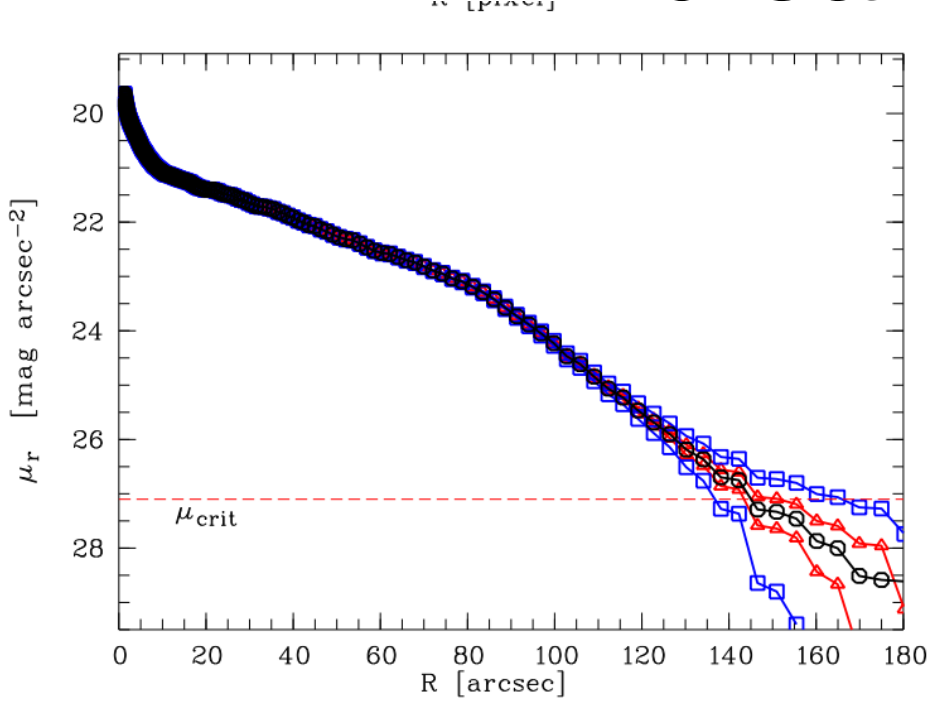
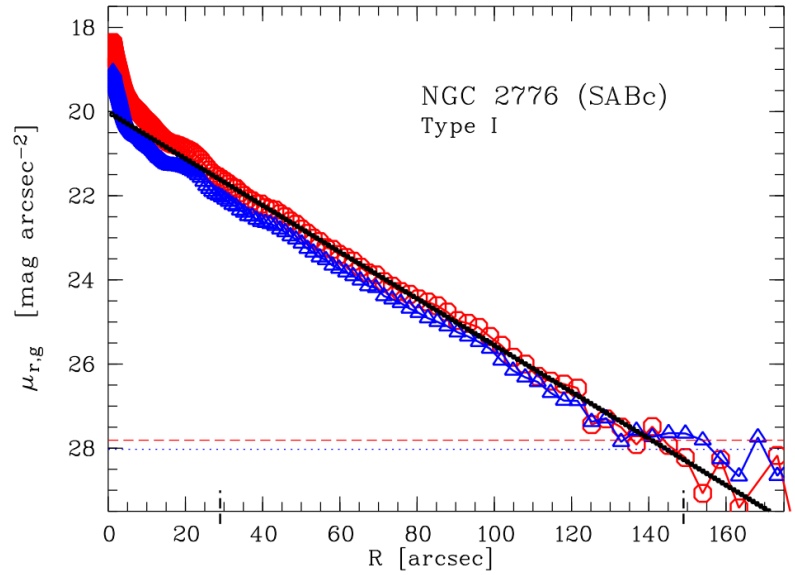
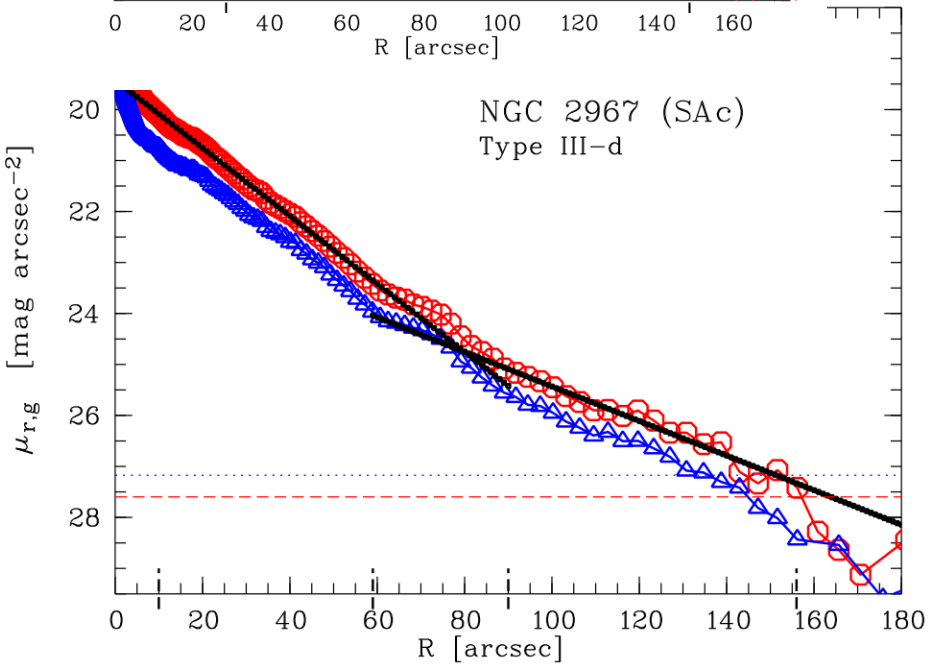
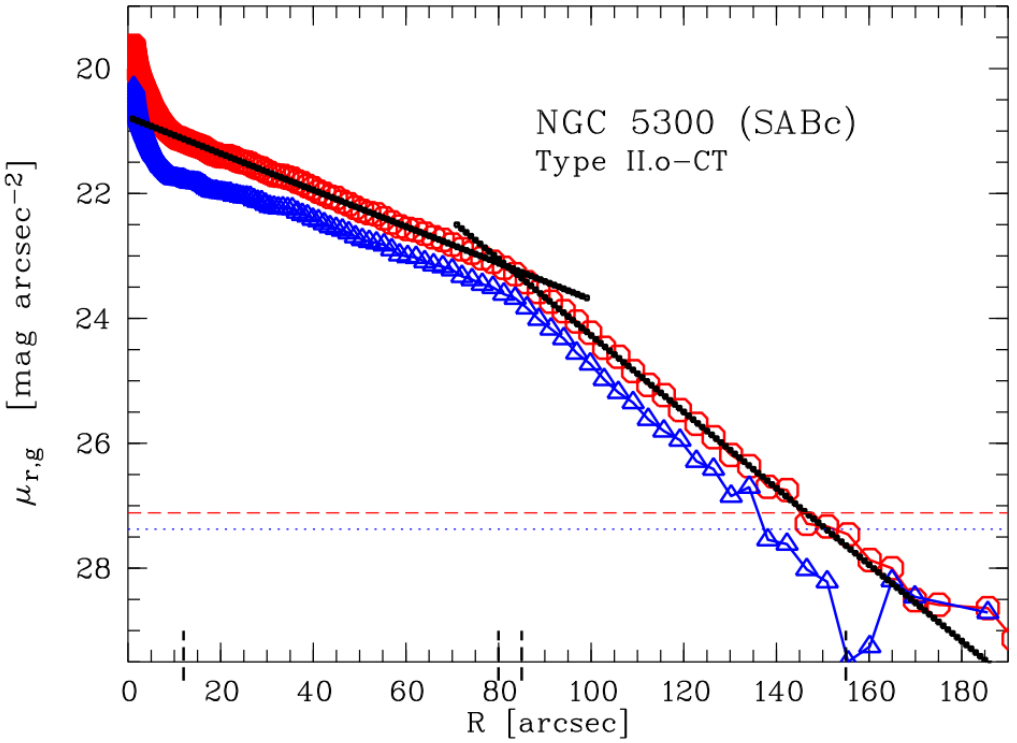
Draw surface brightness profiles of manga dr14 &dr15, using SDSS images, in order to find out the break position




NGC 2776 (SABc)
Type I
$\mu_{r,g}$ [mag arcsec^{-2}]
R [arcsec]

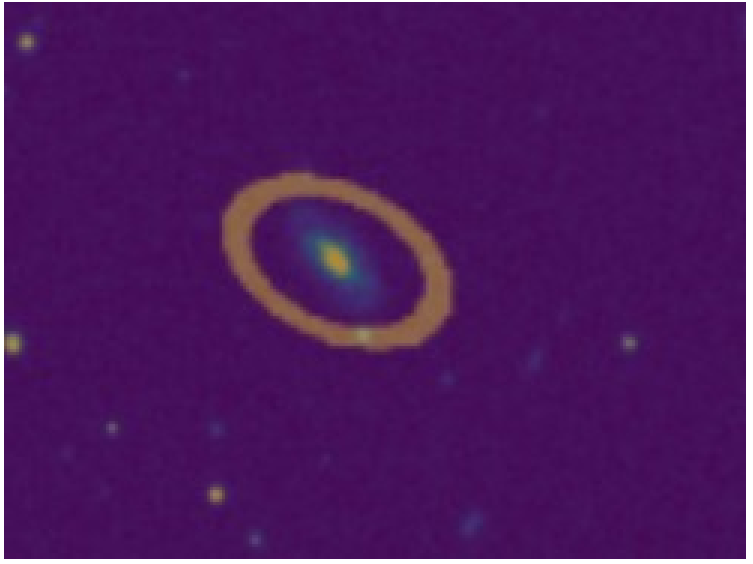

NGC 2967 (SAc)
Type III-d
$\mu_{r,g}$ [mag arcsec^{-2}]
R [arcsec]

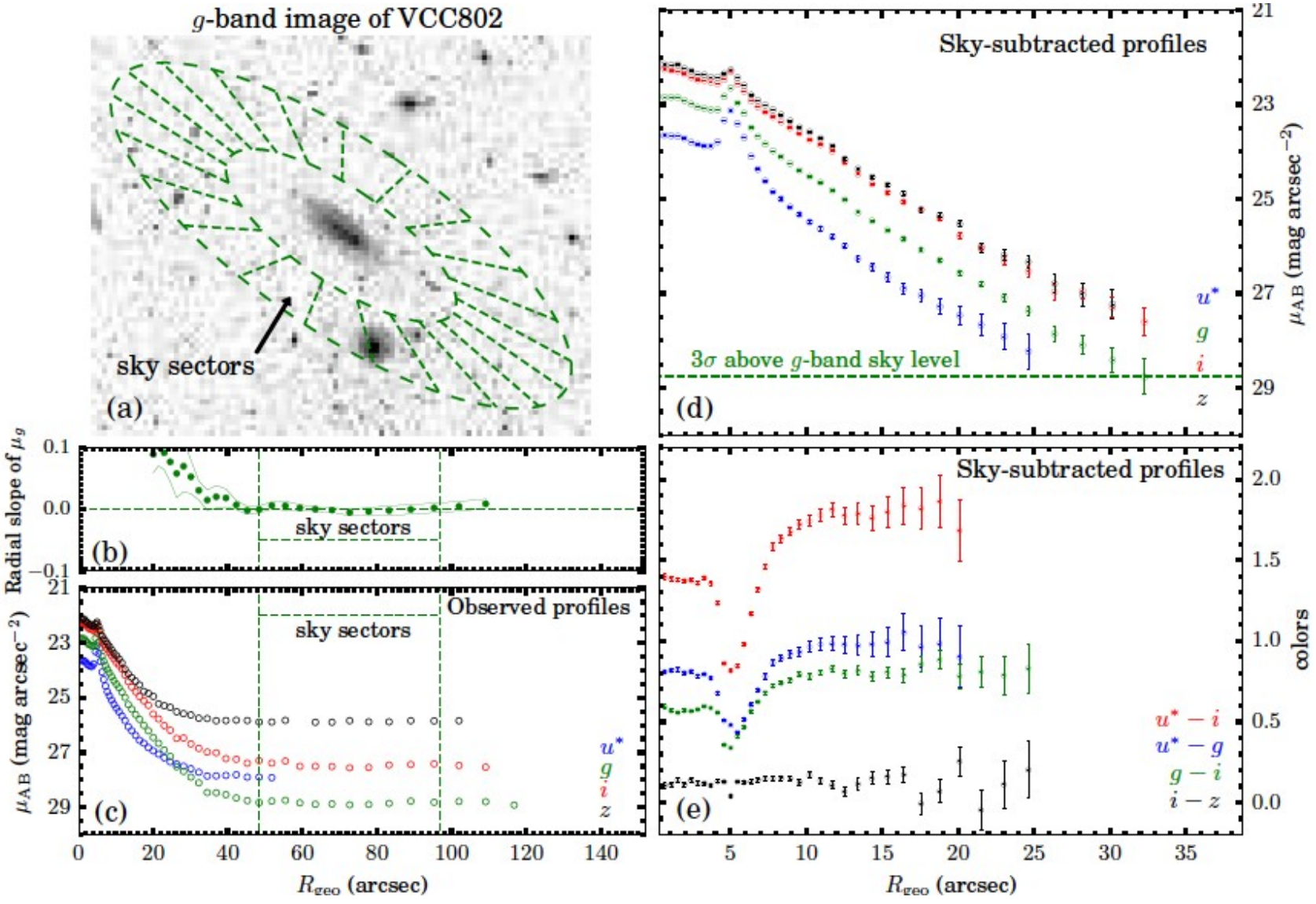

NGC 5300 (SABc)
Type II.o-CT
$\mu_{r,g}$ [mag arcsec^{-2}]
R [arcsec]

- Step 1: select criteria (total: 709)
  - TType>0 ，或 TType≤0 但是为 S0 的概率大于 90% 的星系，肉眼除去 IFU 中同时存在多个星系的情况（并合、观测目标不符合要求等）。
  - Re 处轴比 b/a>0.5
  - 受前景星污染影响较小。

- Step 2: use SExtractor to create mask
  - check the mask in avoid of deviding a galaxy into several
- Step 3: meter the galaxy with pyraf
  - x0, y0, ellipticity, position angle,Re : from Manga drpall
  - All parameters are fixed
-

- Step 4:deduct the background intensity
  - 5 Re-5 ~ 5Re+10
  - 15 parts




g-band image of VCC802
sky sectors
(a)
Sky-subtracted profiles
3σ above g-band sky level
u*
g
i
z
(d)
μAB (mag arcsec−2)
Radial slope of μg
sky sectors
(b)
Observed profiles
sky sectors
(c)
Sky-subtracted profiles
u* − i
u* − g
g − i
i − z
colors
(e)
Rgeo (arcsec)
Rgeo (arcsec)

- Step 5: draw the radial-surface brightness profile
  - Error bar: poisson noise & error from background

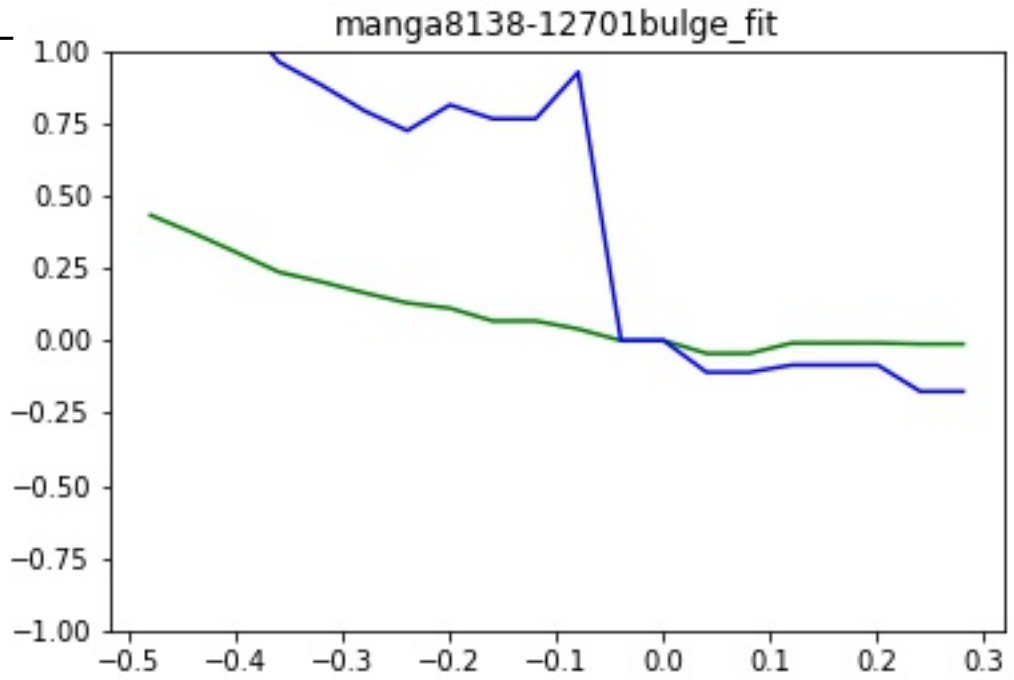
these numbers we measured the value of the sky and its standard deviation in a total of 15–20 regions of $N_{\rm region}$ pixels each around the position of the galaxy. If we now define $\langle\sigma_{\rm sky}\rangle$ and $\langle\sigma_{\rm sky}\rangle^2$ as the mean standard deviation and variance of the sky values measured in these individual regions, respectively, we obtain

qhchen

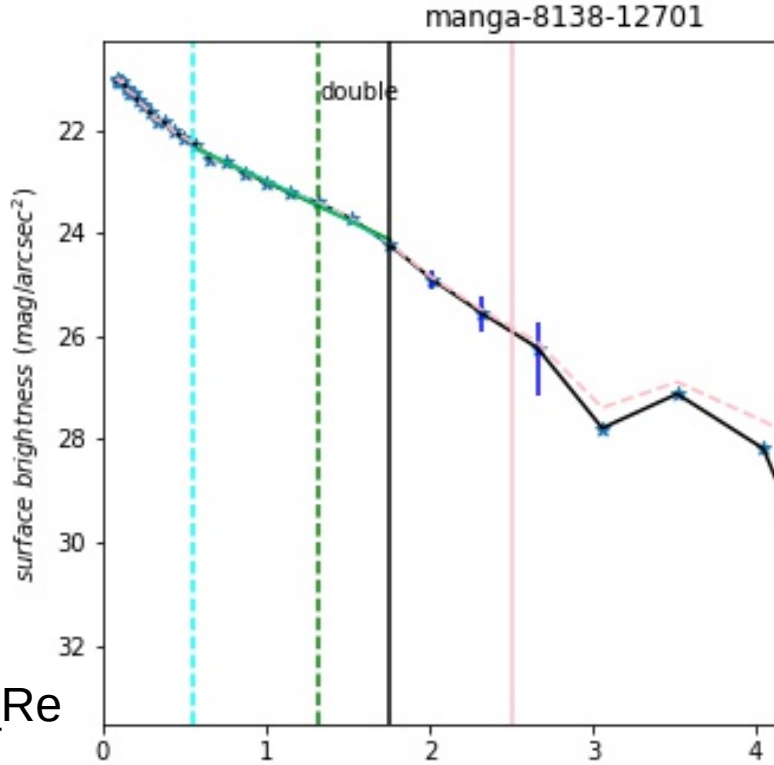
$$\Delta I^2_{{\rm sky},\,\lambda} = \frac{\langle\sigma_{\rm sky}\rangle^2}{N_{\rm isophote}} + \max\left(\sigma^2_{\langle{\rm sky}\rangle} - \frac{\langle\sigma_{\rm sky}\rangle^2}{N_{\rm region}},\ 0\right). \qquad (4)$$

- Step 6: find out the bulge position
  - use eyes to get the initial bulge_locaion and initial break_lo
  - To be more reliable and less subjective, move the bulge_position inward and outward (smallest major axis to initial break), the fitting slope doesn't change much when it's outer than the bulge_lo (I will introduce the fitting process later)

delta_ slope



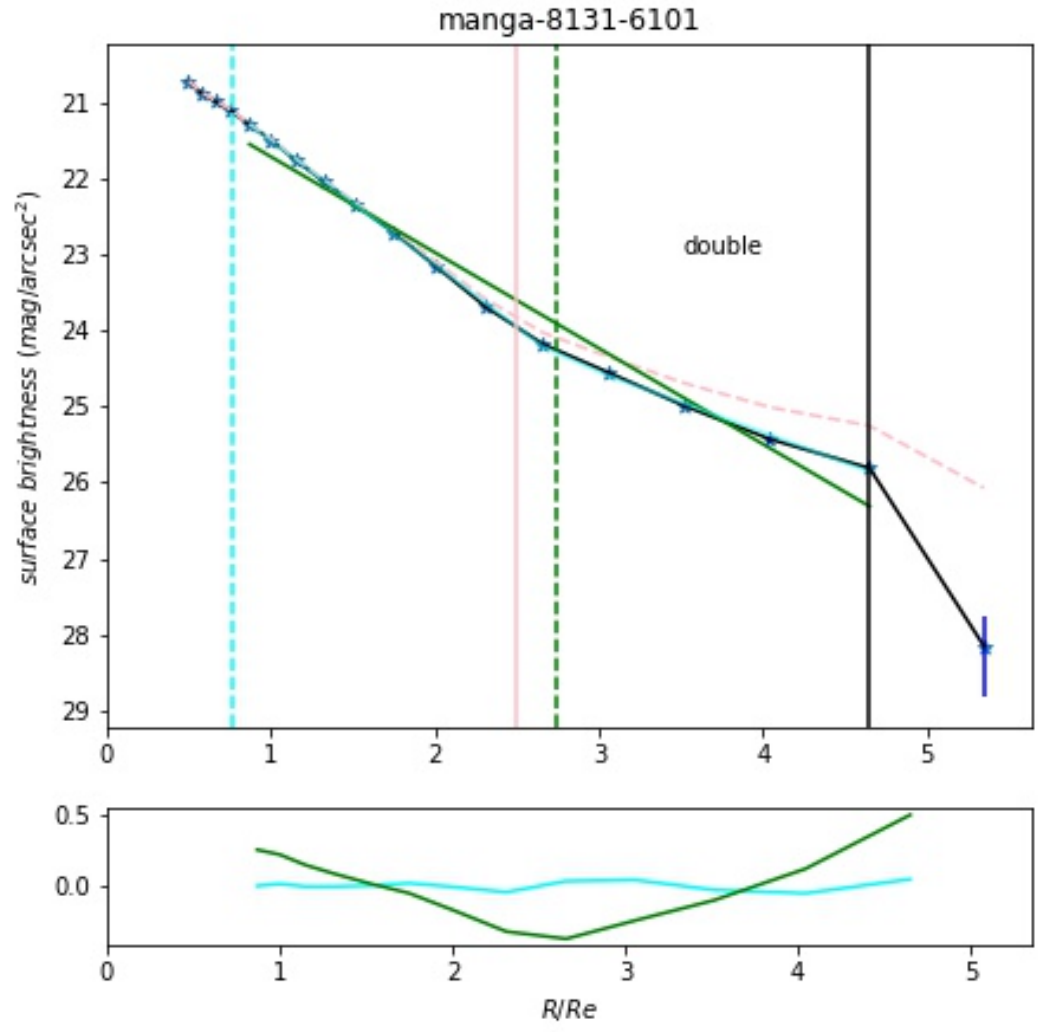
delta_Re

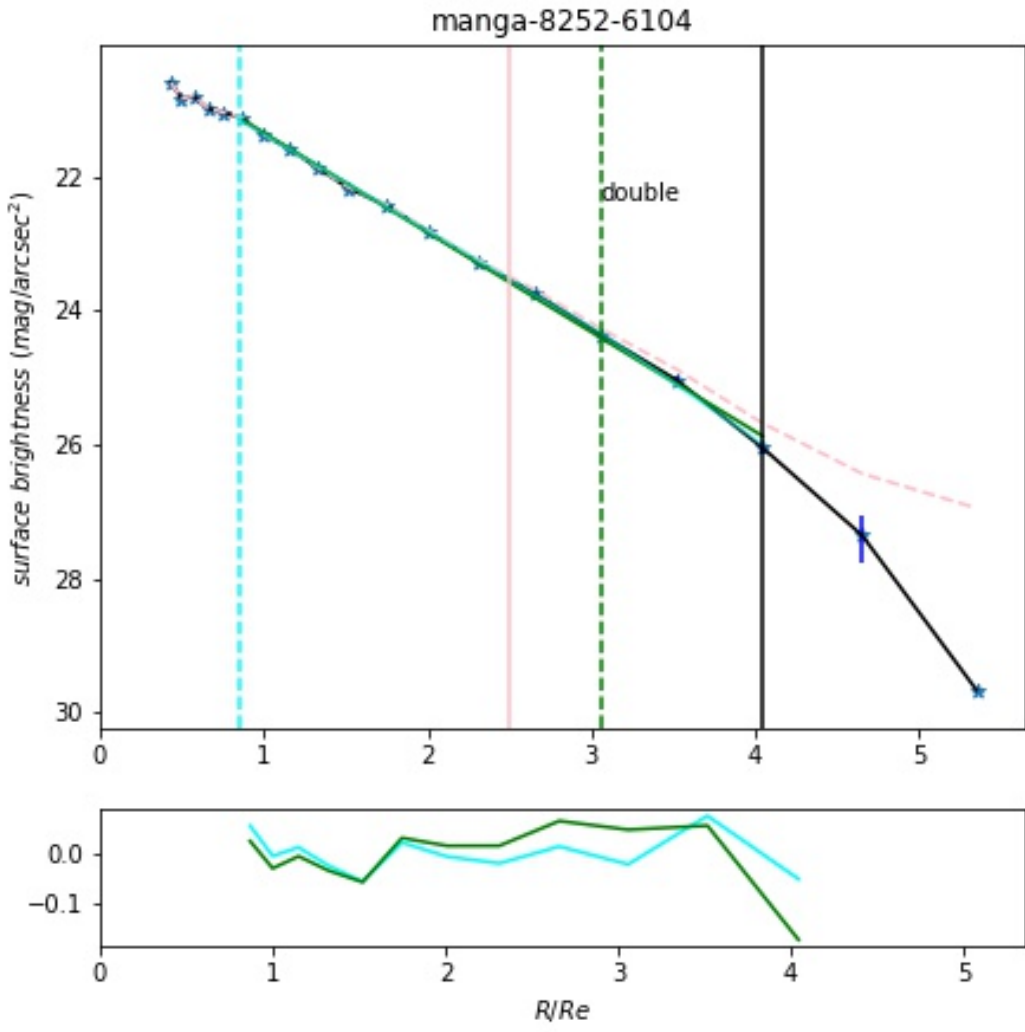


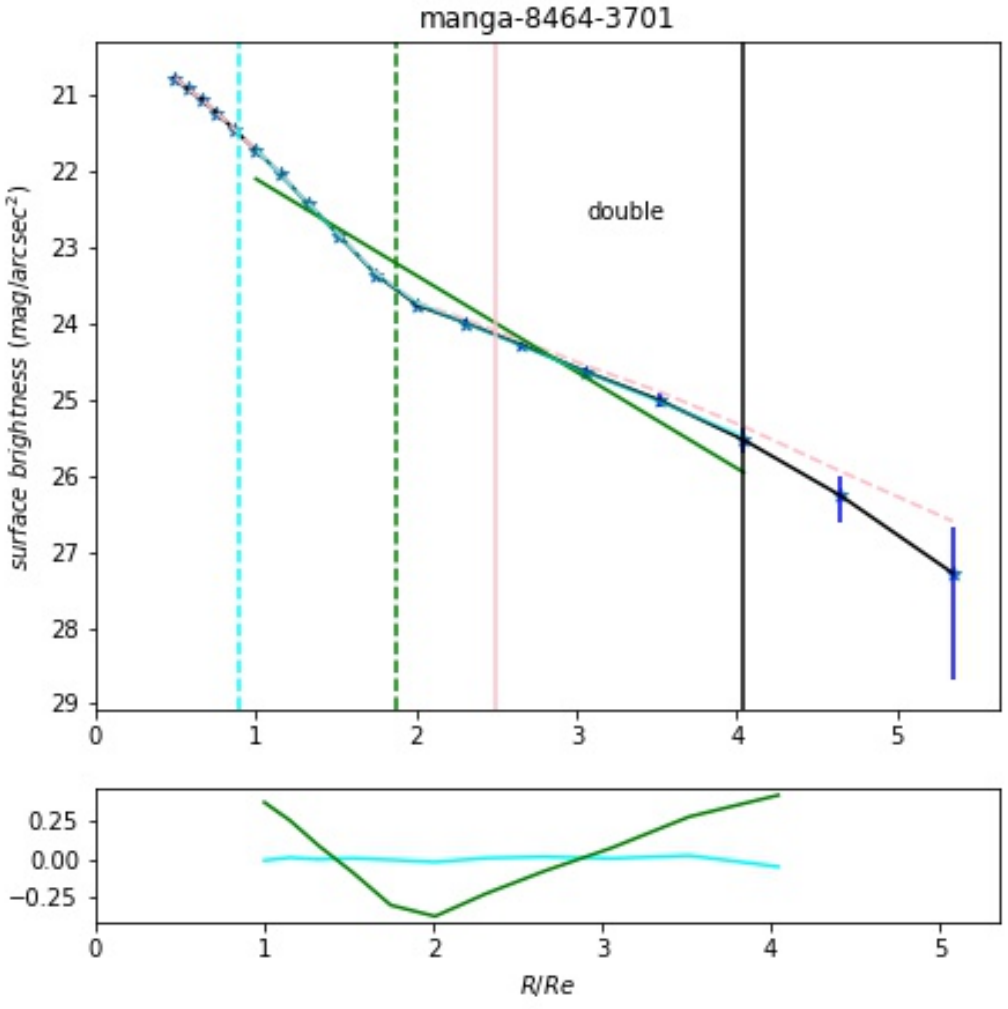
- Step 7: use mpfit to fit the profile with single exponential and double exponential function
  - Fitting scale: outside the bulge location & inside of the total error less than 0.3 mag
  - Initial fitting value of break_lo: two point outer than bulge, +0.5Re, …, inside of error less than 0.3 mag,choose the result with the smallest chi^square
  - Selecting critirian: 1: smaller AIC (2*k + n *chi^squared value)
    - k: number of variable n: amount of data point

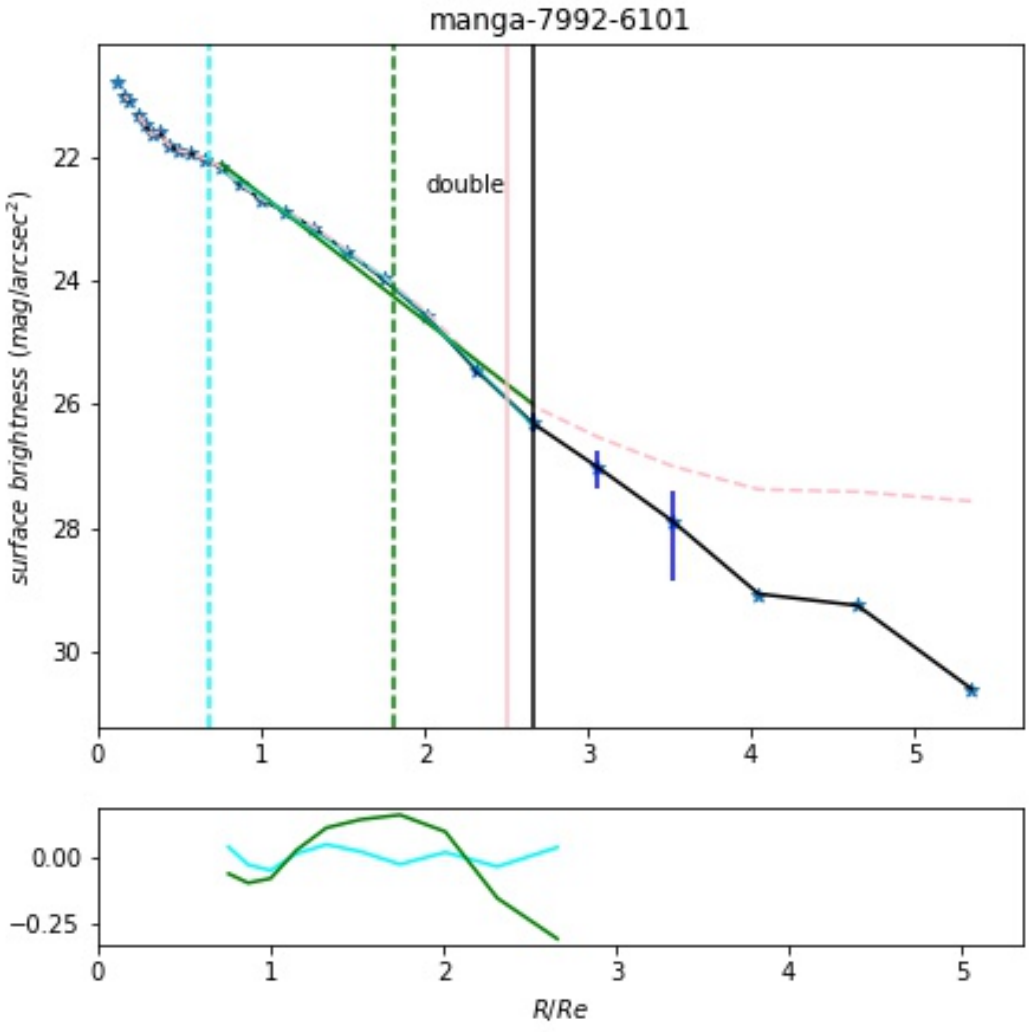
      2: residual distribution without systematic trend (more important)
  - Double fitting tells the break position
  - By now, we first choose galaxies with tan(thata)>0.2 (theta: angle between inner fitting line and outer fitting line) , more obvious, easier to analyze

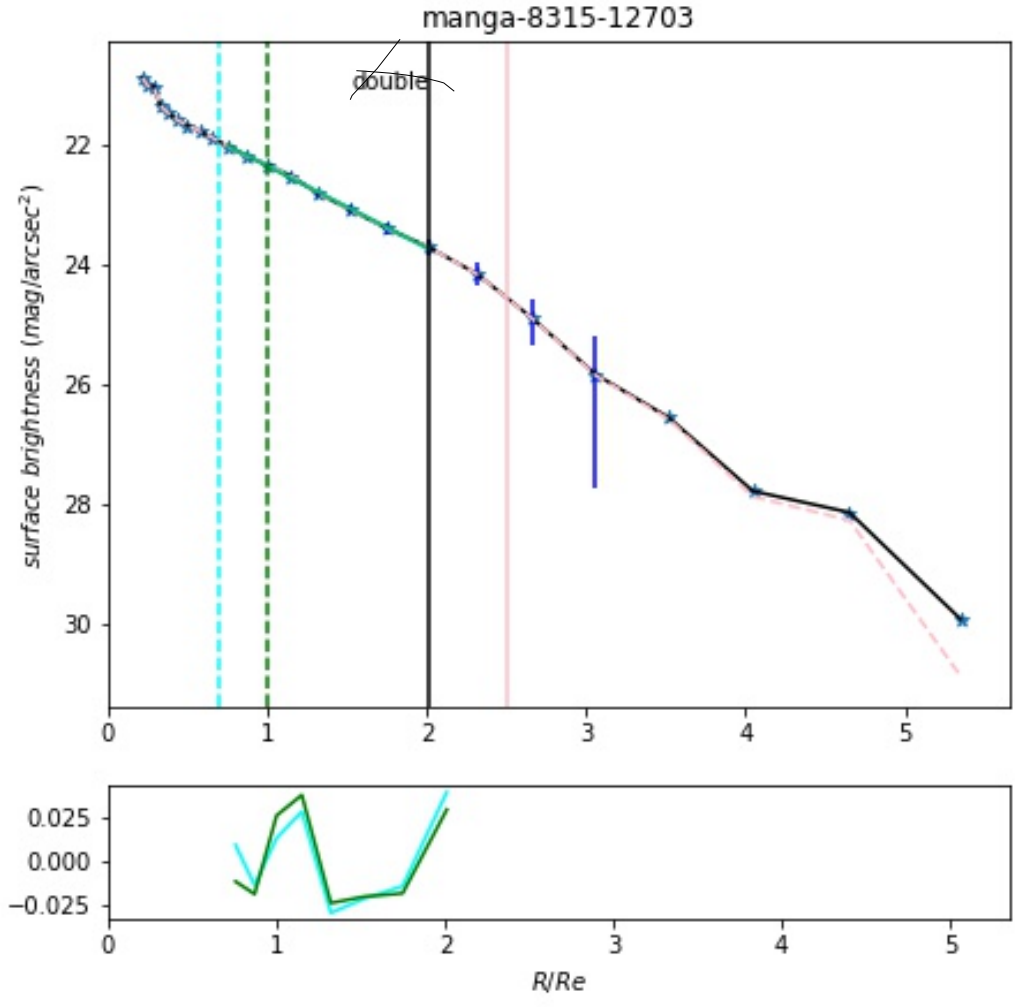
Re

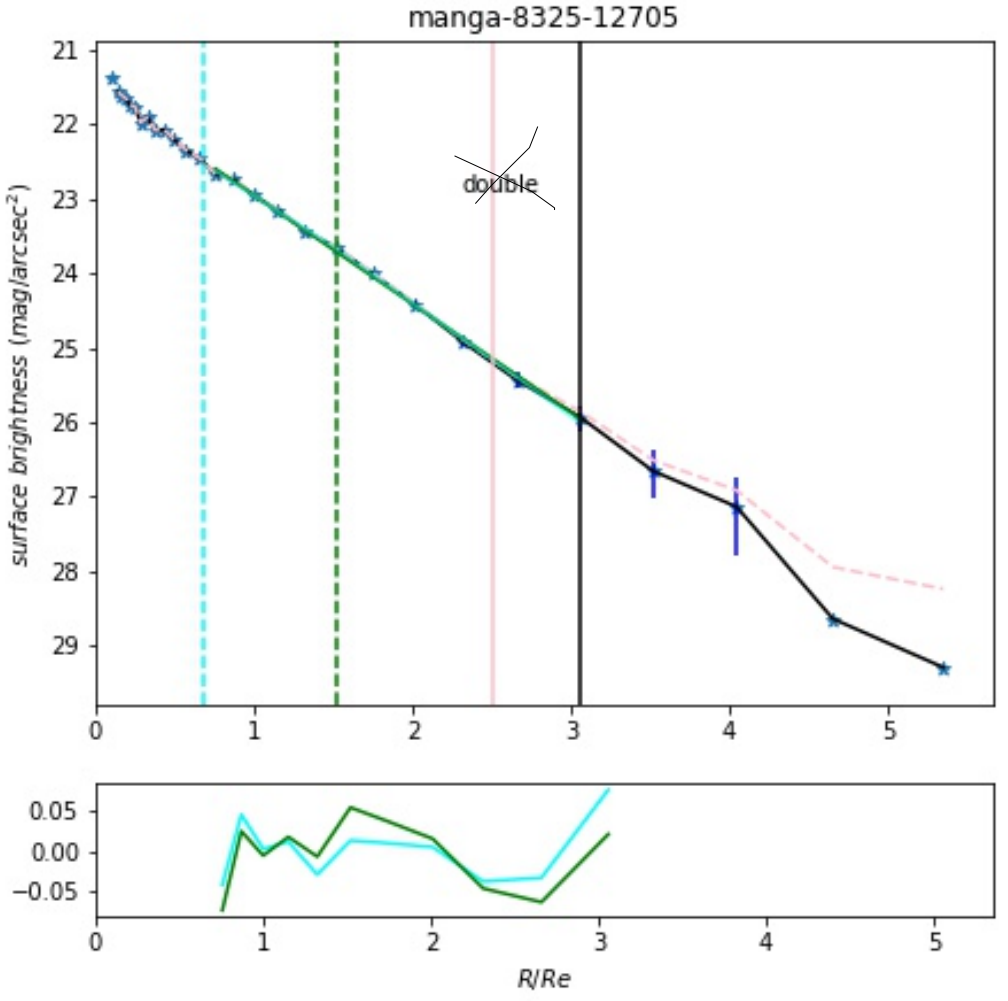

manga-8131-6101
double
surface brightness (mag/arcsec²)
R/Re


manga-8252-6104
double
surface brightness (mag/arcsec²)
R/Re


manga-8464-3701
double
surface brightness (mag/arcsec²)
R/Re


manga-7992-6101
double
surface brightness (mag/arcsec²)
R/Re


manga-8315-12703
double
surface brightness (mag/arcsec²)
R/Re


manga-8325-12705
double
surface brightness (mag/arcsec²)
R/Re