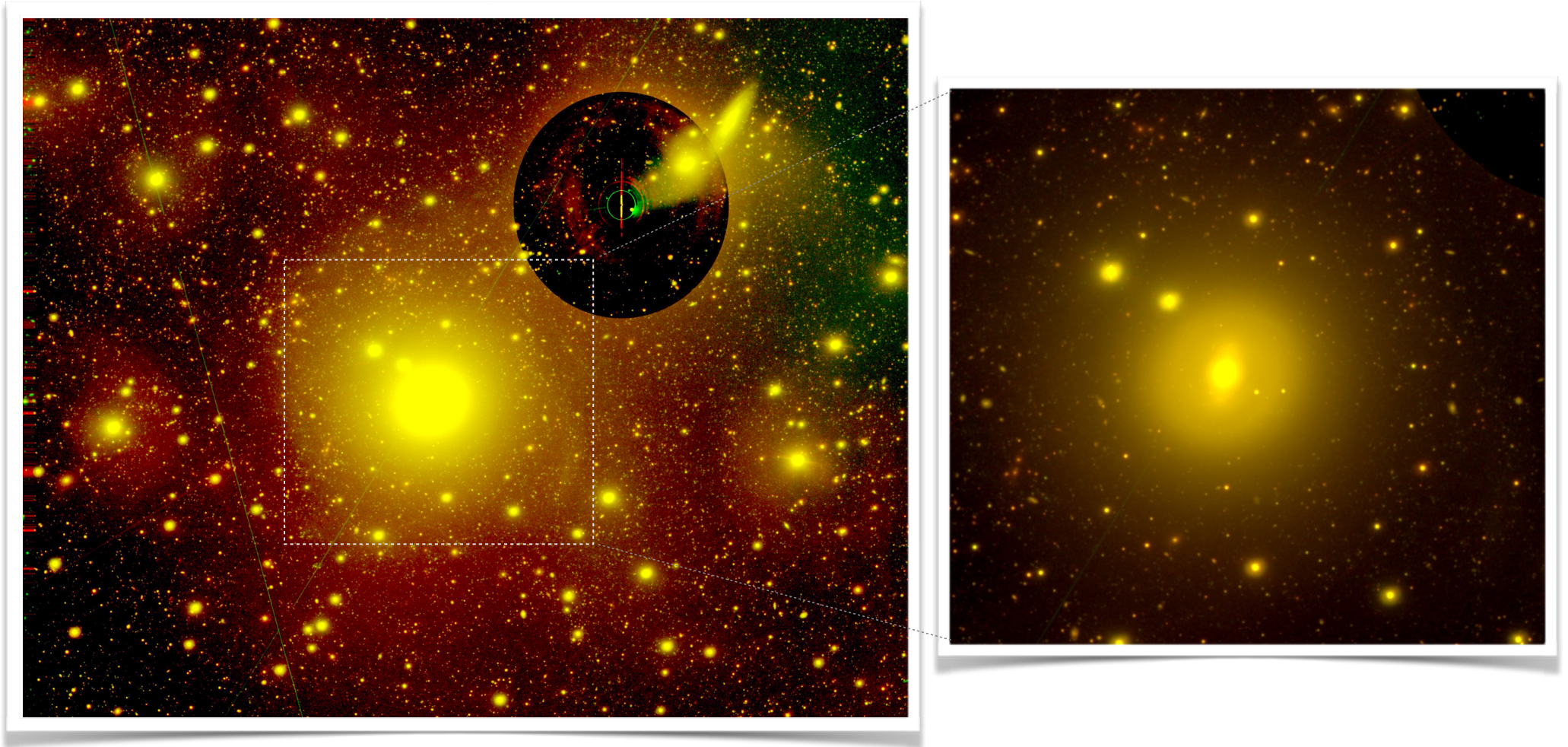
Ho et al. 2011



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

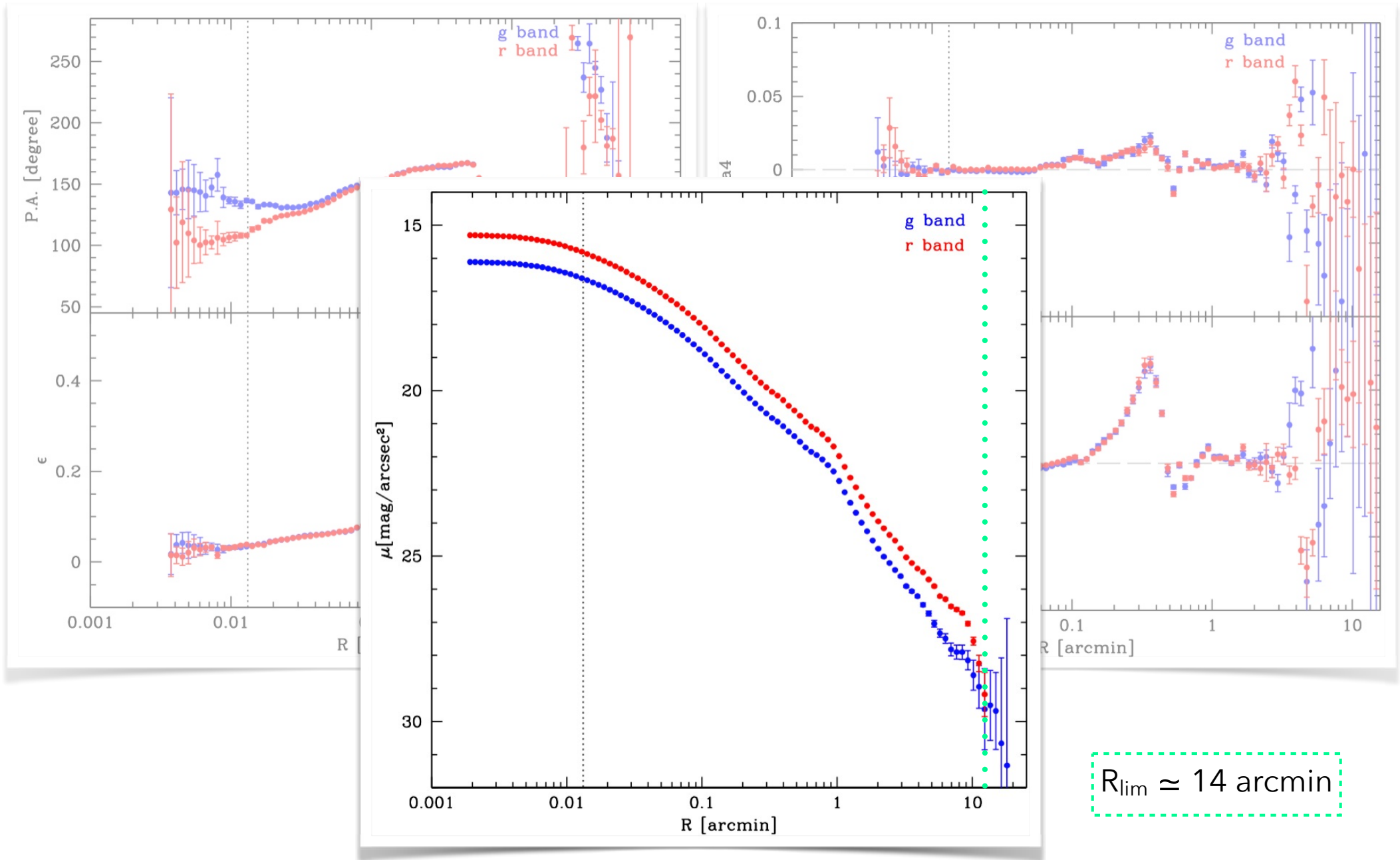
Rampazzo et al. 2017

Imaging with VST

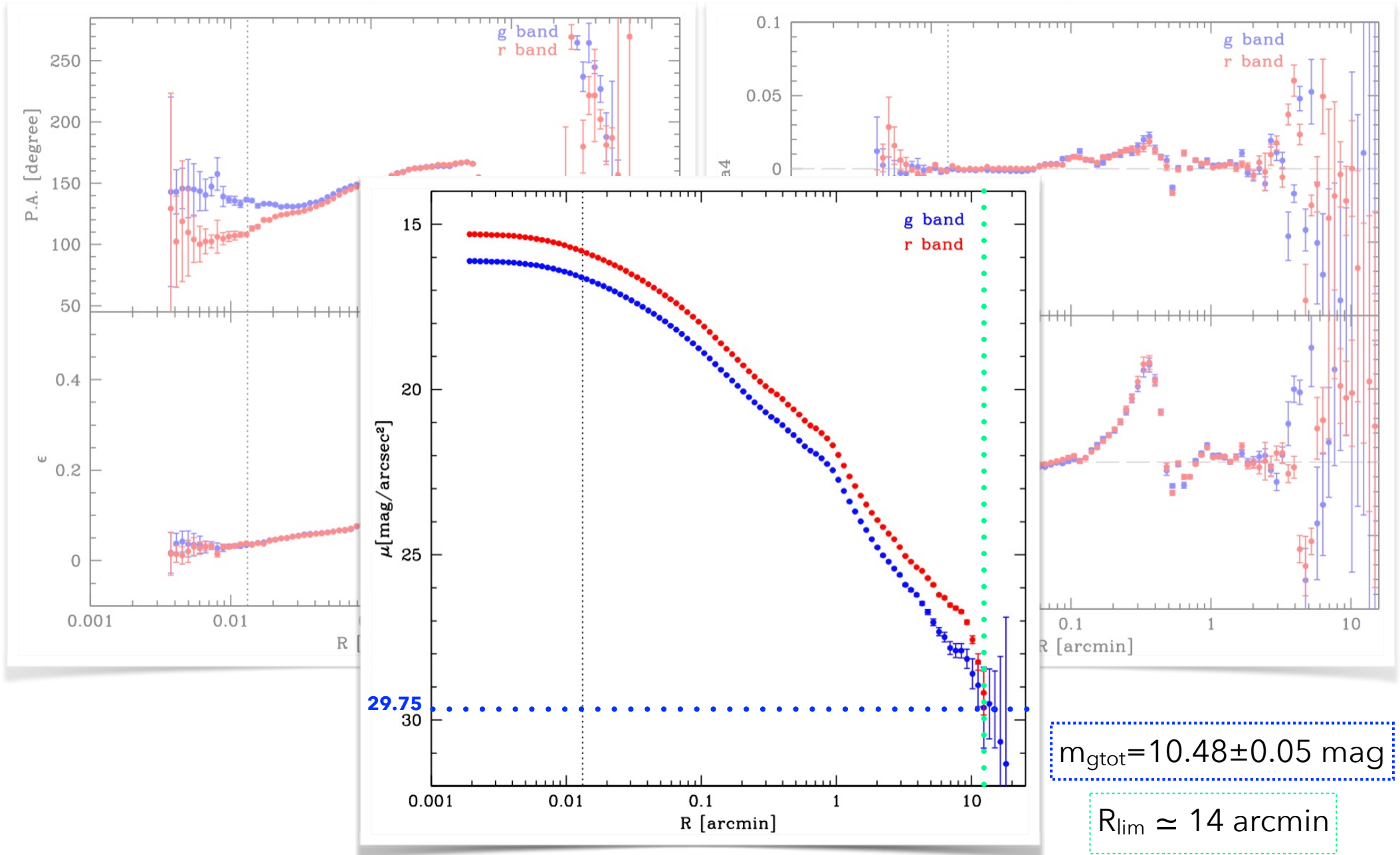


Colour composite image from g (green channel) and r (red channel) band VST image,
24.15x18.9 arcmin.

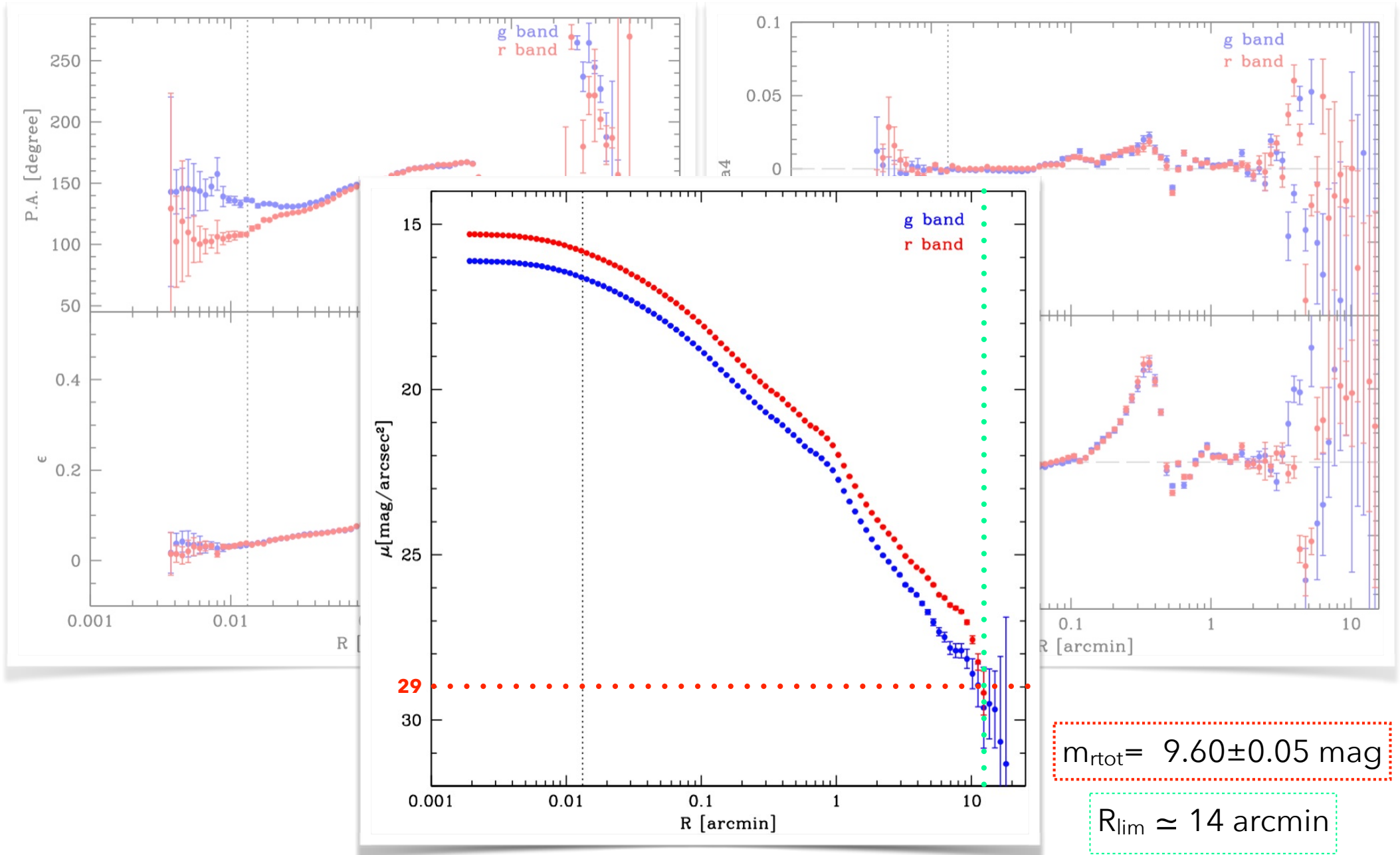
Photometry - Surface Brightness Profile



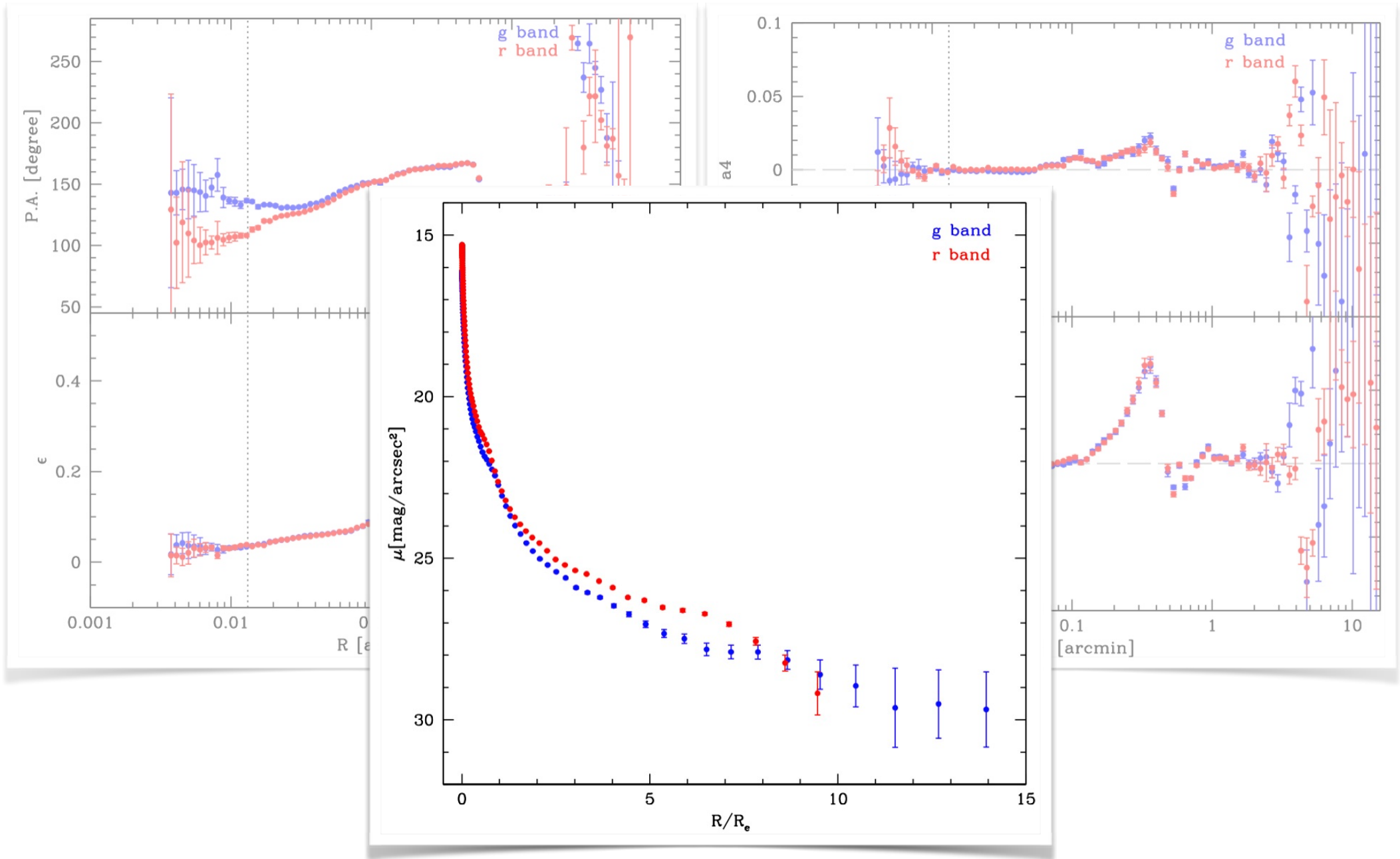
Photometry - Surface Brightness Profile



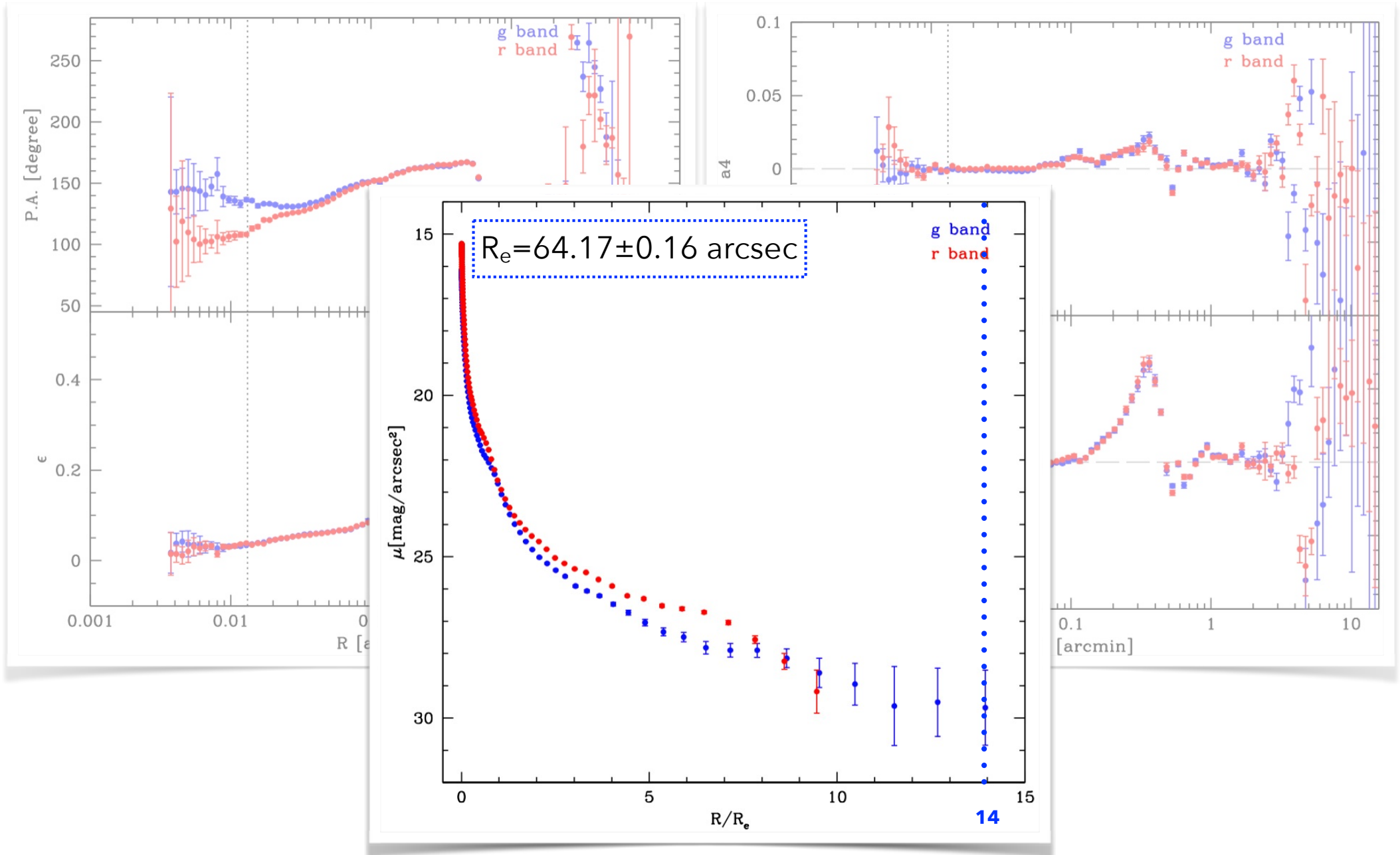
Photometry - Surface Brightness Profile



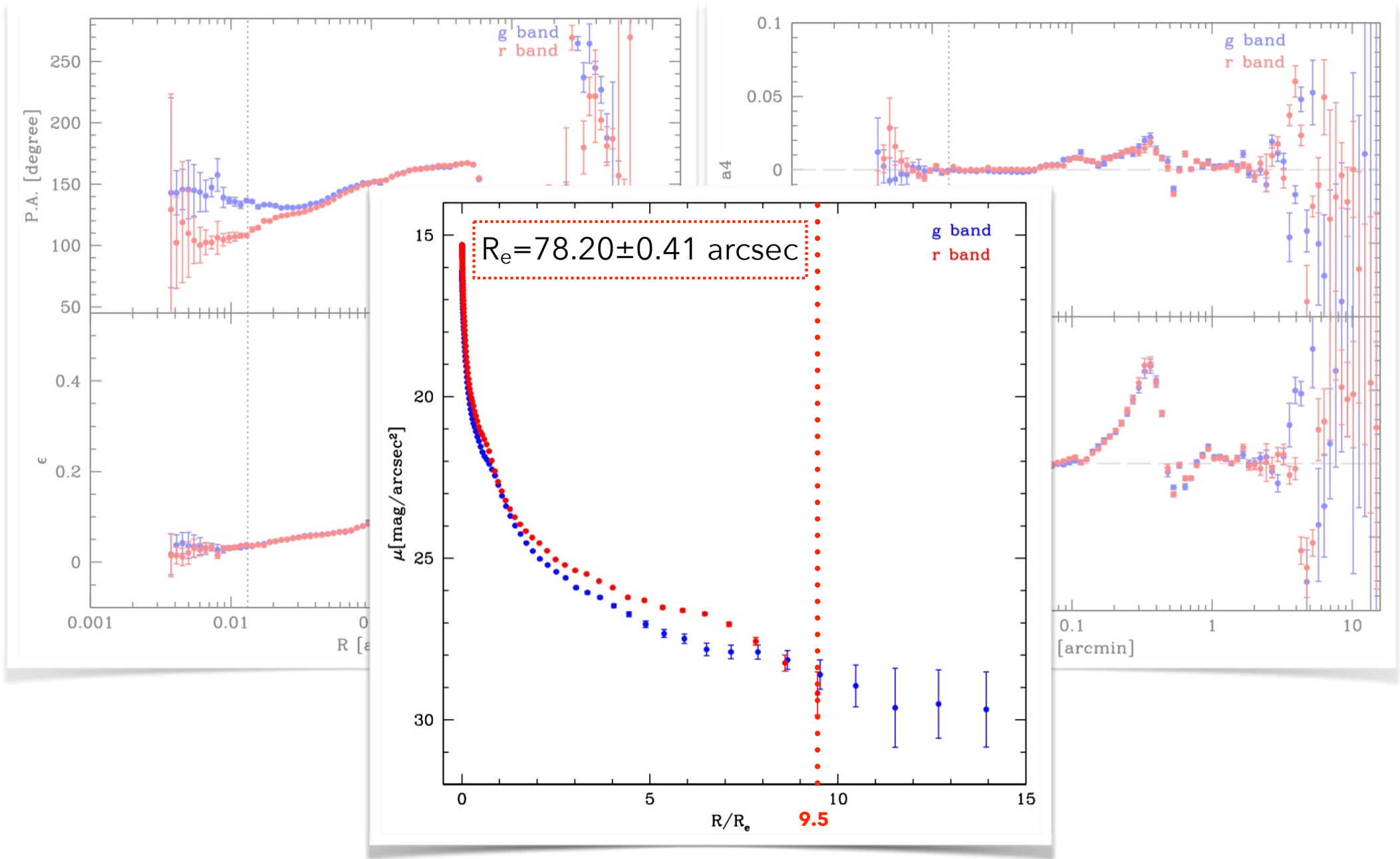
Photometry - Surface Brightness Profile



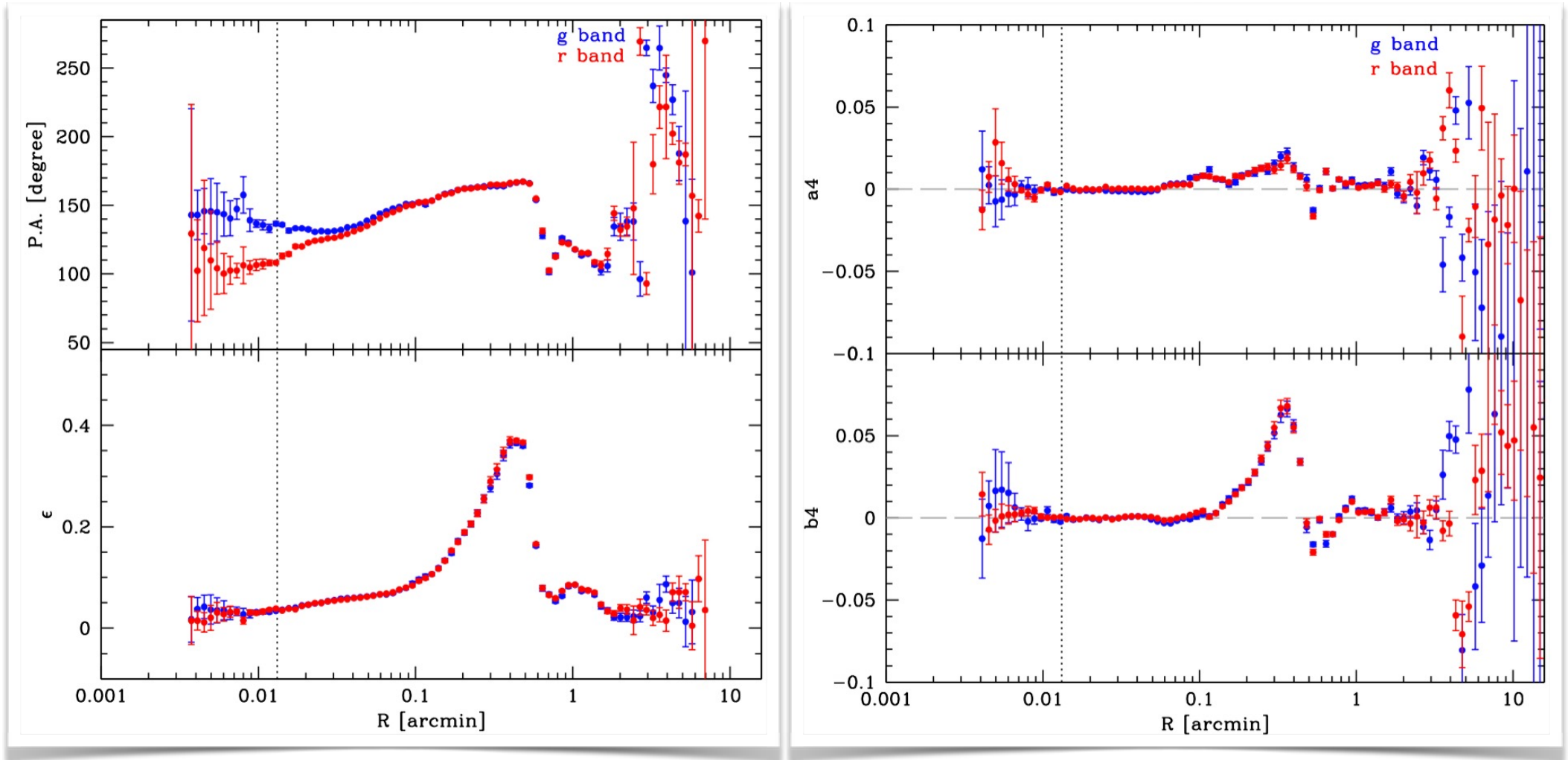
Photometry - Surface Brightness Profile



Photometry - Surface Brightness Profile

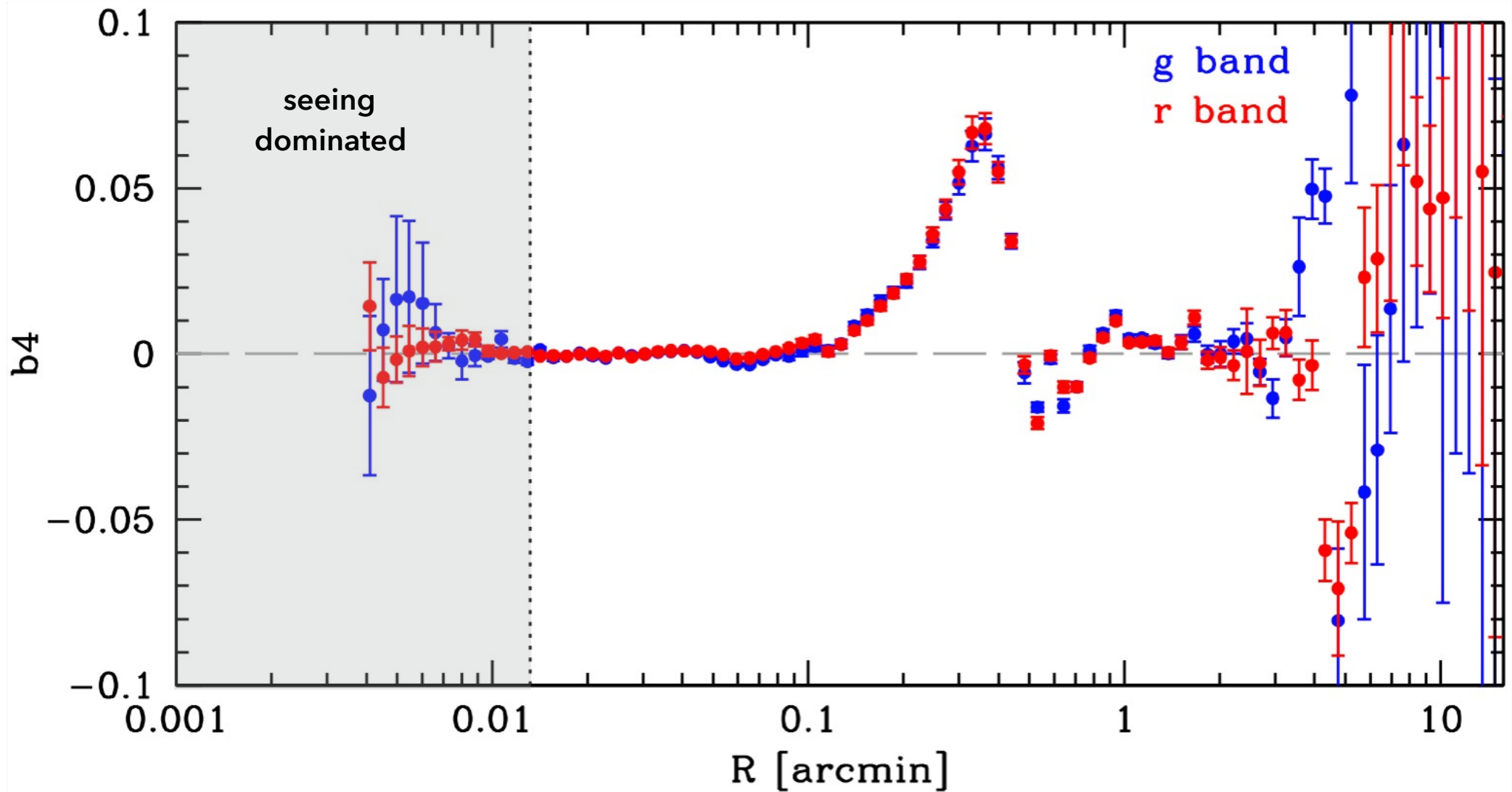


Photometry - Geometrical Parameters



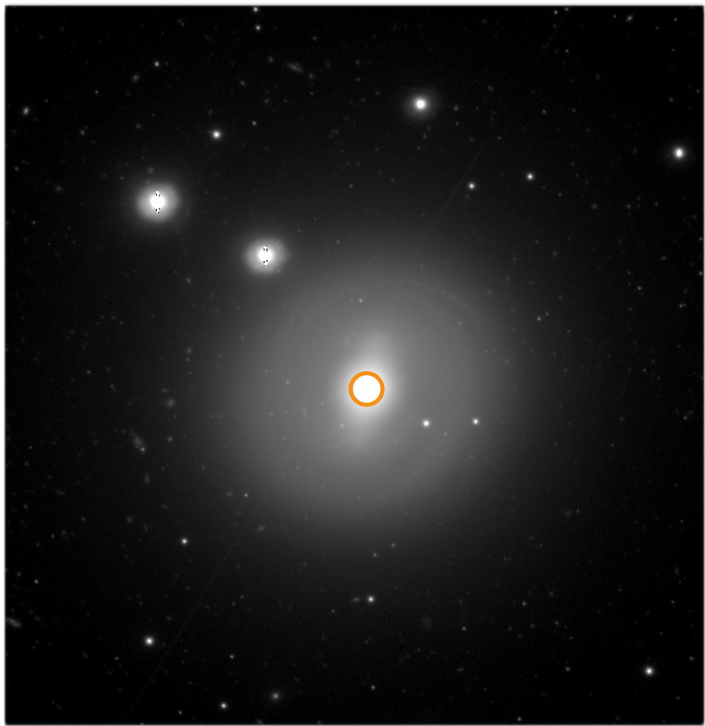
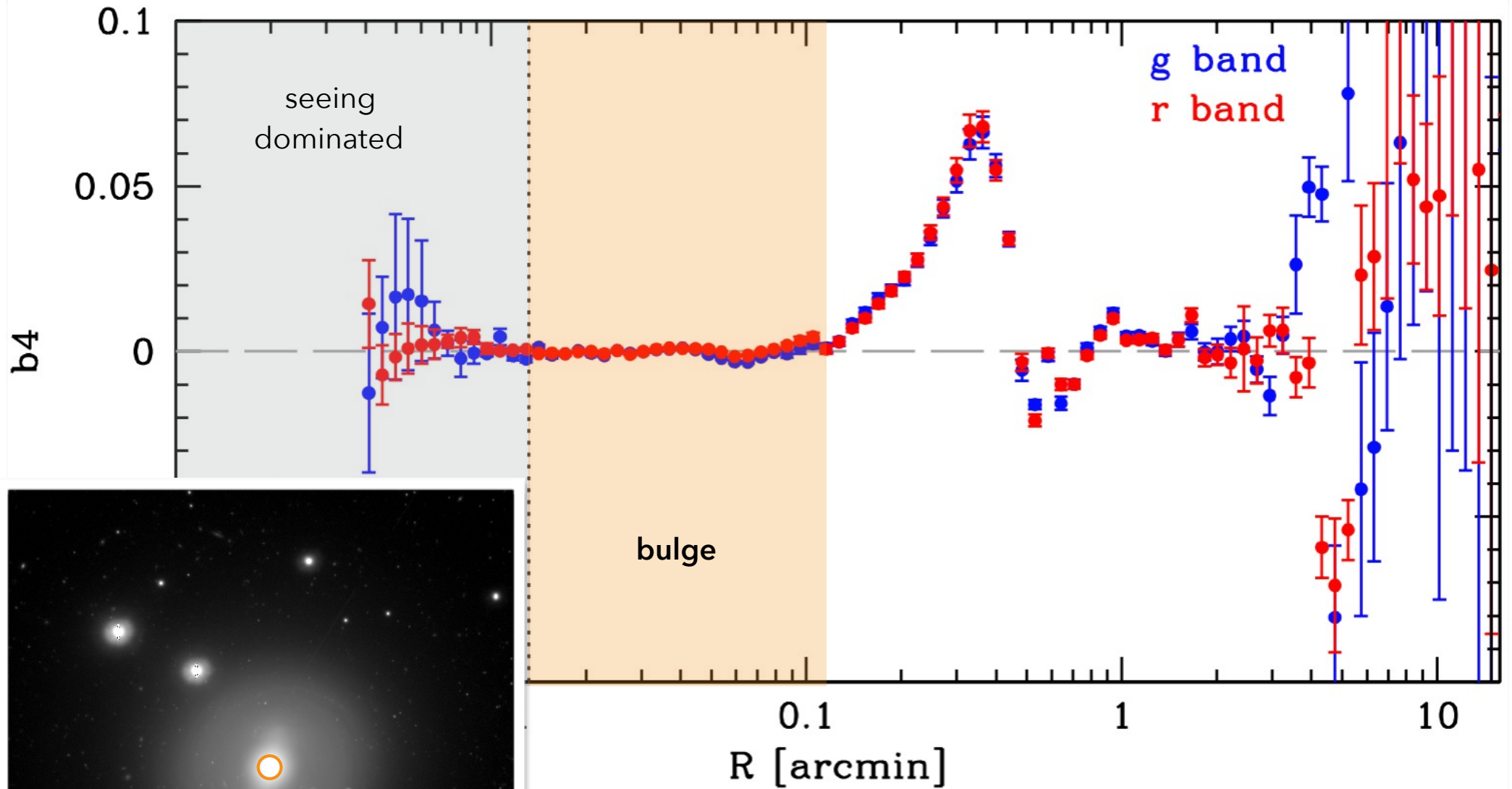
Jedrzejewski, 1987:
$$I(\alpha, \vartheta) = I_0 + \sum_k \left[a_k \sin(k\vartheta) + b_k \cos(k\vartheta) \right]$$

Photometry - Geometrical Parameters



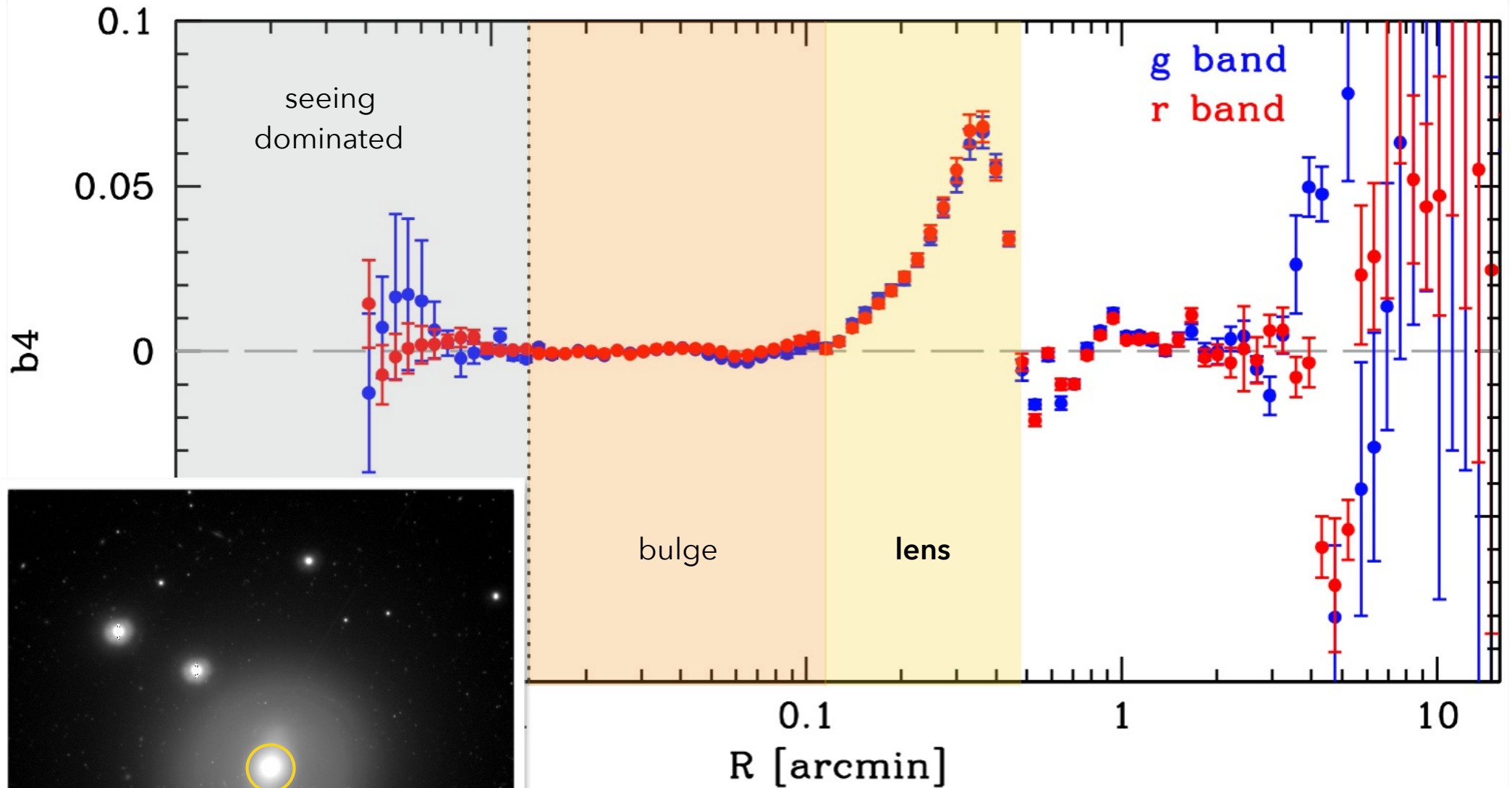
$$R \lesssim 0.79 \text{ arcsec}$$

Photometry - Geometrical Parameters



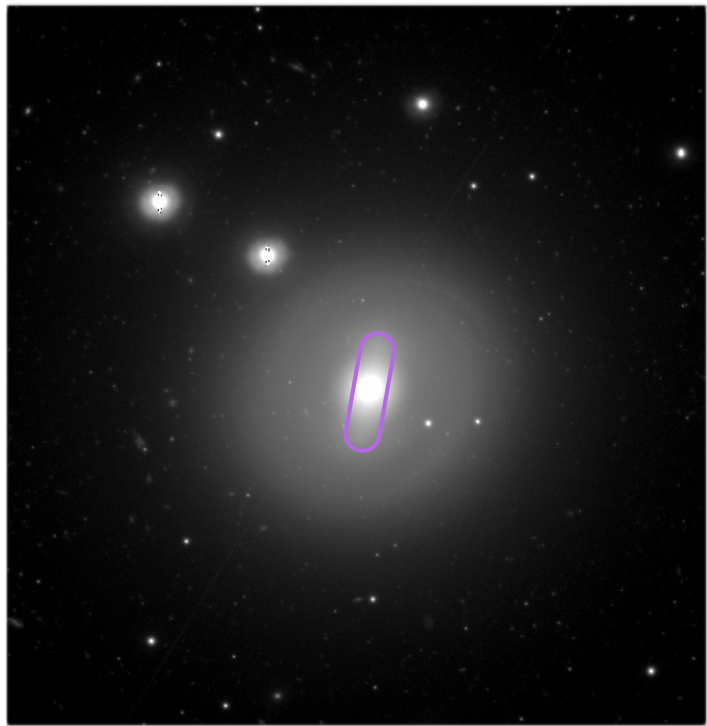
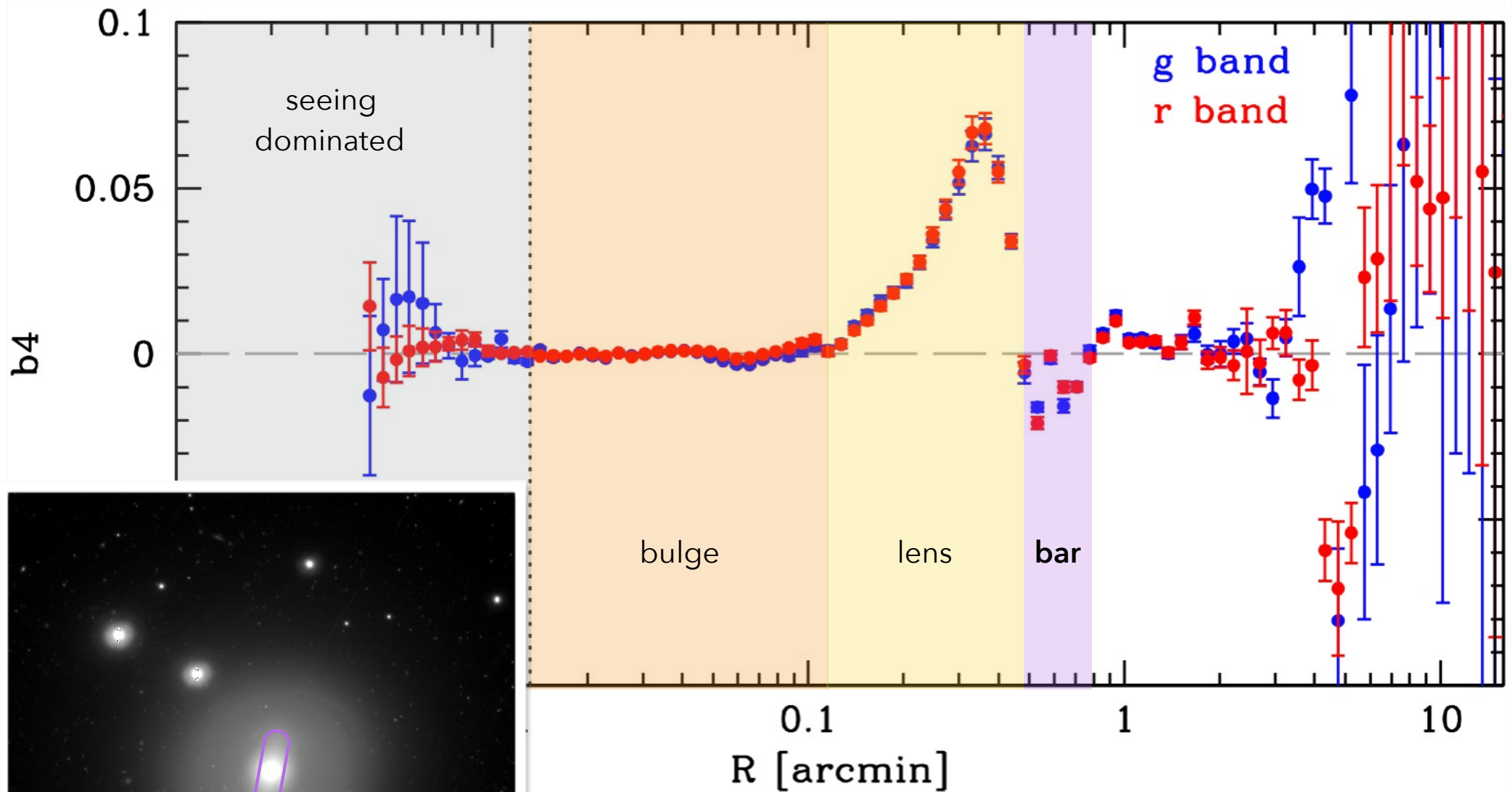
$$0.79 \lesssim R \lesssim 6.95 \text{ arcsec}$$

Photometry - Geometrical Parameters



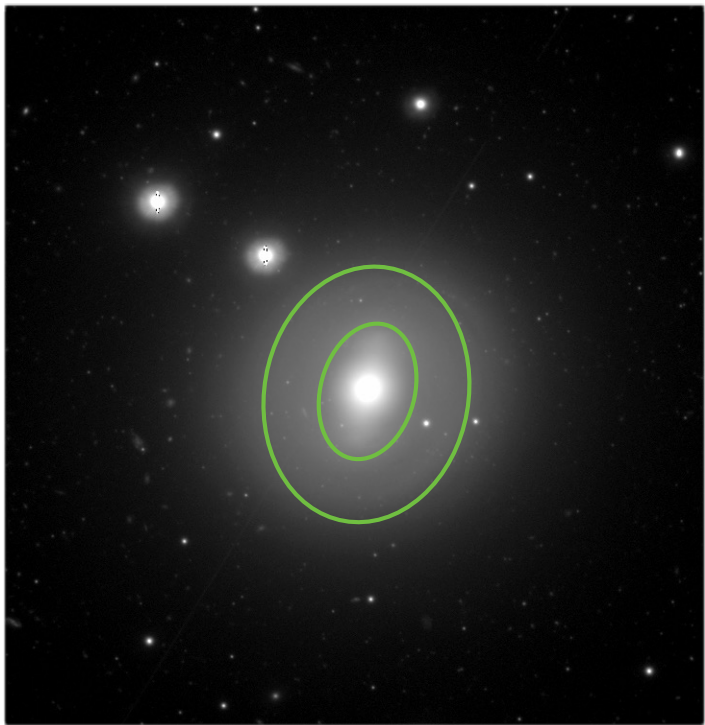
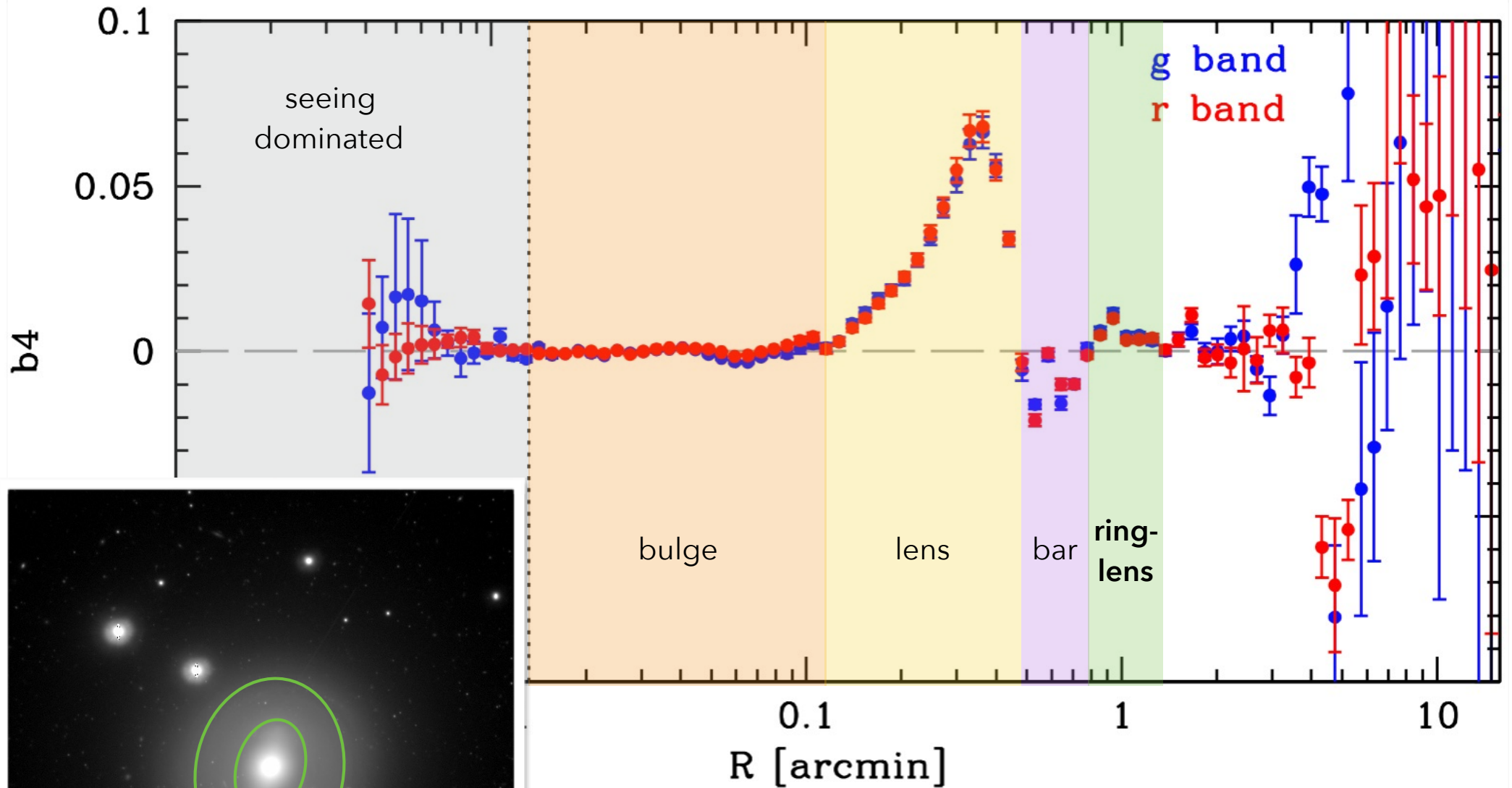
$$6.95 \lesssim R \lesssim 29.00 \text{ arcsec}$$

Photometry - Geometrical Parameters



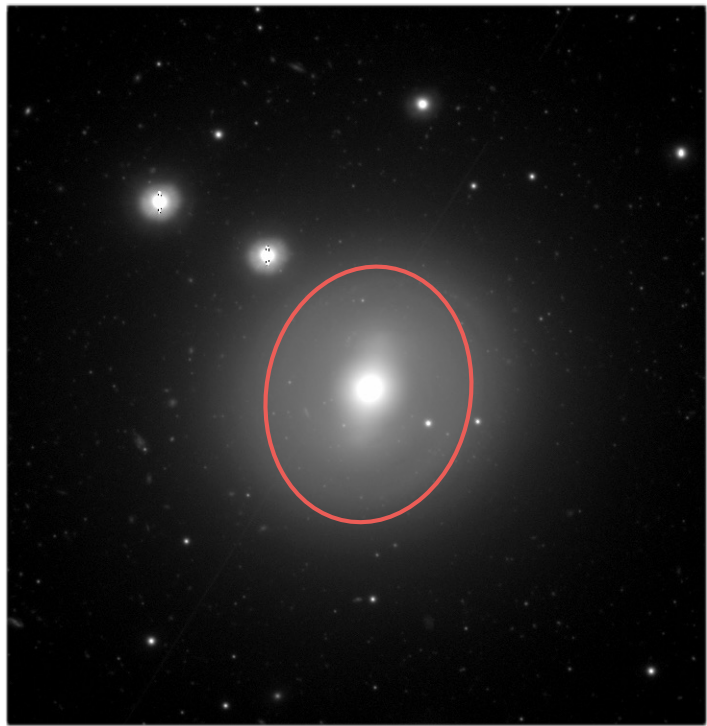
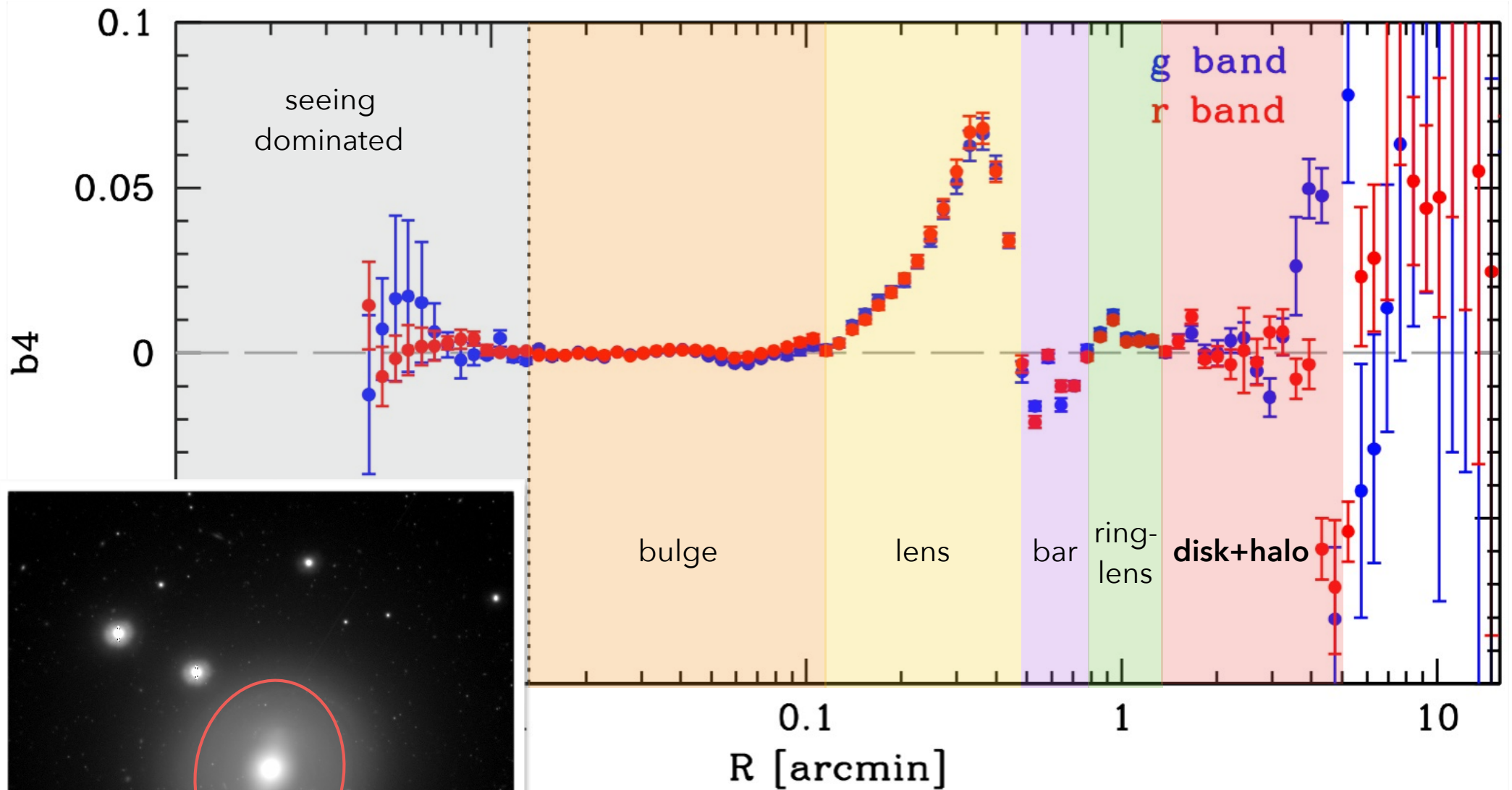
$$29.00 \lesssim R \lesssim 46.70 \text{ arcsec}$$

Photometry - Geometrical Parameters



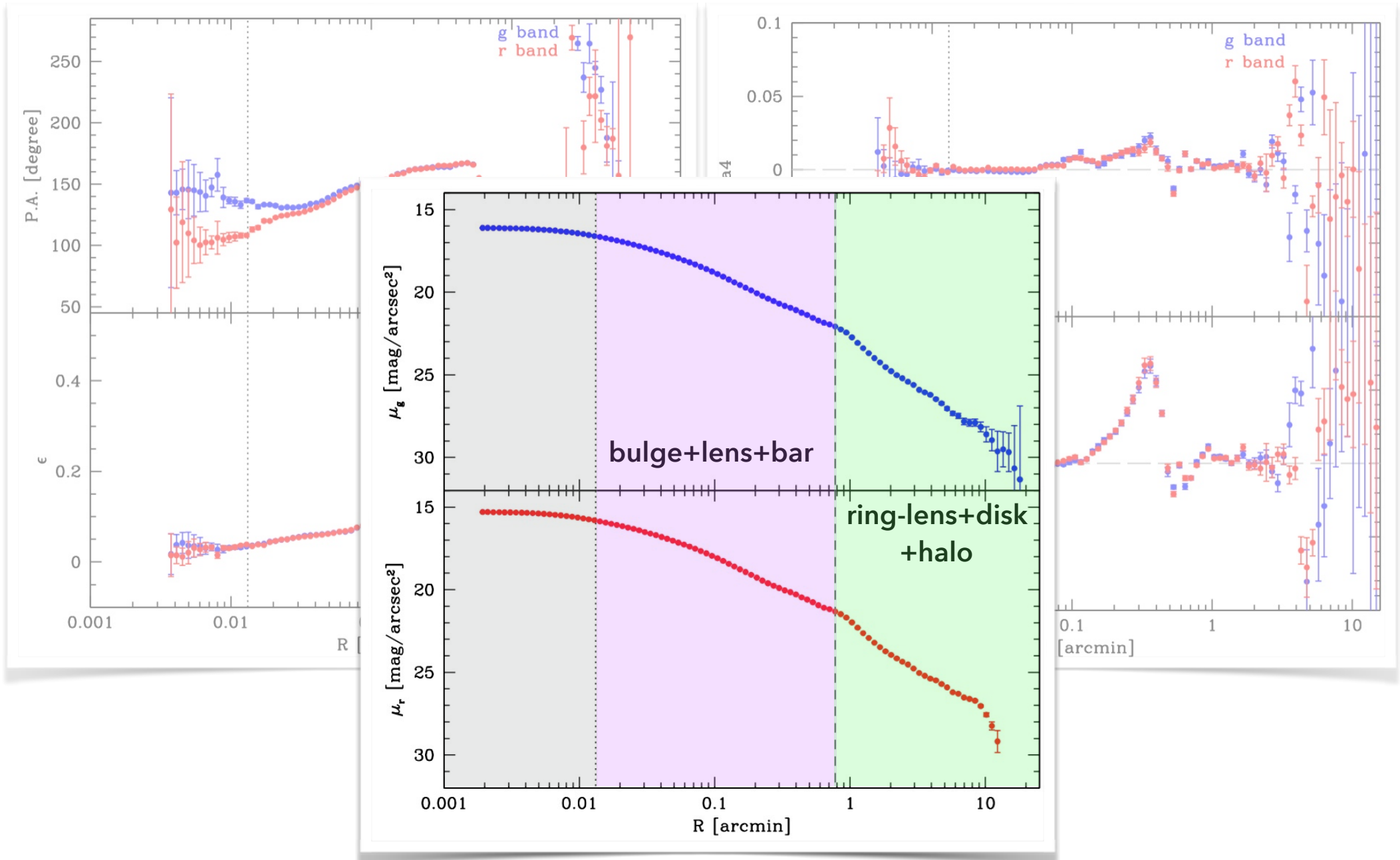
$$46.70 \lesssim R \lesssim 82.58 \text{ arcsec}$$

Photometry - Geometrical Parameters

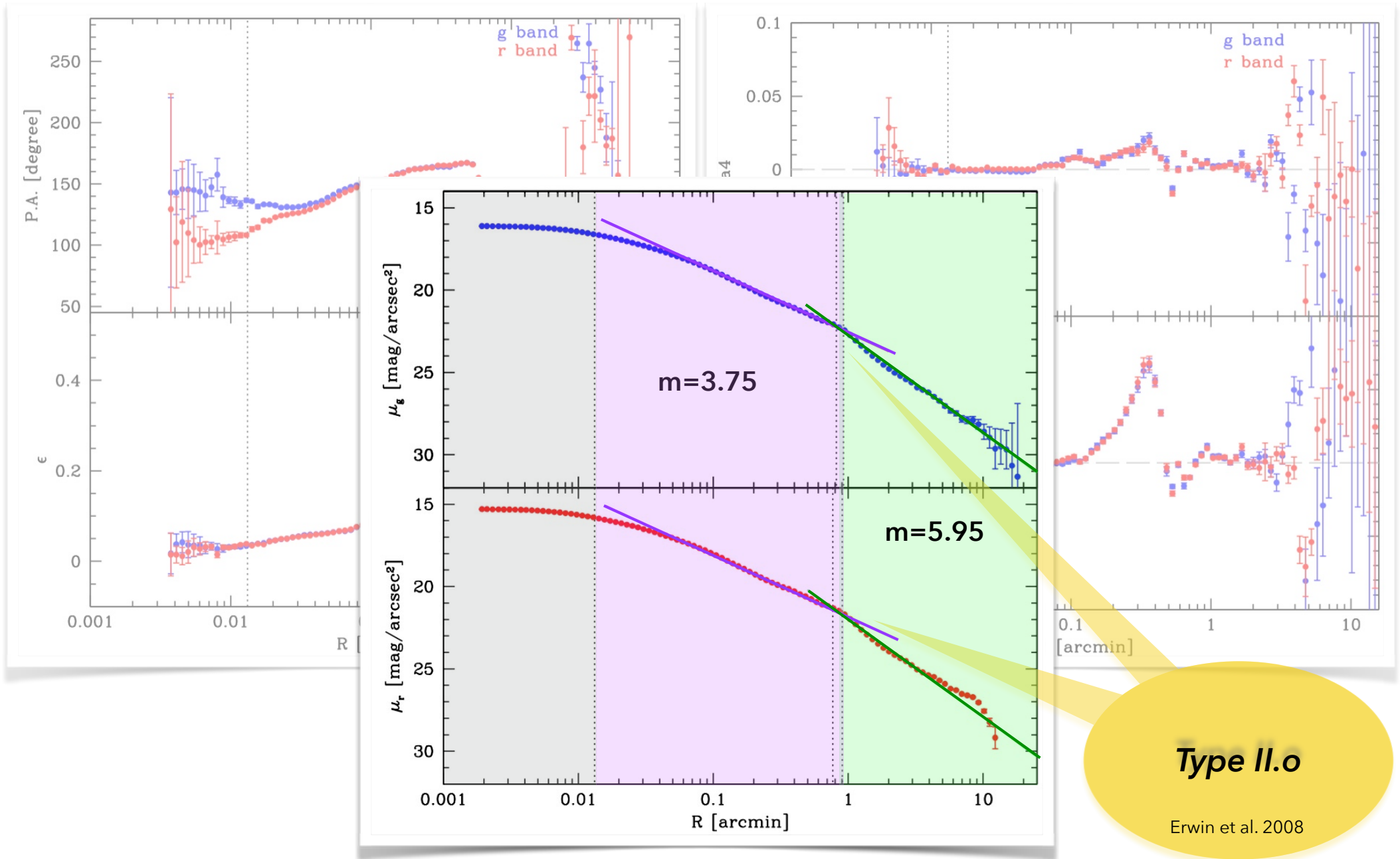


$$82.58 \lesssim R \lesssim 300 \quad \text{arcsec}$$

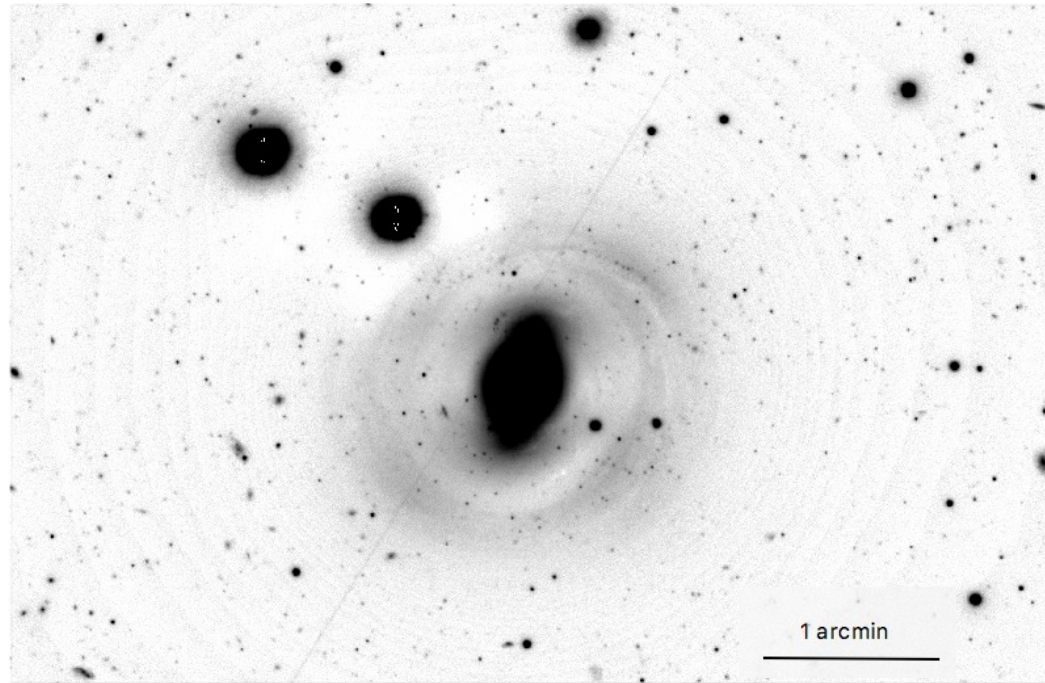
Photometry - Surface Brightness Profile



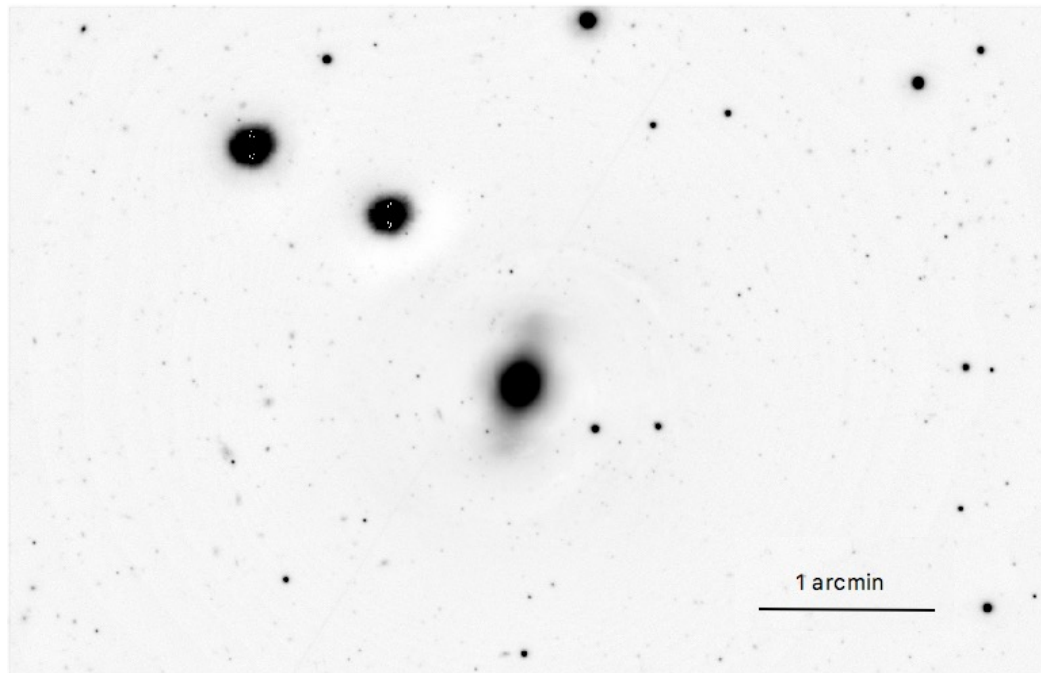
Photometry - Surface Brightness Profile



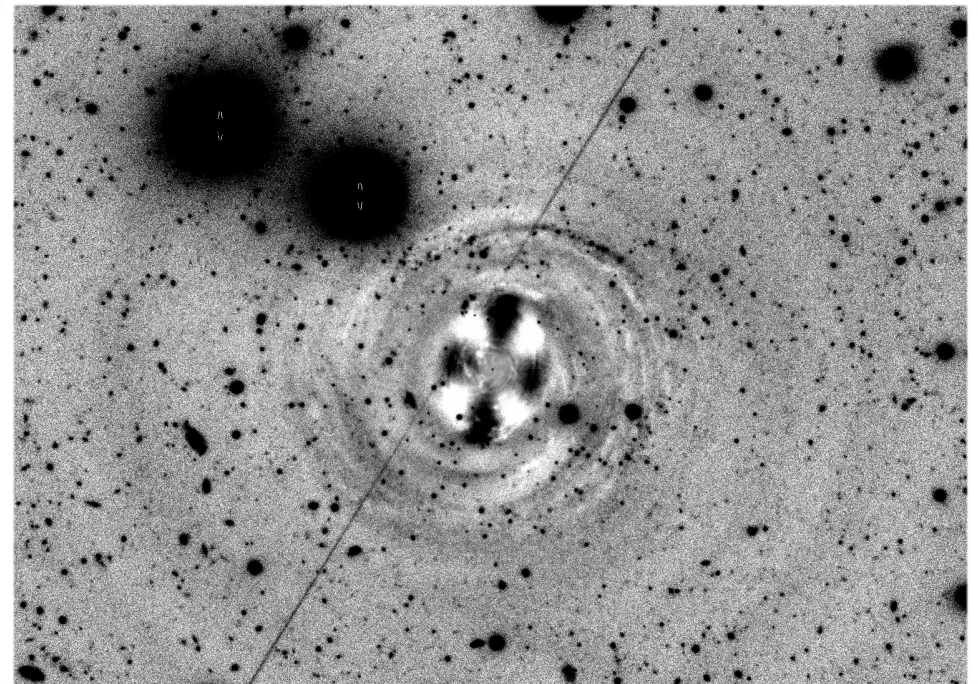
Photometry - Structures



High frequency image with
2D window of 300x300 px

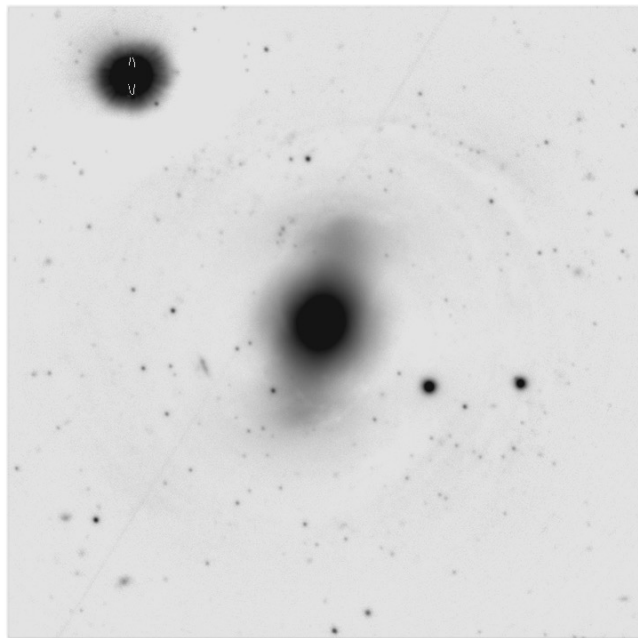
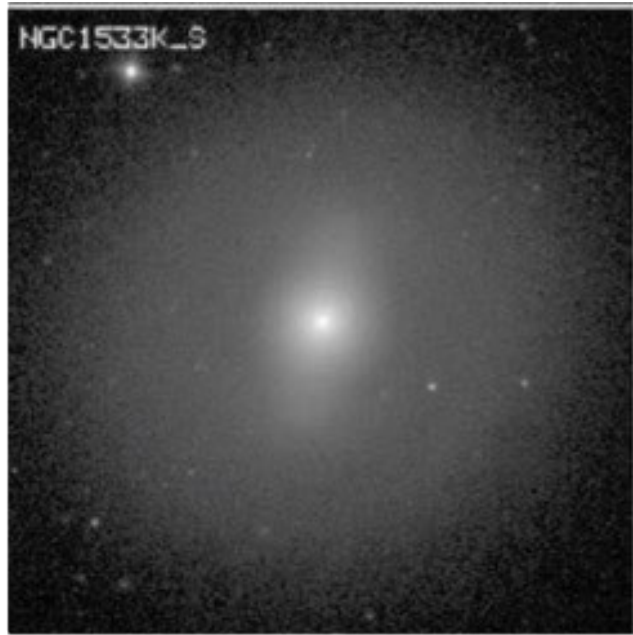


High frequency image with 2D window of 150x150 px



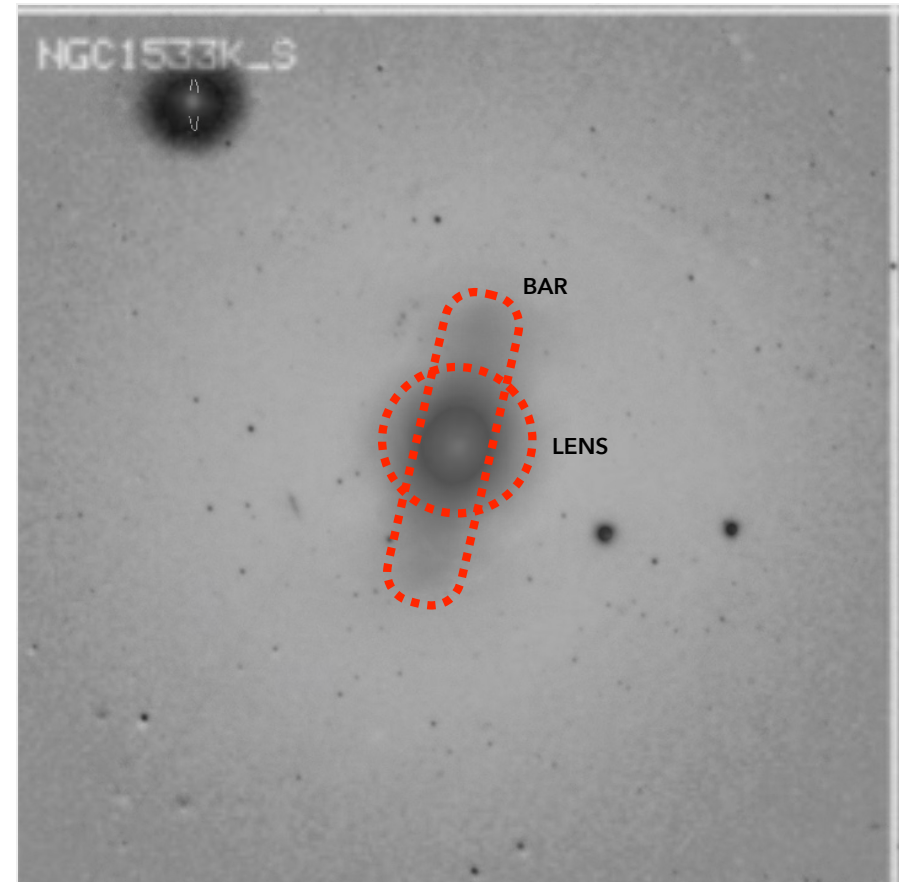
Residual image from 2D model subtraction

Photometry - Structures

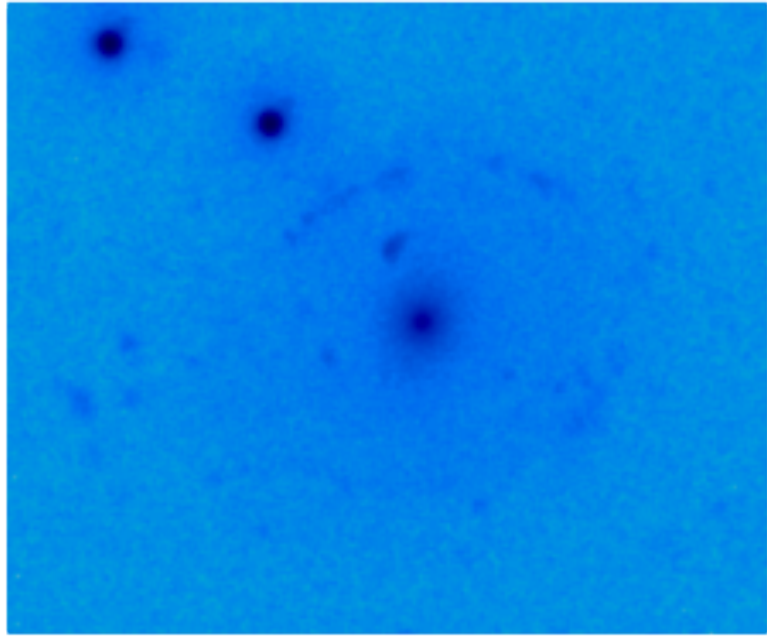


NTT K_s image

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

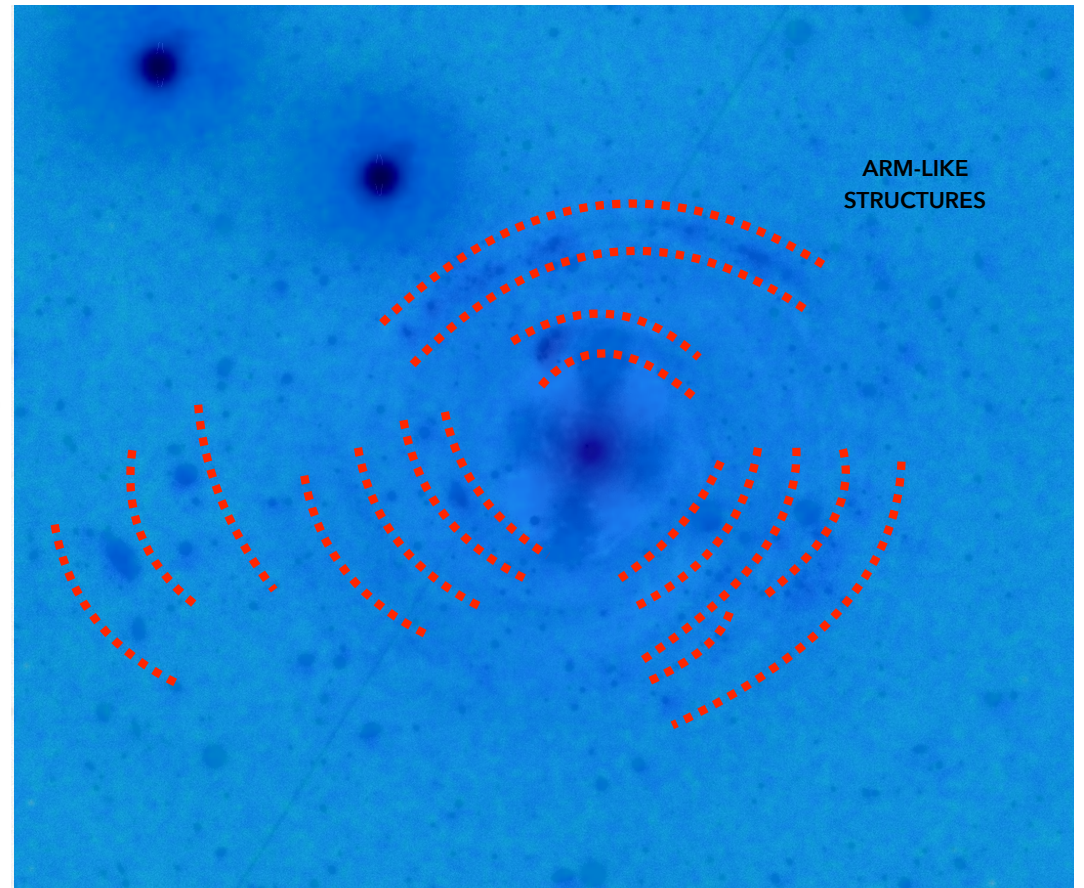
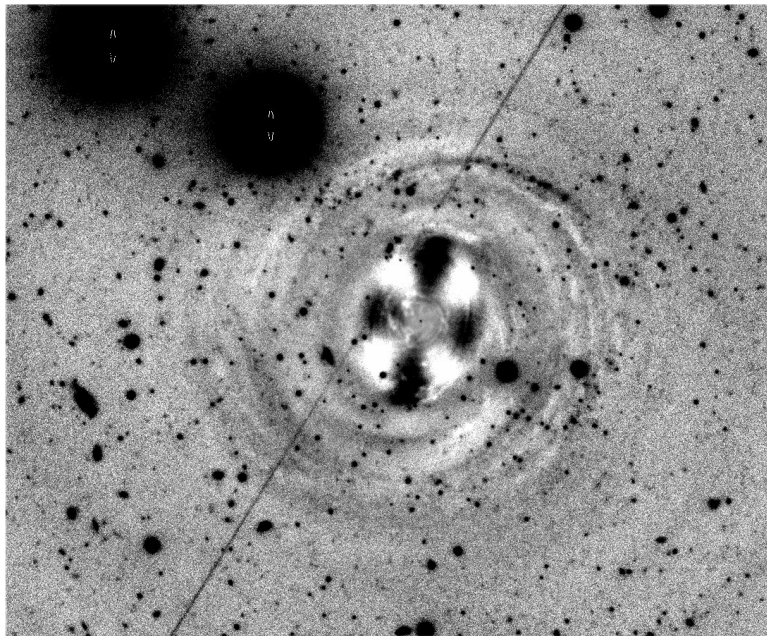


Photometry - Structures



Swift-UVOT W2 image

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

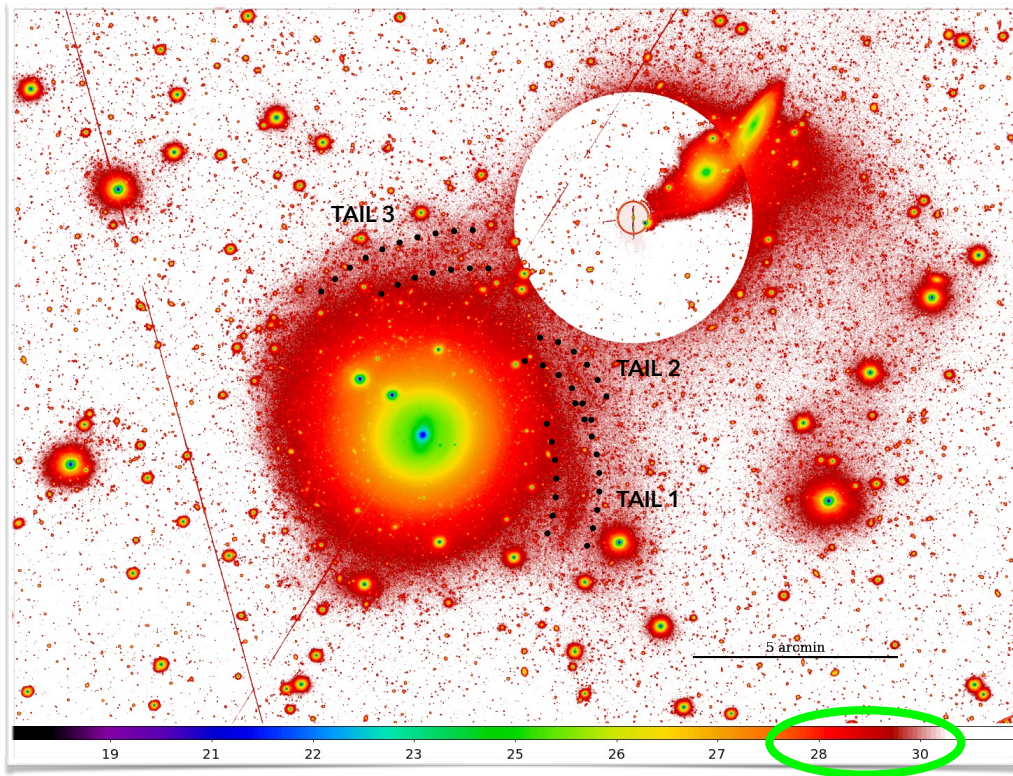


ARM-LIKE
STRUCTURES

Photometry - Structures

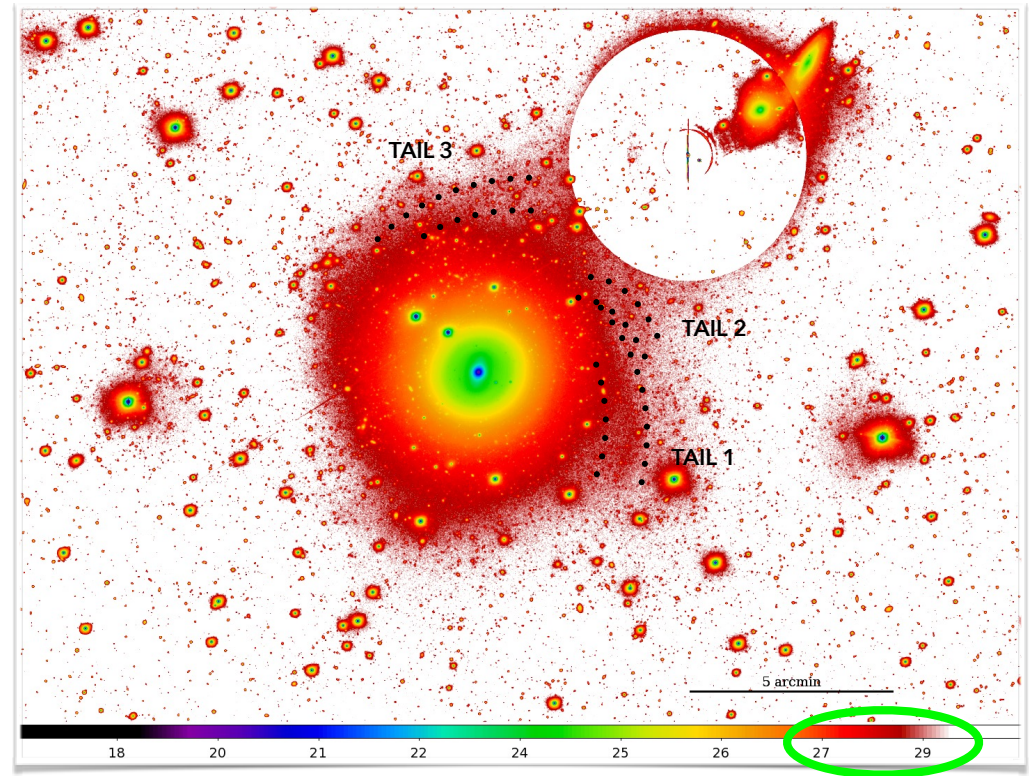
g band

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

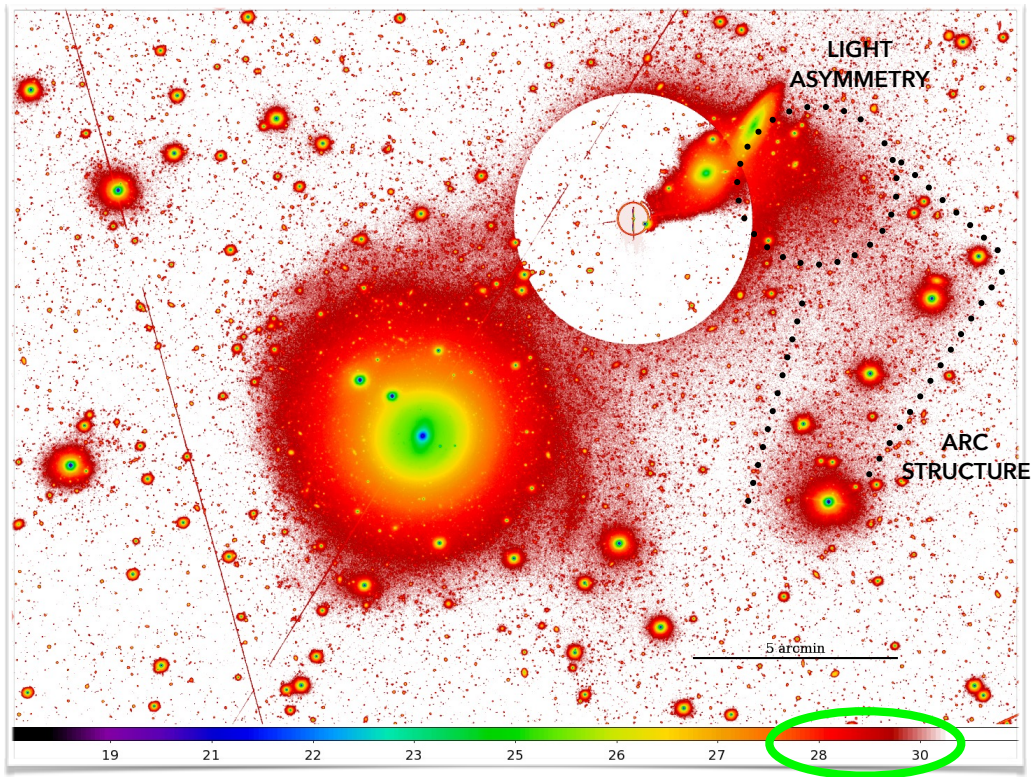


<i>Tail</i>	<i>Centre distance</i> [arcsec]
1	229.27
2	237.02
3	220.34

Photometry - Structures

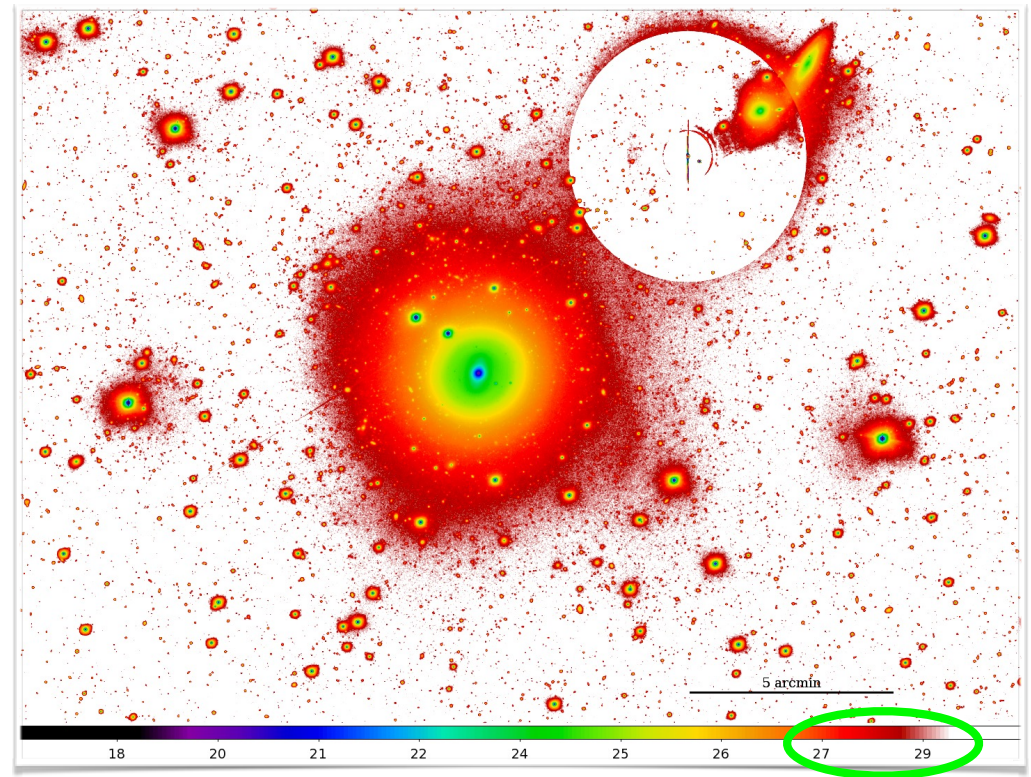
g band

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

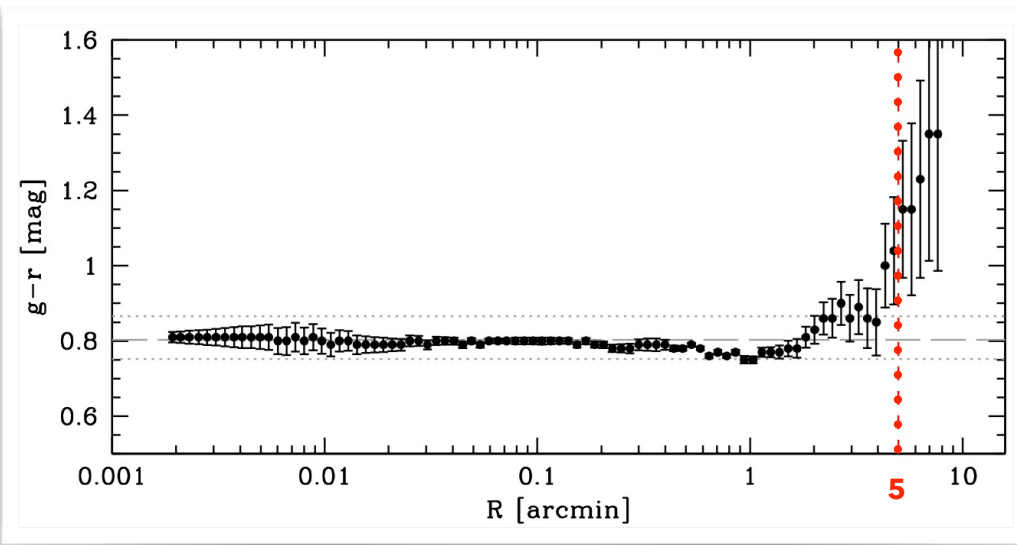


r band

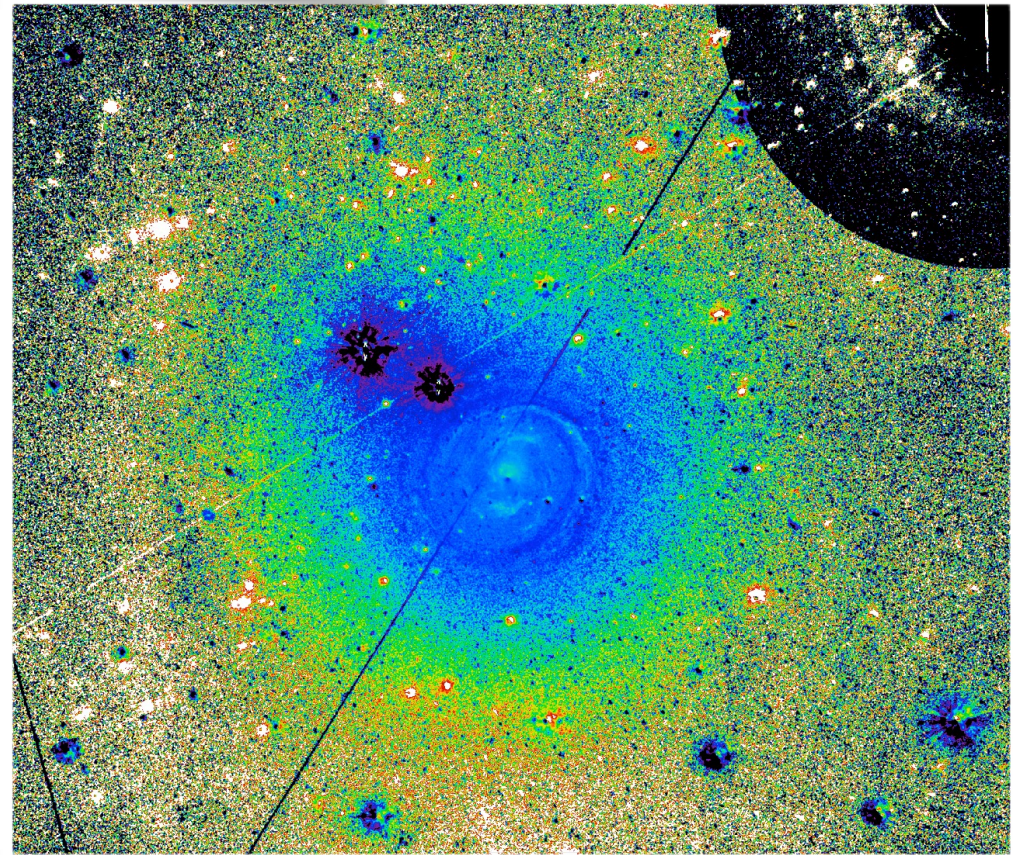
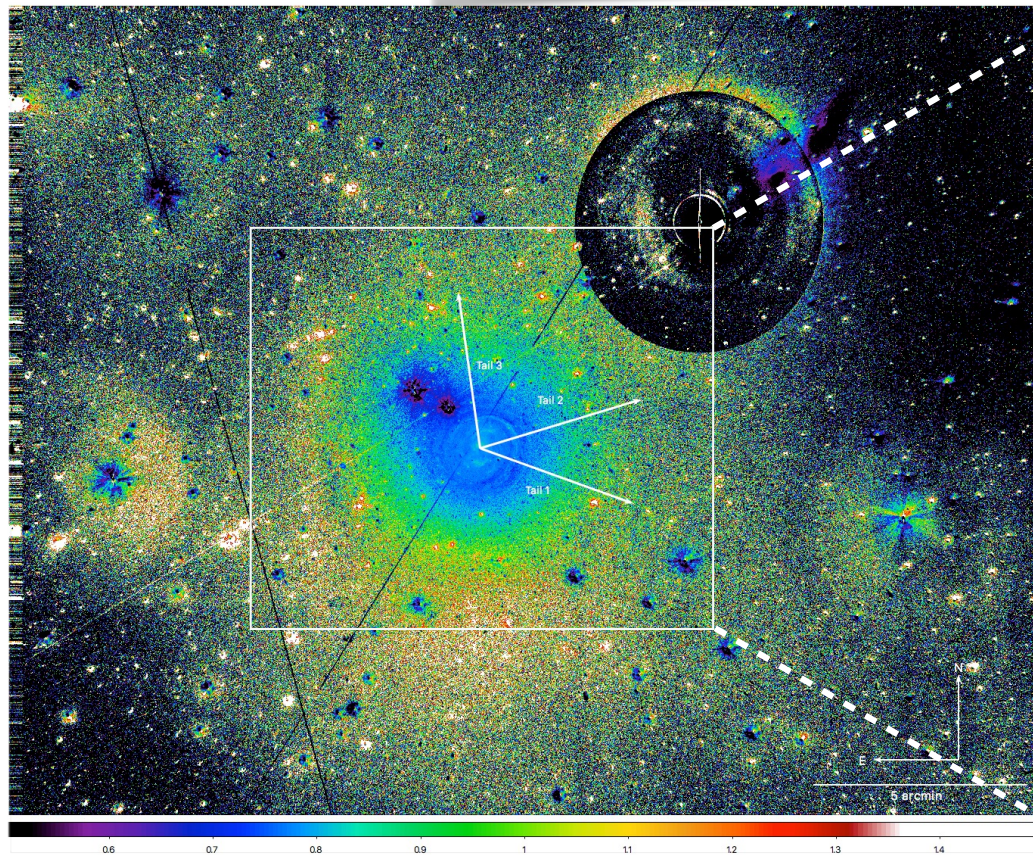
image in units of magnitude, with sky subtraction and subtracted star by 2D model



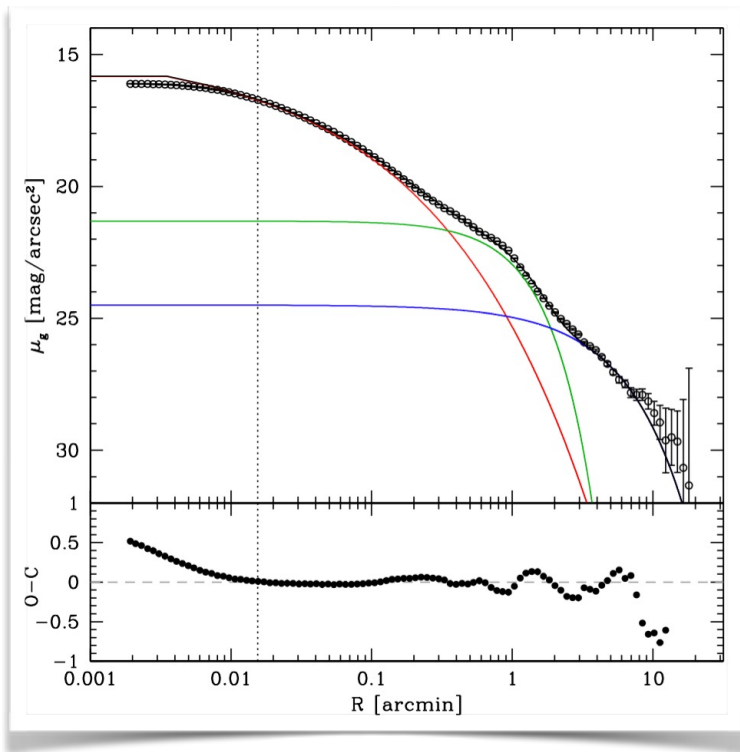
Photometry - Colour profile



$$(g-r)=0.809\pm0.057 \text{ mag}$$



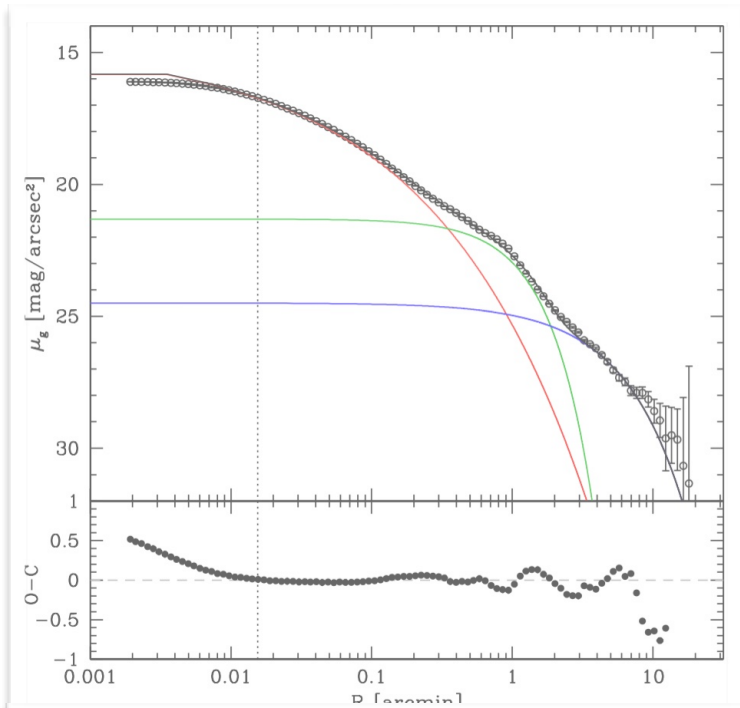
Decomposition



1D decomposition in g band

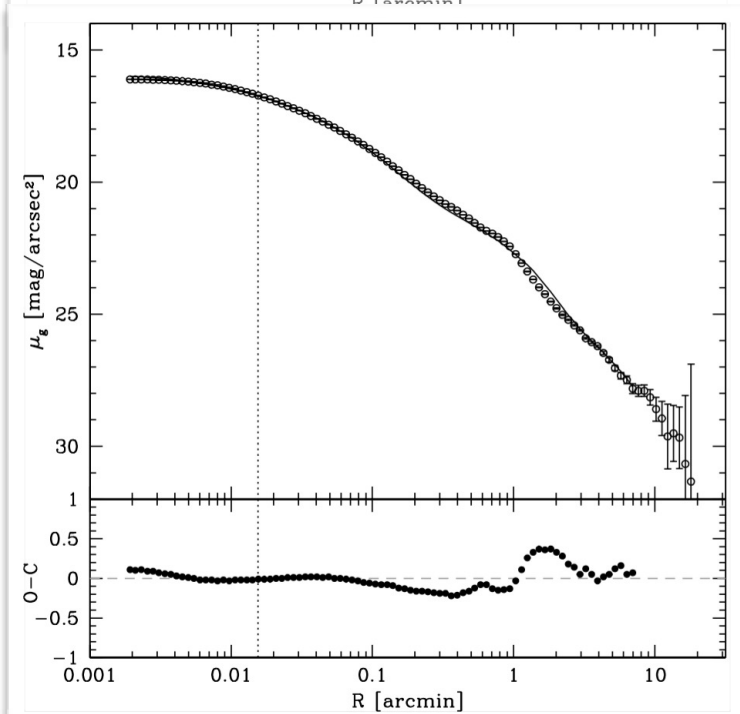
Function	Index	$[arcsec]$	$[mag arcsec^{-2}]$
Sérsic	2.5	$r_e=9.5$	$\mu_e=19.8$
Sérsic	0.7	$r_e=47.0$	$\mu_e=22.48$
Exponential		$r_0=140.0$	$\mu_0=24.5$

Decomposition



1D decomposition in g band

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



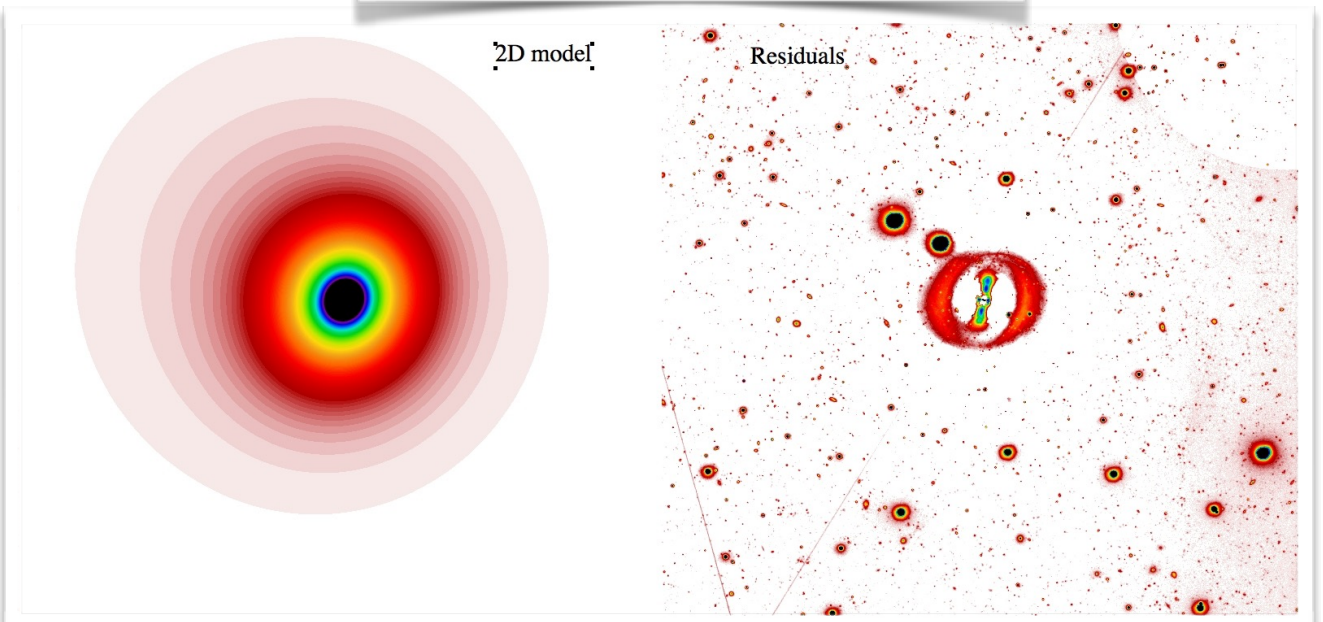
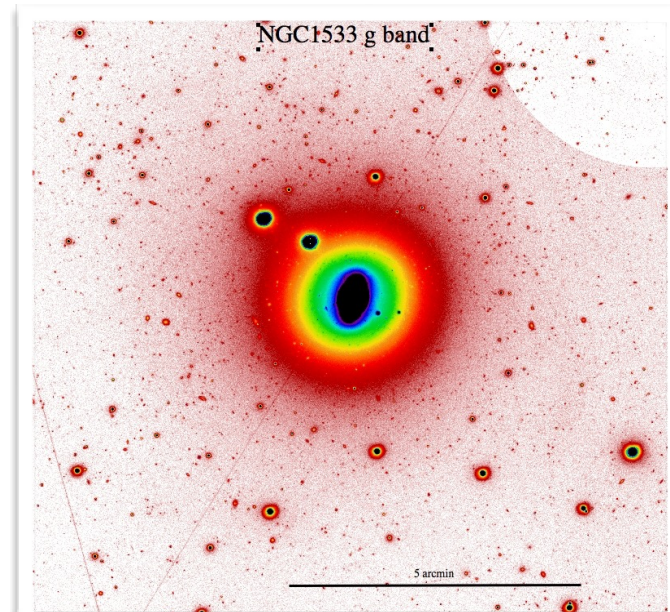
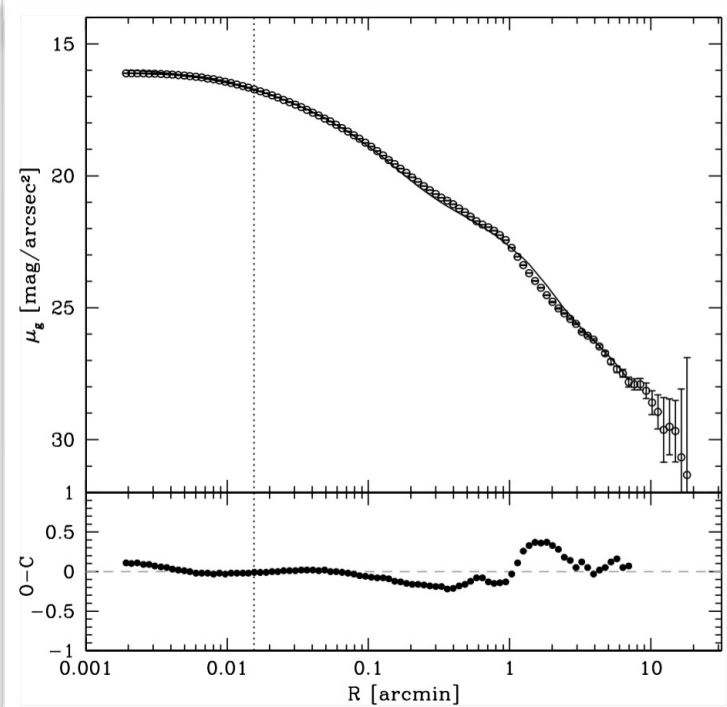
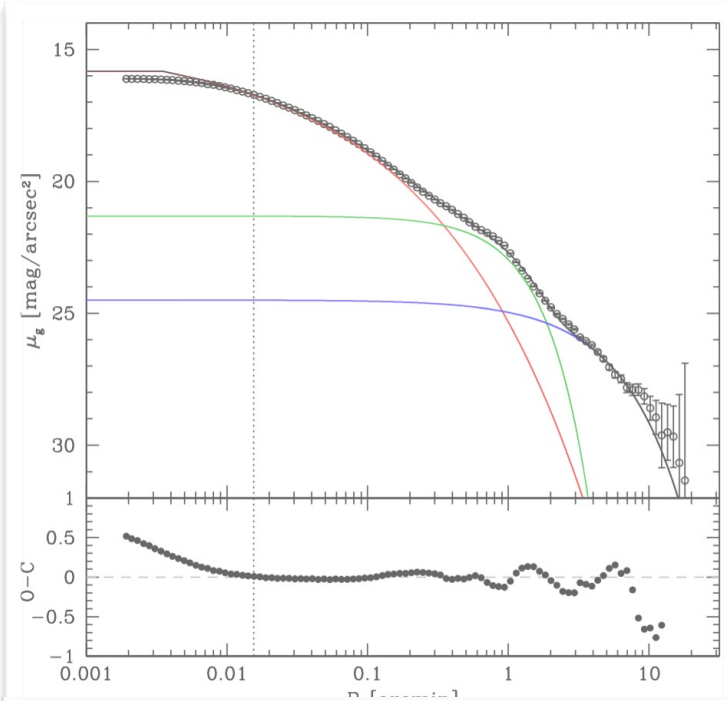
2D decomposition in g band using GALFIT

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

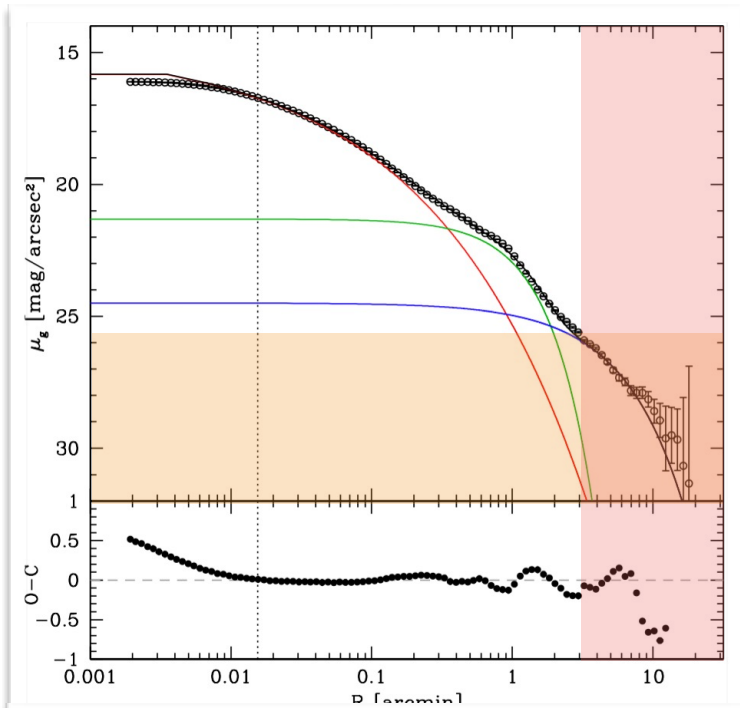
Using a mask and considering the mean value of the residual sky-subtraction fluctuations

Decomposition

2D decomposition in g band using GALFIT

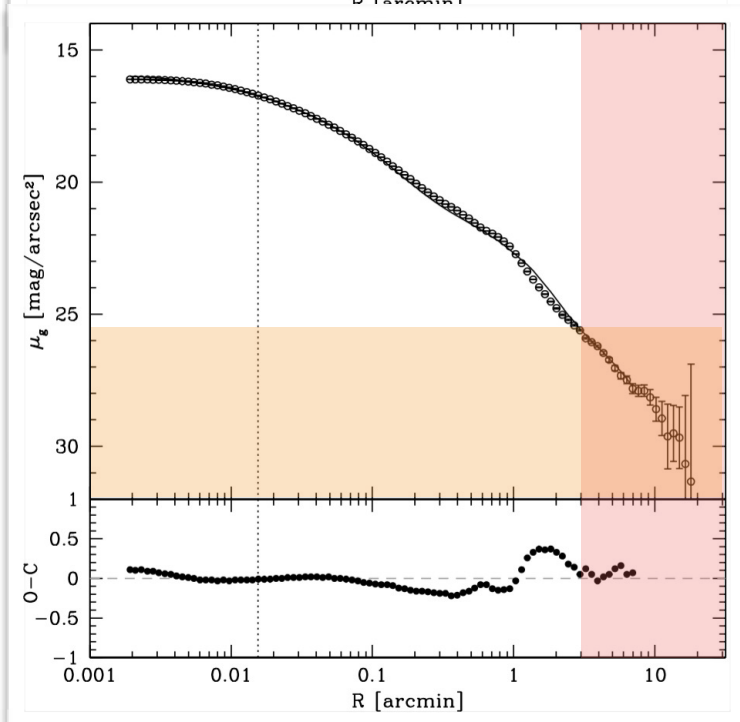


Decomposition



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		$r_0=140.0$	$\mu_0=24.5$

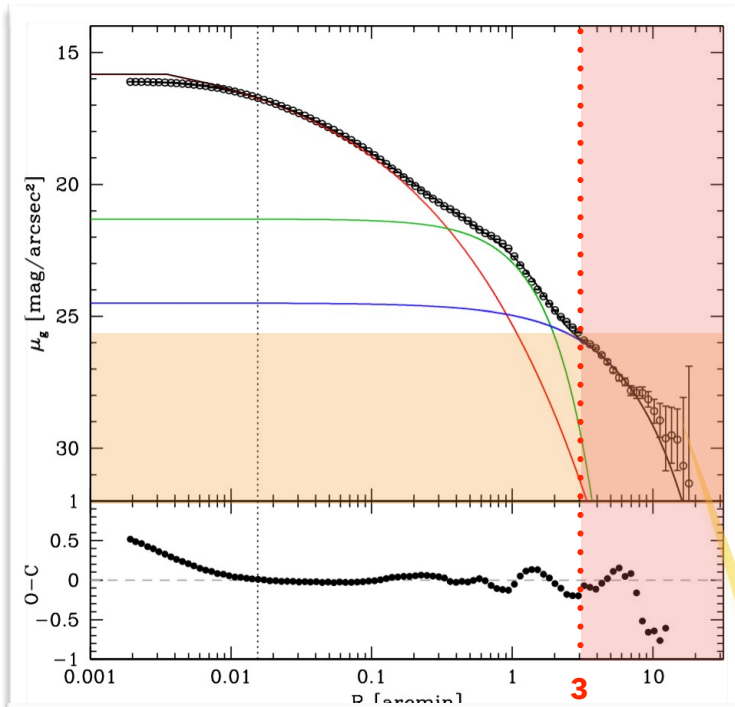


2D decomposition in g band using GALFIT

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)		$r_0=140.00$	$m_0=11.77$

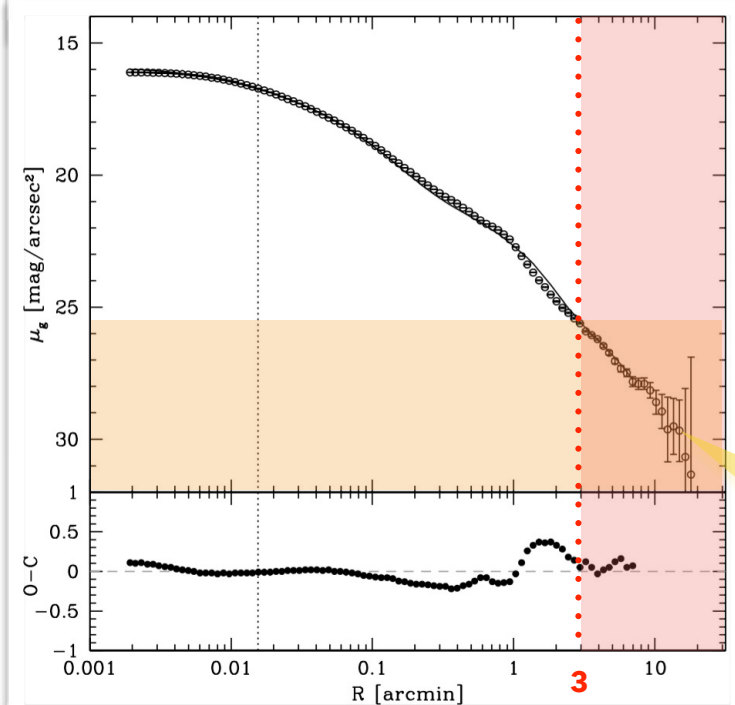
Using a mask and considering the mean value of the residual sky-subtraction fluctuations

Decomposition



1D decomposition in g band

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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

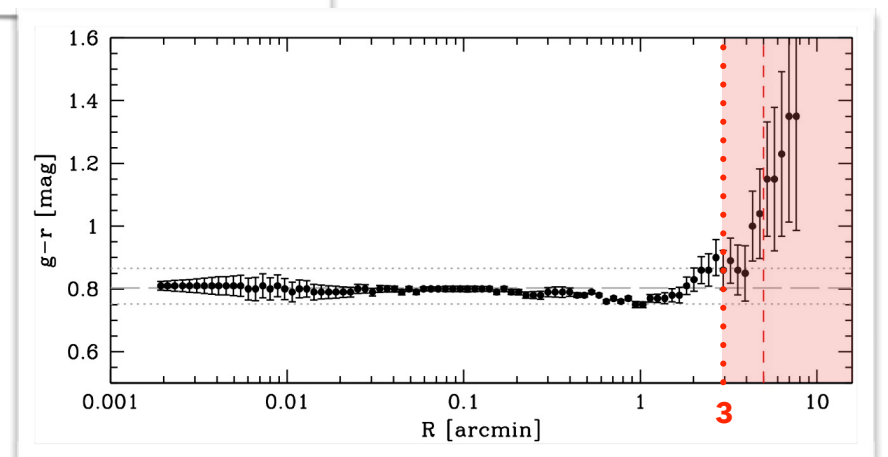
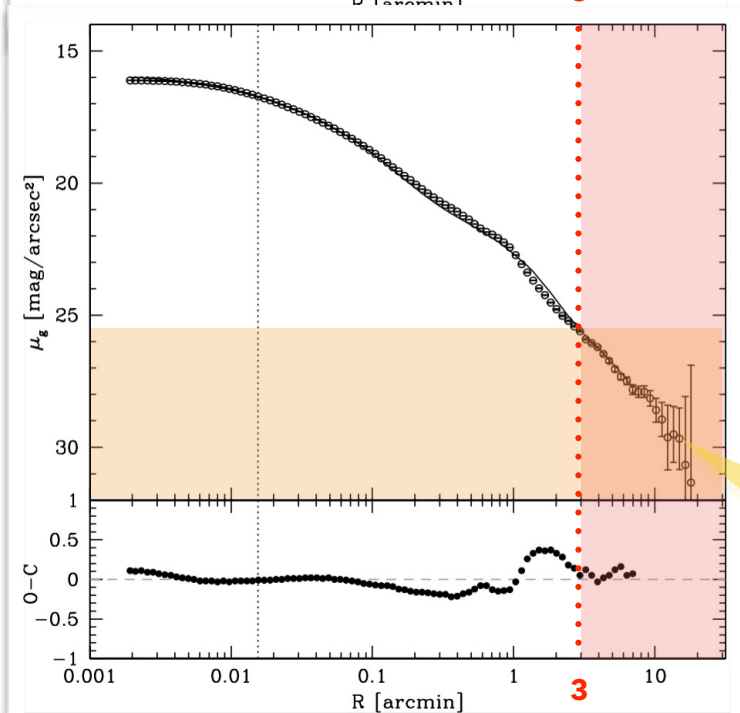
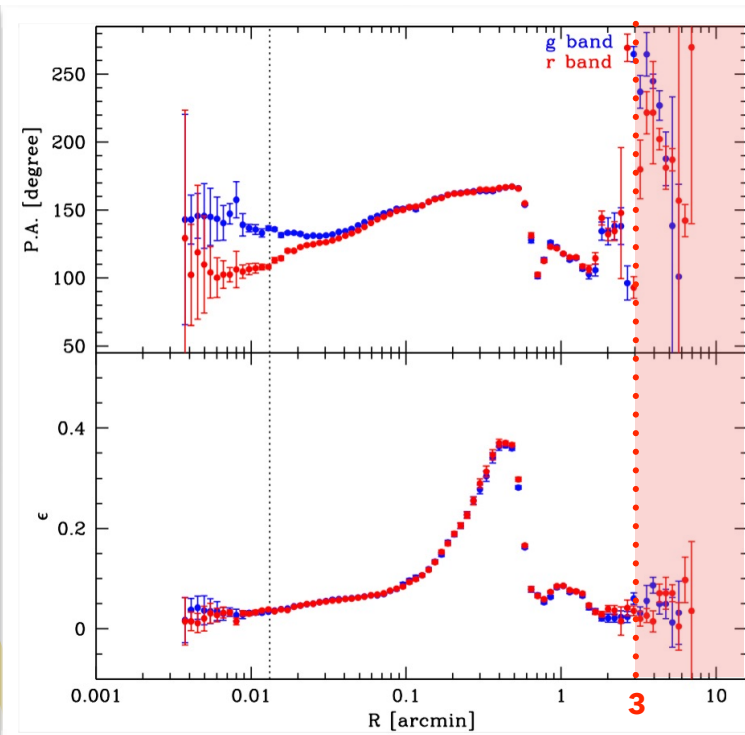
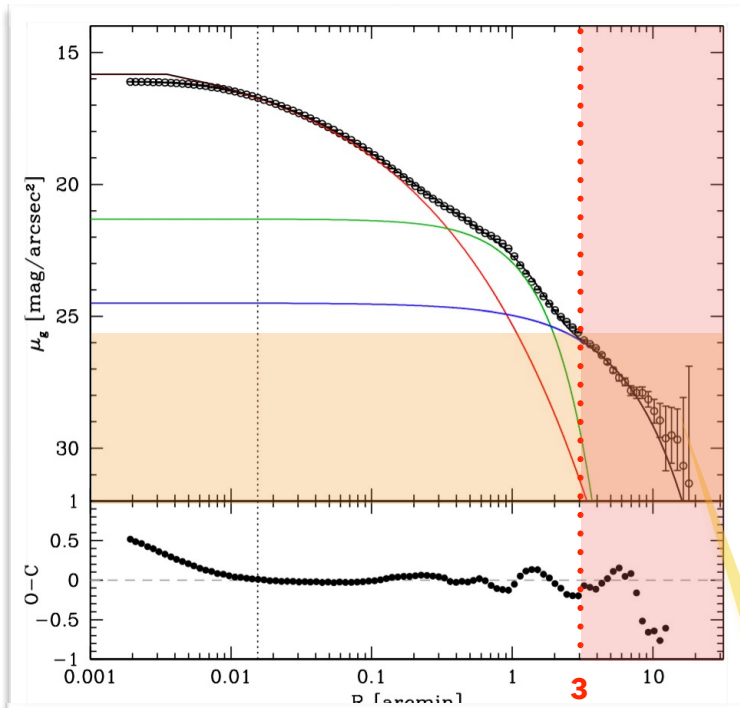
Function	Index	[arcsec]	[mag]
Sérsic	1.7	$r_e=5.76$	$m_e=12.31$
Exponential		$r_0=30.32$	$m_0=11.32$
Exponential (fix)		$r_0=140.00$	$m_0=11.77$

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!

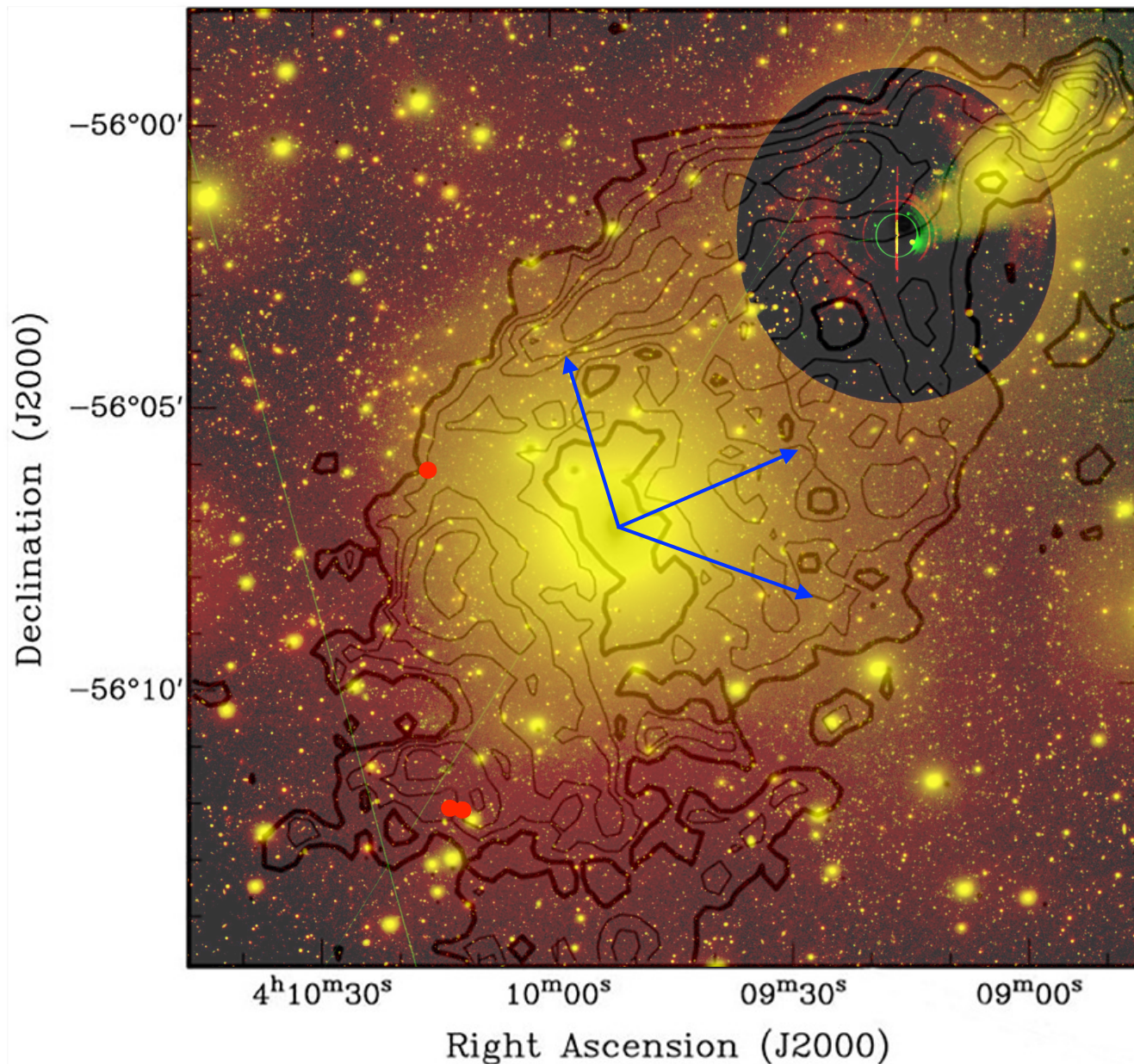
Iodice et al. 2016

~~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

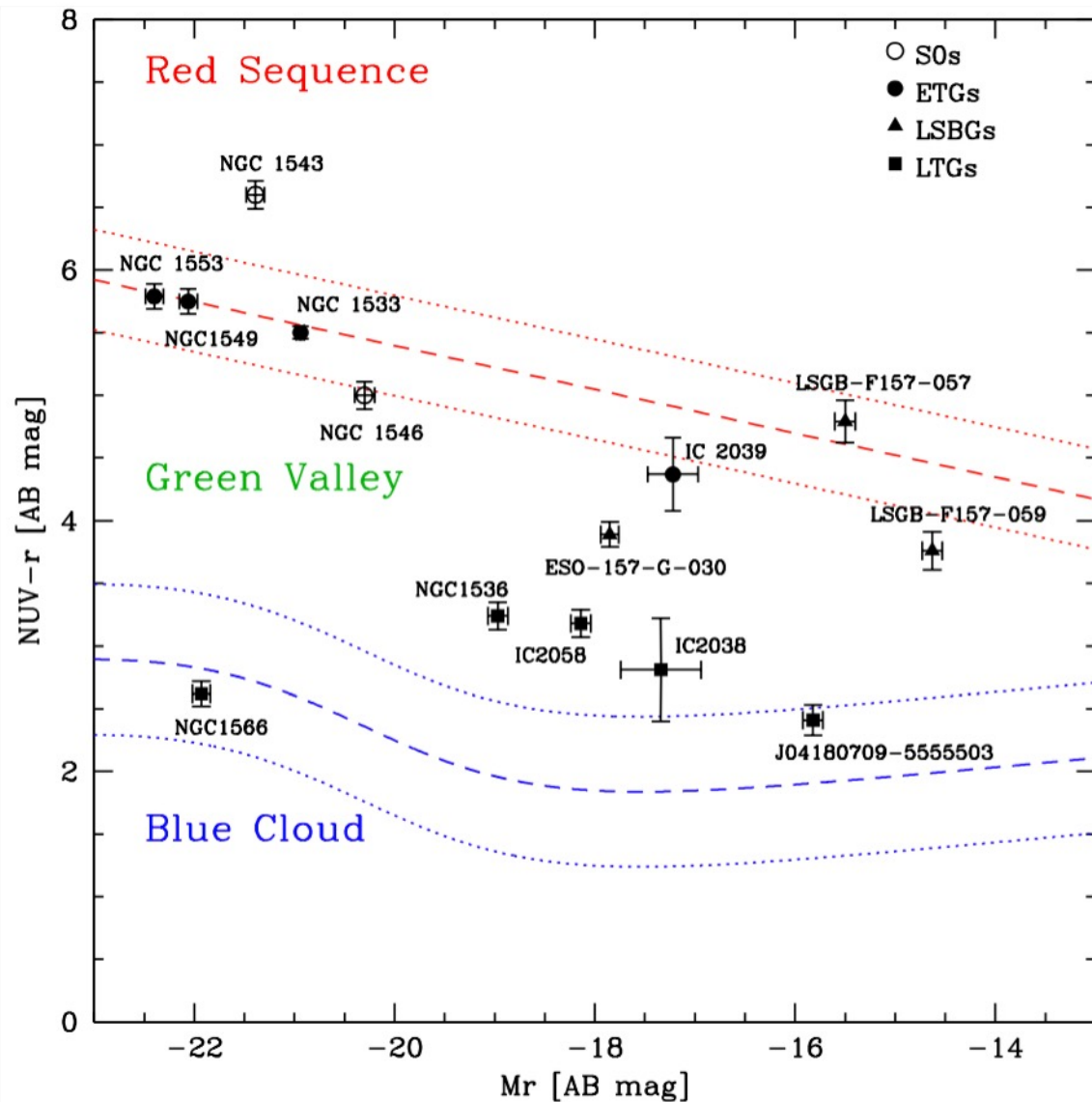
*Galactic recycling:
the HI ring around NGC 1533*

Ryan-Weber, Webster & Bekki, 2003

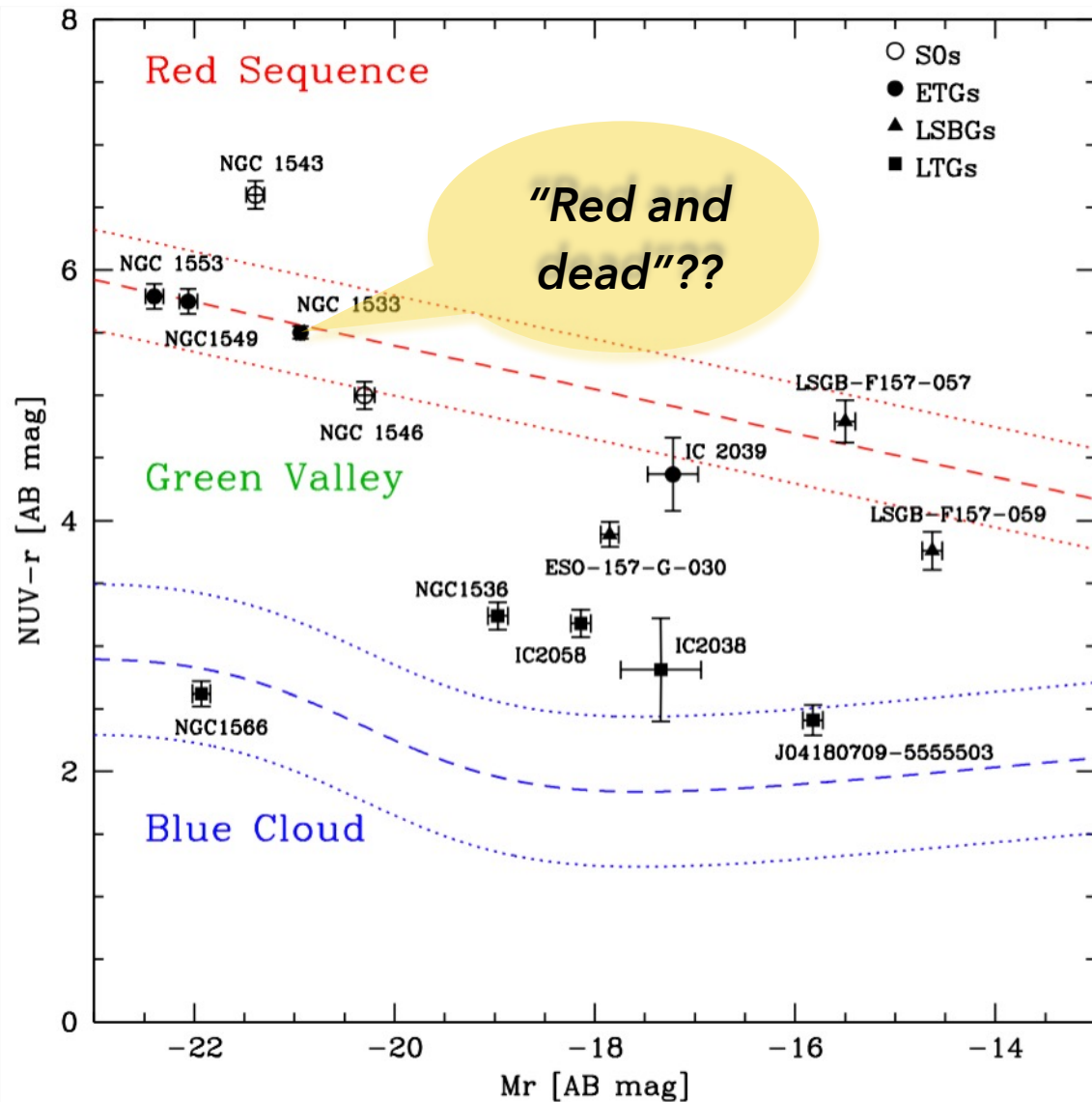
ATCA HI contours are 1.0 (bold), 1.5, 2.0, 2.5 and $3.0 \times 10^{20} \text{ cm}^{-2}$ and have a resolution of about 1'

Werk et al, 2008

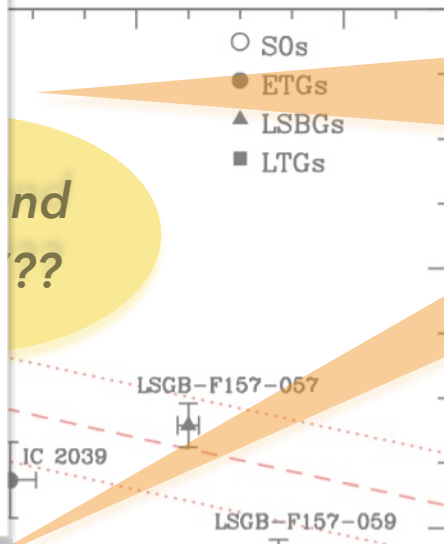
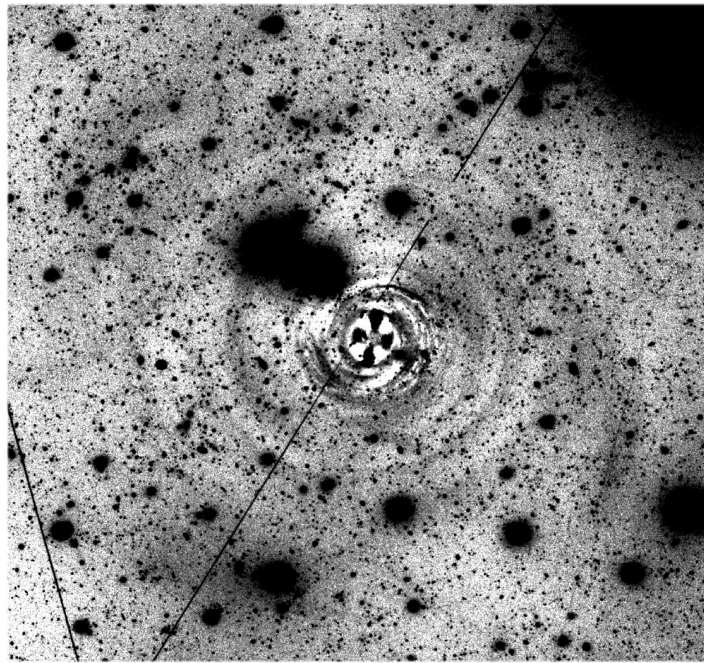
Conclusion - Colour Magnitude Diagram



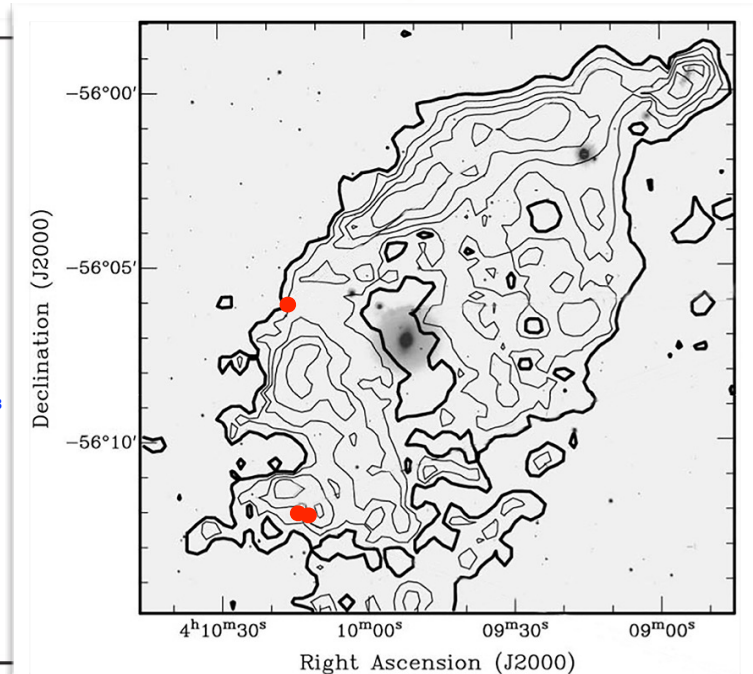
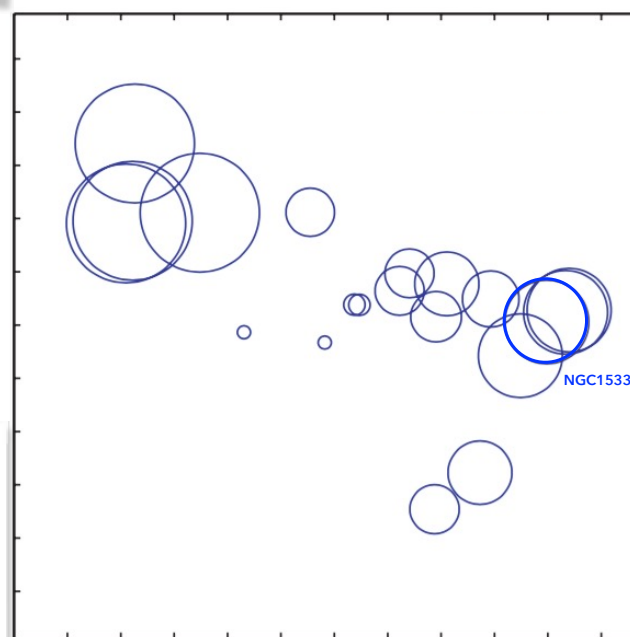
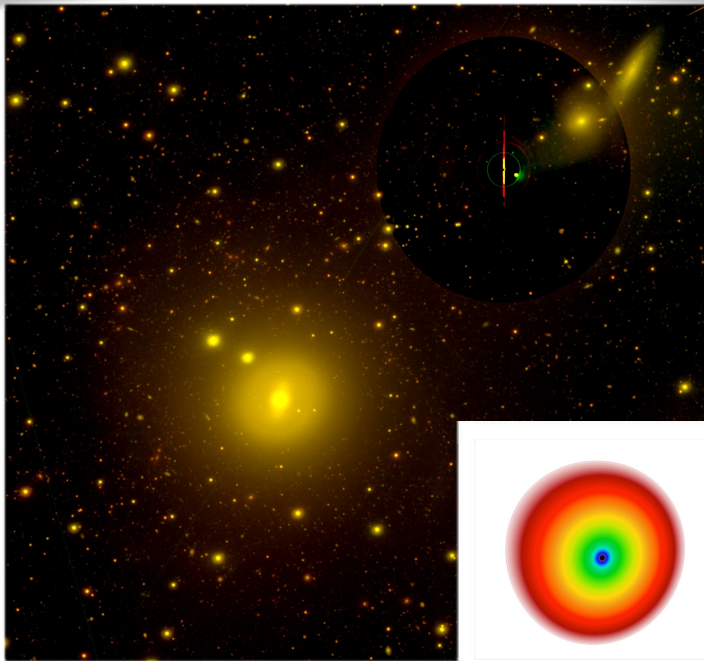
Conclusion - Colour Magnitude Diagram



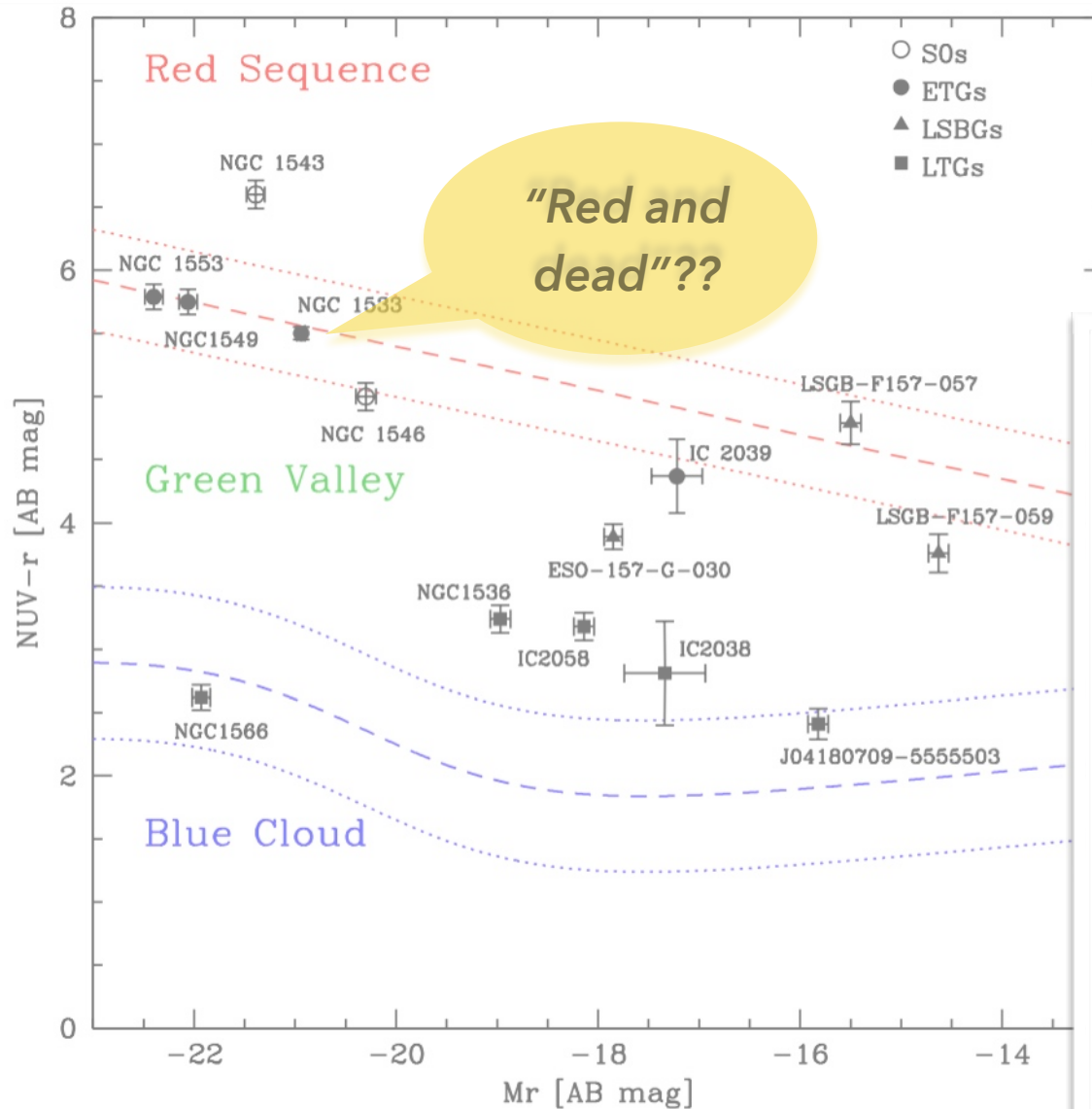
Conclusion - Colour Magnitude Diagram



- *Light asymmetries*
- *Faint spiral-like structures*
- *UV emission regions*
- *H I ring*
- *Connection with IC2038*

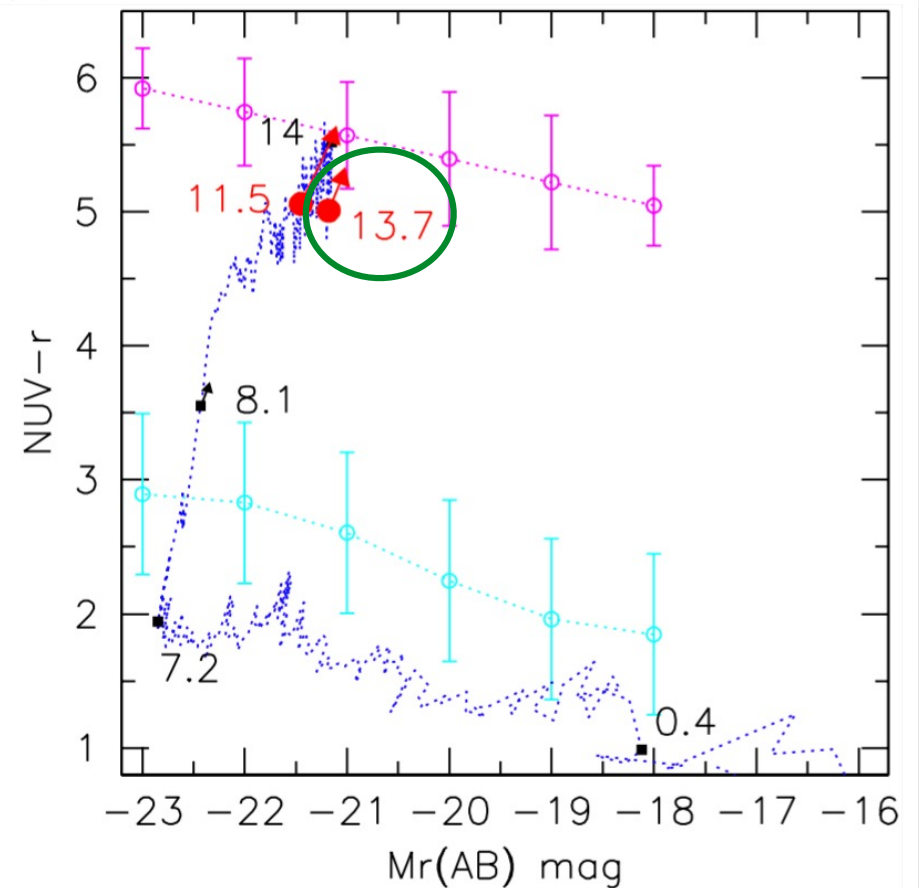


Conclusion - Colour Magnitude Diagram

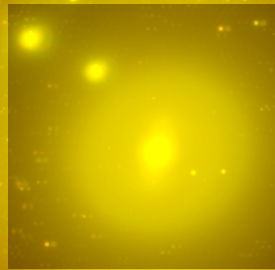
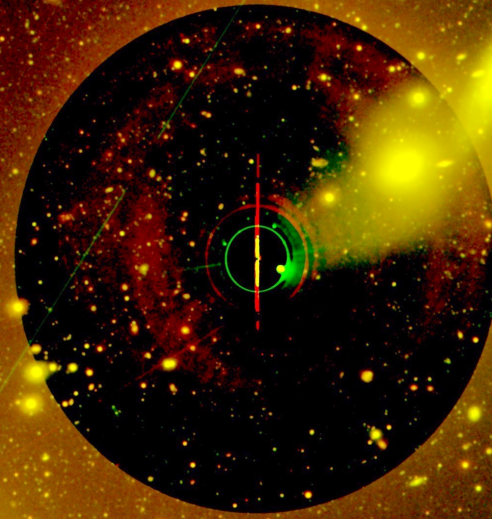


*Catching Spiral-S0 transition in groups?
Insights from SPH simulations with
chemo-photometric implementation*

Mazzei et al, 2014



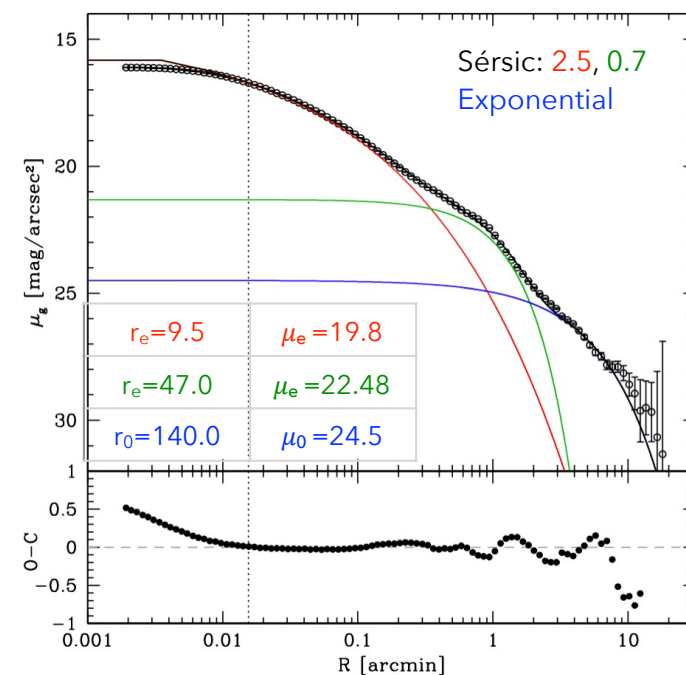
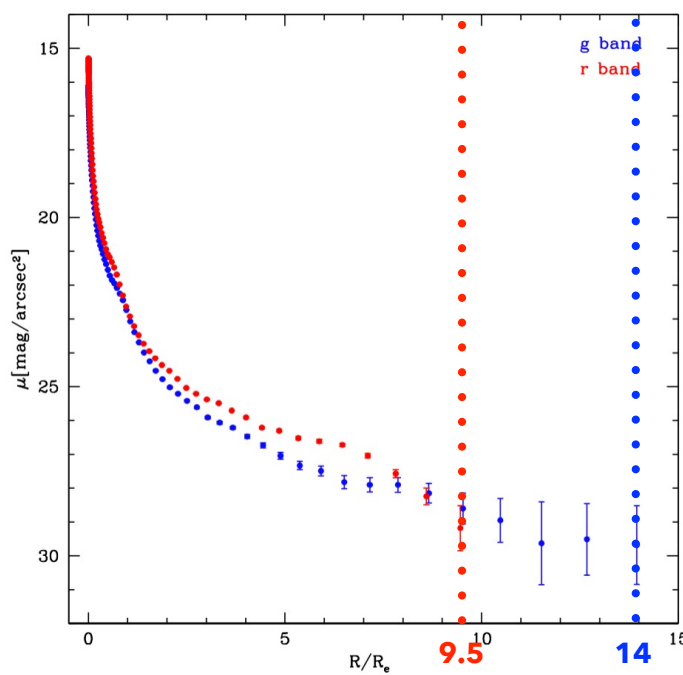
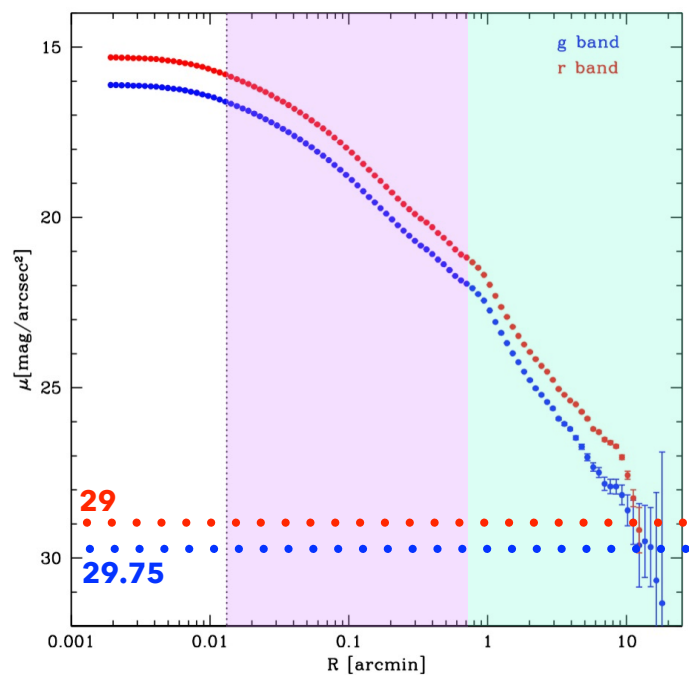
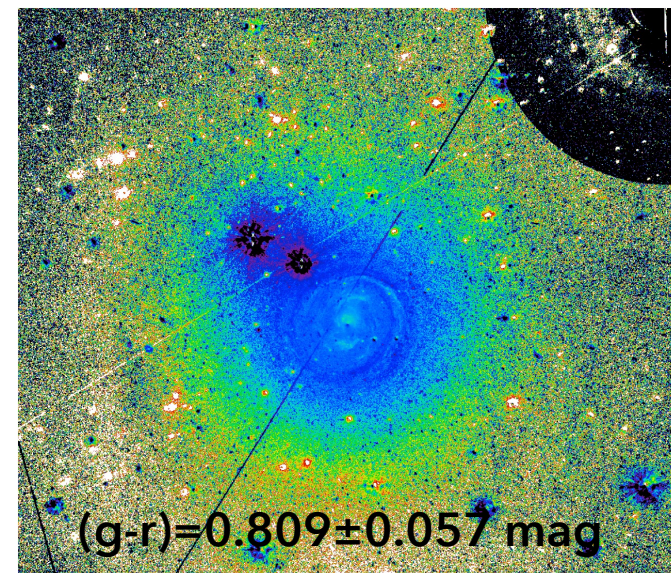
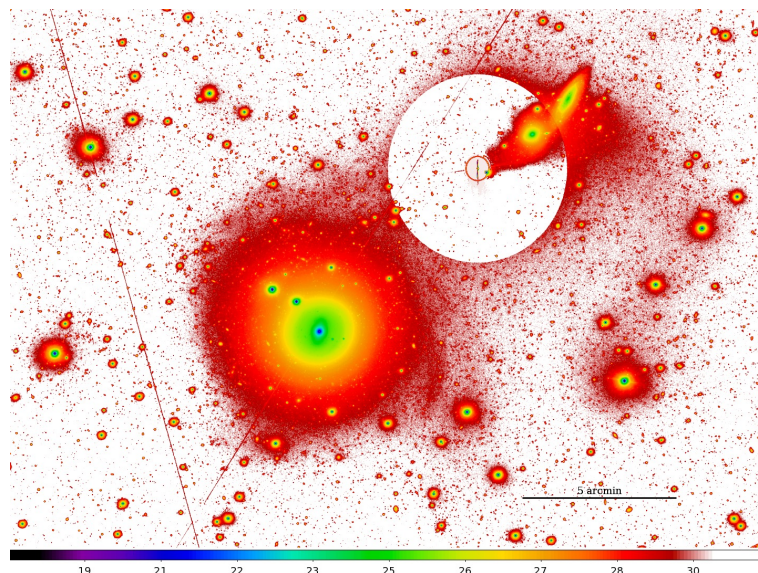
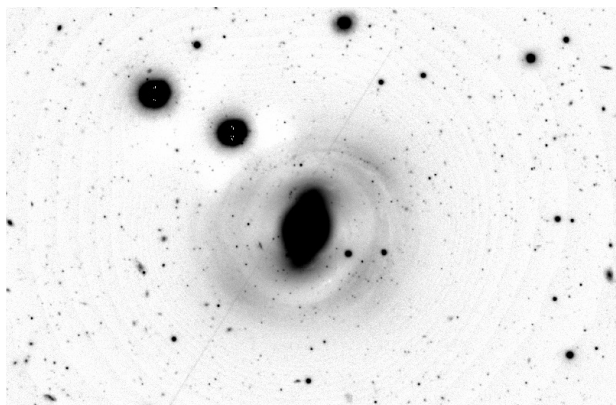
Thanks for



your attention!

Conclusion - Results

(RL)SB0⁰



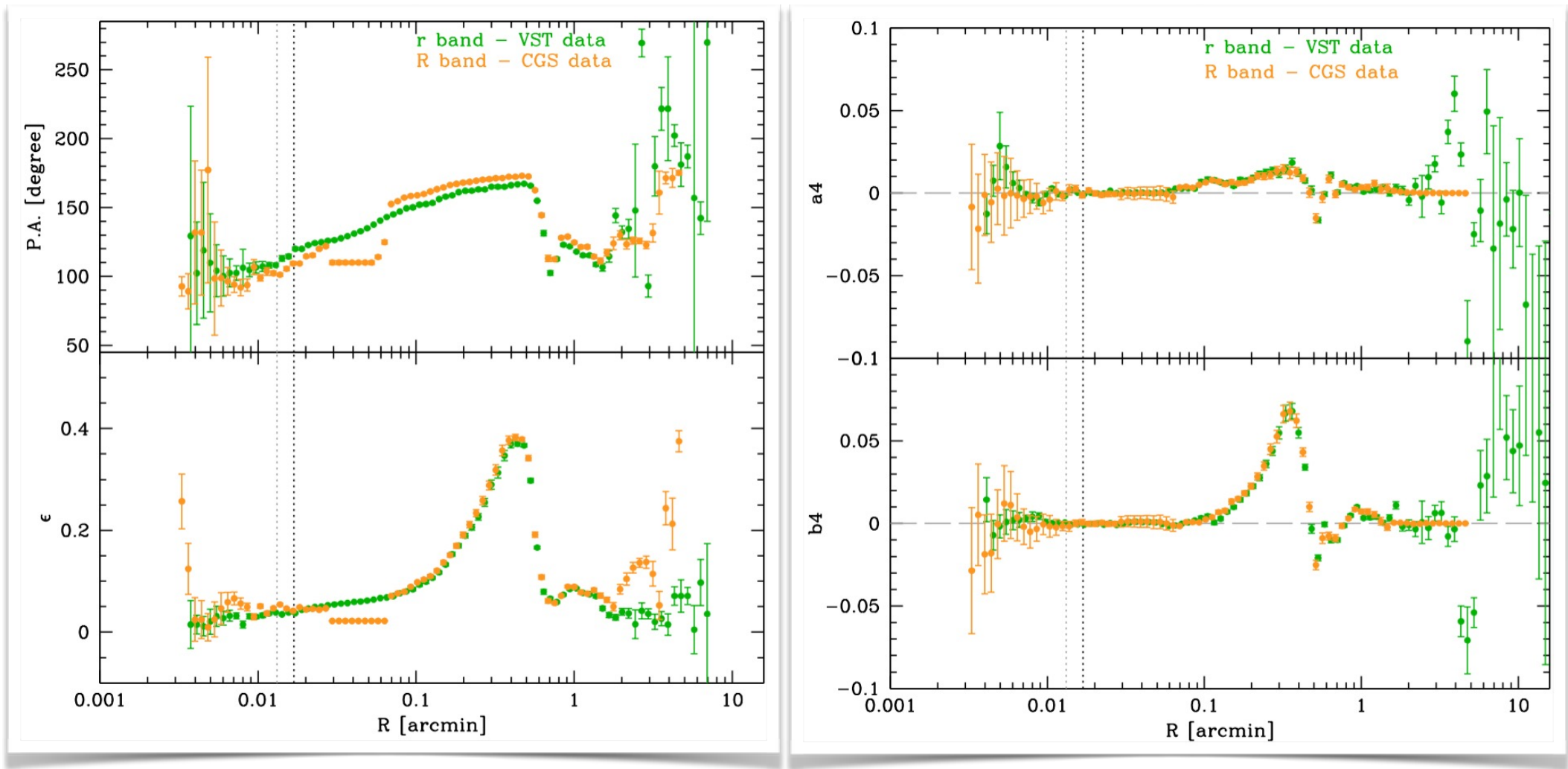
$$m_{\text{tot}}=10.48\pm0.05 \text{ mag}$$

$$m_{\text{tot}}=9.60\pm0.05 \text{ mag}$$

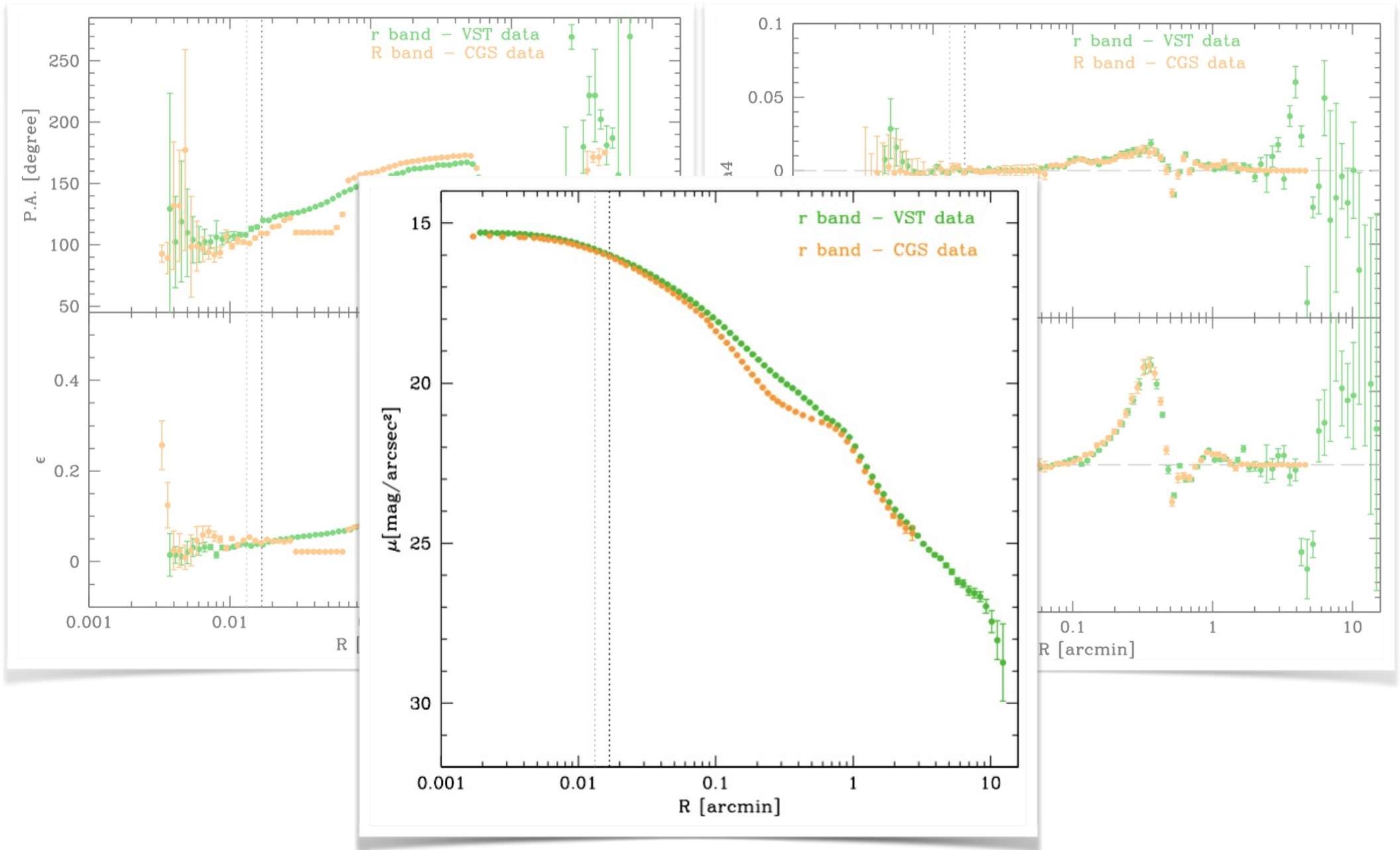
$$R_e=64.17\pm0.16 \text{ arcsec}$$

$$R_e=78.20\pm0.41 \text{ arcsec}$$

Photometry - Geometrical Parameters



Photometry - Surface Brightness Profile



Photometry - Surface Brightness Profile

