

# Sinle Sérsic fits

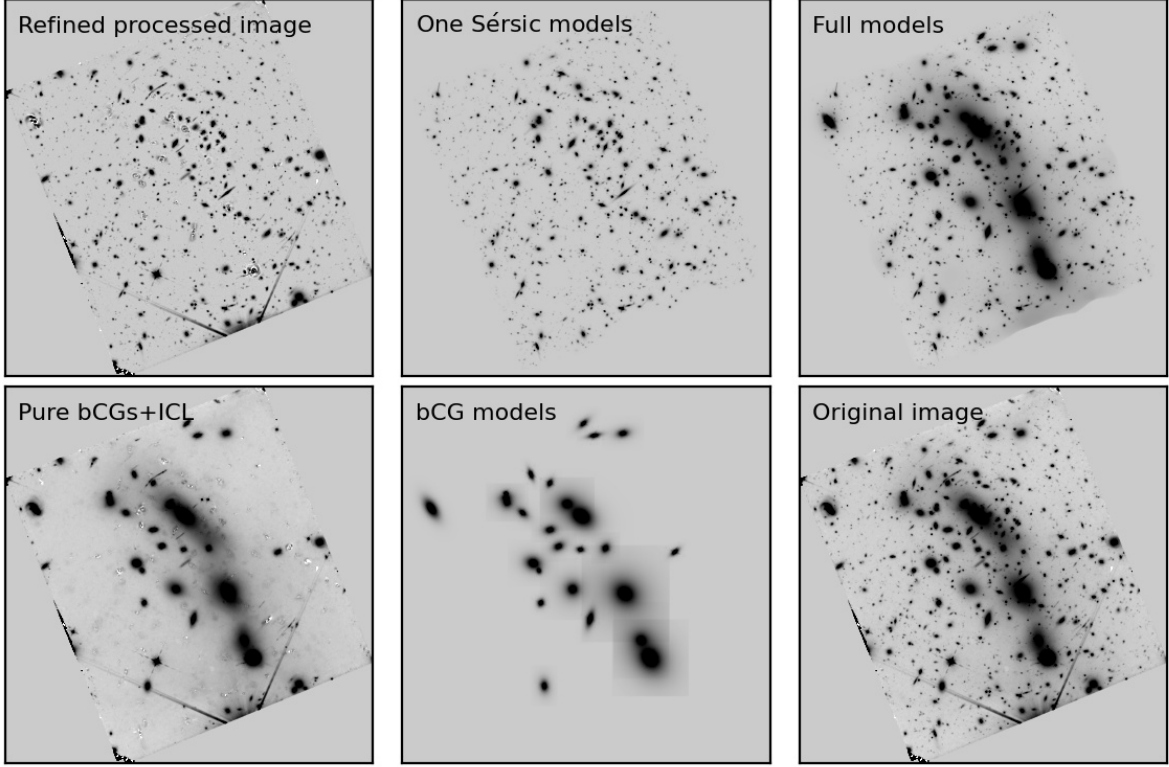
After generating a confident catalog of galaxies with accurate SExtractor parameters (i.e., proper Kron ellipse size), we then apply GALAPAGOS2 pipeline to automatically fit each galaxy with single Sérsic model on the detection image. This fitting procedure is almost identical to that performed in dealing with bCGs. GALAPAGOS2 fit galaxies in order of decreasing brightness, from bright to faint over the whole catalog. It sorts the objects according to SExtractor magnitudes. In this sequential fitting process, every object in the catalog will be fitted as primary. In case a faint primary has a brighter neighbor/secondary that has already been fitted as primary previously, GALAPAGOS2 will hold the existing best parameters of that secondary fixed during the simultaneous fit, which corresponds to directly subtract this object from the image stamp using the already existing fitting result. This strategy avoids the same object being freely fitted multiple times and hence help reduce the overall computational time needed to fit a survey. Note that secondary objects are primarily used to improve the fitting result of the primary. The derived Sérsic parameters are listed in Table 1.

The upper middle panel of Figure 1 gives a global view of the best-fitting single Sérsic models for all objects in the catalog. This mosaic is created by matching the stamp pixel coordinates of primary source model to these in the original image, which demonstrates that simultaneous fit of GALFITM does a good job in crowded galaxy field. We also construct a giant model as shown in the upper right panel of Figure 1, to simulate the entire original field. It consists of one Sérsic models for objects residing in detection image, four-component bCG models with measurements performed on the ICL-subtracted images, and ICL model. For a visibly convenient comparison, we also provide the original image in the bottom right panel of Figure 1. This overall model that we have reproduced strongly resembles the real image in appearance, illustrating the robustness and reliability of our approach.

**Table 1:** Galfitm-derived Sérsic parameters of galaxies in the catalog

ID	RA (degree)	DEC (degree)	Mag (mag)	Re (pixels)	N	Q	PA (degree)	CHI2NU	FLAG
1	64.044337	-24.095366	20.464	15.032	0.348	0.212	21.288	8.067	2
2	64.044467	-24.097809	26.043	3.219	0.497	0.069	-89.644	1.043	2
3	64.044877	-24.097585	25.586	0.302	3.433	0.05	-84.272	1.079	2
4	64.045276	-24.097677	26.519	3.392	0.522	0.391	84.189	1.115	2
5	64.046086	-24.097044	25.245	4.068	2.865	0.473	-52.878	1.421	2
6	64.046824	-24.097152	26.009	3.135	0.752	0.212	-6.304	0.956	2
7	64.043281	-24.096763	26.434	1.18	1.211	0.547	89.503	0.973	2
8	64.045103	-24.096319	25.292	7.298	0.37	0.25	1.99	1.217	2
9	64.043751	-24.094014	20.453	5.509	3.383	0.492	3.329	3.473	2
10	64.044712	-24.095901	23.557	0.667	3.688	0.772	-84.636	4.488	2
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

**Notes.** This tables shows the physical parameters for the first 10 objects of the catalog. Column 1 gives the galaxy ID number. Column 2 and 3 are the right ascension and declination, respectively. Column 4 is the total apparent magnitude. Column 5 is the half-light semimajor axis in pixels. Column 6 is the Sérsic index. Column 7 is the axis ratio. Column 8 is the position angle in units of degrees. Column 9 is the reduced  $\chi^2$  of the best-fitting model. Column 10 is Single-Sérsic fit flag (0 = the fits has not started, 1 = fits started, but crashed, 2 = fits completed).



**Figure 1:** The upper left panel is the refined processed image after local background correction, which is used as the detection image. The upper middle panel shows the models-only mosaic including best-fitting single Sérsic models for the entire sample, with measurements performed on the detection image. The upper right panel stands for the combined model containing one Sérsic models derived from the detection image, bCG models with four Sérsic components, and ICL model, in order to mimic original cluster field. For comparison, we also show the original image in the bottom right panel. All images are displayed in an inverted color and locked to the same asinh scale. The bottom left panel reports ICL+bCGs-only image created by subtracting faint galaxies from the original image using two-component Sérsic models. It is used as detection (and measurement) image for bCGs. The bottom middle panel shows the resulting one Sérsic models for bCGs.