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MBH-N PAPER

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ABSTRACT

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Subject headings: keywords

1. INTRODUCTION

The empirical Sérsic (1963, 1968) $R^{1/n}$ model has been demonstrated to provide adequate description of the light distribution of the stellar spheroidal and disk components of galaxies (add REFS), yet its physical origin has remained unexplained for decades. The Sérsic model parametrizes the intensity I as a function of the projected galactic radius R such that

$$I(R; I_{\rm e}, R_{\rm e}, n) = I_{\rm e} \exp\left\{-b_{\rm n}\left[\left(\frac{R}{R_{\rm e}}\right)^{1/n} - 1\right]\right\}, \qquad (1)$$

where $I_{\rm e}$ indicates the intensity at the effective radius $R_{\rm e}$ that encloses half of the total light from the model, the Sérsic index n is the parameter that regulates the curvature of the radial light profile, and $b_{\rm n}$ is a constant defined in terms of the Sérsic index n (see Graham & Driver 2005, and references therein). A large Sérsic index corresponds to a steep central profile and a shallow outer profile, whereas a small Sérsic index corresponds to a shallow central profile and a steep outer profile. This means that, for a stellar spheroidal system whose light distribution is well approximated by the Sérsic model, the larger the Sérsic index n is, the more centrally concentrated the stars are and the more extended the outer envelope is.

A compelling physical interpretation for the Sérsic profile family was recently theorized by Cen (2014) and later confirmed by Nipoti (2015) by means of N-body simulations. Cen (2014) conjectured that, when structures form within a standard cold dark matter model seeded by random Gaussian fluctuations, any centrally concentrated stellar structure always possesses an extended stellar envelope, and vice versa. Nipoti (2015) quantitatively explored Cen's hypothesis and showed that systems originated from several mergers have a large Sérsic index ($n \gtrsim 4$), whereas systems with a Sérsic index as small as $n \simeq 2$ can be produced by coherent dissipationless collapse, and exponential profiles ($n = 1$) can only be obtained through dissipative processes. This scenario sets the theoretical framework for the well known correlation between the spheroid luminosity and the spheroid Sérsic index (e.g. Young & Currie 1994; Jerjen et al. 2000; Graham & Guzmán 2003), although the numerical results of Nipoti (2015) seem to lack of spheroidal systems with n as large as $7 - 10$ which are commonly observed in the local Universe.

origin of L-n
M-L + L-n ... M-n
M-C and M-n
s+11 v+12 b+12
my paper
paper I and II

2. DATA

3. RESULTS

Fig. 1.—

Fig. 2.—

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TABLE 1
Galaxy sample.

Galaxy	Type	Distance [Mpc]	M_{BH} [10^8 $M_\odot$]	MAG_{sph} [mag]	n_{sph}
(1)	(2)	(3)	(4)	(5)	(6)
IC 1459	E	28.4	24^{+10}_{-10}	$-26.15^{+0.18}_{-0.11}$	$6.6^{+0.9}_{-0.8}$
IC 2560	Sp (bar)	40.7	$0.044^{+0.044}_{-0.022}$	$-22.27^{+0.66}_{-0.58}$	$0.8^{+0.4}_{-0.3}$
IC 4296	E	40.7	11^{+2}_{-2}	$-26.35^{+0.18}_{-0.11}$	$5.8^{+0.8}_{-0.7}$
M104	S0/Sp	9.5	$6.4^{+0.4}_{-0.4}$	$-23.91^{+0.66}_{-0.58}$	$5.8^{+2.7}_{-1.8}$
M105	E	10.3	4^{+1}_{-1}	$-24.29^{+0.66}_{-0.58}$	$5.2^{+2.4}_{-1.6}$
M106	Sp (bar)	7.2	$0.39^{+0.01}_{-0.01}$	$-21.11^{+0.18}_{-0.11}$	$2.0^{+0.3}_{-0.2}$
M31	Sp (bar)	0.7	$1.4^{+0.9}_{-0.3}$	$-22.74^{+0.18}_{-0.11}$	$2.2^{+0.3}_{-0.3}$
M49	E	17.1	25^{+3}_{-1}	$-26.54^{+0.18}_{-0.11}$	$6.6^{+0.9}_{-0.8}$
M59	E	17.8	$3.9^{+0.4}_{-0.4}$	$-25.18^{+0.18}_{-0.11}$	$5.5^{+0.8}_{-0.7}$
M64	Sp	7.3	$0.016^{+0.004}_{-0.004}$	$-21.54^{+0.18}_{-0.11}$	$0.8^{+0.1}_{-0.1}$
M81	Sp (bar)	3.8	$0.74^{+0.21}_{-0.11}$	$-23.01^{+0.88}_{-0.66}$	$1.7^{+1.3}_{-0.7}$
M84	E	17.9	$9.0^{+0.9}_{-0.8}$	$-26.01^{+0.66}_{-0.58}$	$7.8^{+3.6}_{-2.5}$
M87	E	15.6	$58.0^{+3.5}_{-3.5}$	$-26.00^{+0.66}_{-0.58}$	$10.0^{+4.7}_{-3.2}$
M89	E	14.9	$4.7^{+0.5}_{-0.5}$	$-24.48^{+0.66}_{-0.58}$	$4.6^{+2.2}_{-1.5}$
M94	Sp (bar)	4.4	$0.060^{+0.014}_{-0.014}$	$-22.08^{+0.18}_{-0.11}$	$0.9^{+0.1}_{-0.1}$
M96	Sp (bar)	10.1	$0.073^{+0.015}_{-0.015}$	$-22.15^{+0.18}_{-0.11}$	$1.5^{+0.2}_{-0.2}$
NGC 0524	S0	23.3	$8.3^{+2.7}_{-1.3}$	$-23.19^{+0.18}_{-0.11}$	$1.1^{+0.2}_{-0.1}$
NGC 0821	E	23.4	$0.39^{+0.26}_{-0.09}$	$-24.00^{+0.88}_{-0.66}$	$5.3^{+4.1}_{-2.3}$
NGC 1023	S0 (bar)	11.1	$0.42^{+0.04}_{-0.04}$	$-22.82^{+0.18}_{-0.11}$	$2.1^{+0.3}_{-0.3}$
NGC 1300	Sp (bar)	20.7	$0.73^{+0.69}_{-0.35}$	$-22.06^{+0.66}_{-0.58}$	$3.8^{+1.8}_{-1.2}$
NGC 1316	merger	18.6	$1.50^{+0.75}_{-0.80}$	$-24.89^{+0.66}_{-0.58}$	$2.0^{+1.0}_{-0.7}$
NGC 1332	E/S0	22.3	14^{+2}_{-2}	$-24.89^{+0.88}_{-0.66}$	$5.1^{+3.9}_{-2.2}$
NGC 1374	E	19.2	$5.8^{+0.5}_{-0.5}$	$-23.68^{+0.18}_{-0.11}$	$3.7^{+0.5}_{-0.5}$
NGC 1399	E	19.4	$4.7^{+0.6}_{-0.6}$	$-26.43^{+0.18}_{-0.11}$	$10.0^{+1.4}_{-1.2}$
NGC 2273	Sp (bar)	28.5	$0.083^{+0.004}_{-0.004}$	$-23.00^{+0.66}_{-0.58}$	$2.1^{+1.0}_{-0.7}$
NGC 2549	S0 (bar)	12.3	$0.14^{+0.02}_{-0.13}$	$-21.25^{+0.18}_{-0.11}$	$2.3^{+0.3}_{-0.3}$
NGC 2778	S0 (bar)	22.3	$0.15^{+0.09}_{-0.10}$	$-20.80^{+0.66}_{-0.58}$	$1.3^{+0.6}_{-0.4}$
NGC 2787	S0 (bar)	7.3	$0.40^{+0.04}_{-0.05}$	$-20.11^{+0.66}_{-0.58}$	$1.1^{+0.5}_{-0.4}$
NGC 2974	Sp (bar)	20.9	$1.7^{+0.2}_{-0.2}$	$-22.95^{+0.66}_{-0.58}$	$1.4^{+0.7}_{-0.5}$
NGC 3079	Sp (bar)	20.7	$0.024^{+0.024}_{-0.012}$	$-23.01^{+0.66}_{-0.58}$	$1.3^{+0.6}_{-0.4}$
NGC 3091	E	51.2	36^{+1}_{-2}	$-26.28^{+0.18}_{-0.11}$	$7.6^{+1.0}_{-0.9}$
NGC 3115	E/S0	9.4	$8.8^{+10.0}_{-2.7}$	$-24.22^{+0.18}_{-0.11}$	$4.4^{+0.6}_{-0.5}$
NGC 3227	Sp (bar)	20.3	$0.14^{+0.10}_{-0.06}$	$-21.76^{+0.66}_{-0.58}$	$1.7^{+0.8}_{-0.5}$
NGC 3245	S0 (bar)	20.3	$2.0^{+0.5}_{-0.5}$	$-22.43^{+0.18}_{-0.11}$	$2.9^{+0.4}_{-0.3}$
NGC 3377	E	10.9	$0.77^{+0.04}_{-0.06}$	$-23.49^{+0.66}_{-0.58}$	$7.7^{+3.6}_{-2.5}$
NGC 3384	S0 (bar)	11.3	$0.17^{+0.01}_{-0.02}$	$-22.43^{+0.18}_{-0.11}$	$1.6^{+0.2}_{-0.2}$
NGC 3393	Sp (bar)	55.2	$0.34^{+0.02}_{-0.02}$	$-23.48^{+0.66}_{-0.58}$	$3.4^{+1.6}_{-1.1}$
NGC 3414	E	24.5	$2.4^{+0.3}_{-0.3}$	$-24.35^{+0.18}_{-0.11}$	$4.8^{+0.7}_{-0.6}$
NGC 3489	S0/Sp (bar)	11.7	$0.058^{+0.008}_{-0.008}$	$-21.13^{+0.66}_{-0.58}$	$1.5^{+0.7}_{-0.5}$
NGC 3585	E	19.5	$3.1^{+1.4}_{-0.6}$	$-25.52^{+0.66}_{-0.58}$	$5.2^{+2.4}_{-1.7}$
NGC 3607	E	22.2	$1.3^{+0.5}_{-0.5}$	$-25.36^{+0.66}_{-0.58}$	$5.5^{+2.6}_{-1.7}$
NGC 3608	E	22.3	$2.0^{+1.1}_{-0.6}$	$-24.50^{+0.66}_{-0.58}$	$5.2^{+2.4}_{-1.7}$
NGC 3842	E	98.4	97^{+30}_{-26}	$-27.00^{+0.18}_{-0.11}$	$8.1^{+1.1}_{-1.0}$
NGC 3998	S0 (bar)	13.7	$8.1^{+2.0}_{-1.9}$	$-22.32^{+0.88}_{-0.66}$	$1.2^{+0.9}_{-0.5}$
NGC 4026	S0 (bar)	13.2	$1.8^{+0.6}_{-0.3}$	$-21.58^{+0.88}_{-0.66}$	$2.4^{+1.8}_{-1.0}$
NGC 4151	Sp (bar)	20.0	$0.65^{+0.07}_{-0.07}$	$-23.40^{+0.66}_{-0.58}$	$1.4^{+0.6}_{-0.4}$
NGC 4261	E	30.8	5^{+1}_{-1}	$-25.72^{+0.66}_{-0.58}$	$4.7^{+2.2}_{-1.5}$
NGC 4291	E	25.5	$3.3^{+0.9}_{-2.5}$	$-24.05^{+0.66}_{-0.58}$	$4.2^{+2.0}_{-1.4}$
NGC 4388	Sp (bar)	17.0	$0.075^{+0.002}_{-0.002}$	$-21.26^{+0.88}_{-0.66}$	$0.6^{+0.5}_{-0.3}$
NGC 4459	S0	15.7	$0.68^{+0.13}_{-0.13}$	$-23.48^{+0.66}_{-0.58}$	$3.1^{+1.5}_{-1.0}$
NGC 4473	E	15.3	$1.2^{+0.4}_{-0.9}$	$-23.88^{+0.66}_{-0.58}$	$2.3^{+1.1}_{-0.7}$
NGC 4564	S0	14.6	$0.60^{+0.03}_{-0.09}$	$-22.30^{+0.18}_{-0.11}$	$2.6^{+0.4}_{-0.3}$
NGC 4596	S0 (bar)	17.0	$0.79^{+0.38}_{-0.33}$	$-22.73^{+0.18}_{-0.11}$	$2.7^{+0.4}_{-0.3}$

Galaxy	**Type**	**Distance**	M_{BH}	MAG_{sph}	n_{sph}
		[Mpc]	[10^8 $\mathrm{M}_\odot$]	[mag]	
(1)	(2)	(3)	(4)	(5)	(6)
NGC 4697	E	11.4	$1.8^{+0.2}_{-0.1}$	$-24.82^{+0.88}_{-0.66}$	$7.2^{+5.5}_{-3.1}$
NGC 4889	E	103.2	210^{+160}_{-160}	$-27.54^{+0.18}_{-0.11}$	$8.1^{+1.1}_{-1.0}$
NGC 4945	Sp (bar)	3.8	$0.014^{+0.014}_{-0.007}$	$-20.96^{+0.66}_{-0.58}$	$1.4^{+0.7}_{-0.5}$
NGC 5077	E	41.2	$7.4^{+4.7}_{-3.0}$	$-25.45^{+0.18}_{-0.11}$	$4.2^{+0.6}_{-0.5}$
NGC 5128	merger	3.8	$0.45^{+0.17}_{-0.10}$	$-23.89^{+0.88}_{-0.66}$	$1.2^{+0.9}_{-0.5}$
NGC 5576	E	24.8	$1.6^{+0.3}_{-0.4}$	$-24.44^{+0.18}_{-0.11}$	$3.3^{+0.5}_{-0.4}$
NGC 5845	S0	25.2	$2.6^{+0.4}_{-1.5}$	$-22.96^{+0.88}_{-0.66}$	$2.5^{+1.9}_{-1.1}$
NGC 5846	E	24.2	11^{+1}_{-1}	$-25.81^{+0.66}_{-0.58}$	$6.4^{+3.0}_{-2.1}$
NGC 6251	E	104.6	5^{+2}_{-2}	$-26.75^{+0.18}_{-0.11}$	$6.8^{+0.9}_{-0.8}$
NGC 7052	E	66.4	$3.7^{+2.6}_{-1.5}$	$-26.32^{+0.18}_{-0.11}$	$4.2^{+0.6}_{-0.5}$
NGC 7619	E	51.5	25^{+8}_{-3}	$-26.35^{+0.66}_{-0.58}$	$5.3^{+2.5}_{-1.7}$
NGC 7768	E	112.8	13^{+5}_{-4}	$-26.90^{+0.66}_{-0.58}$	$8.4^{+3.9}_{-2.7}$
UGC 03789	Sp (bar)	48.4	$0.108^{+0.005}_{-0.005}$	$-22.77^{+0.88}_{-0.66}$	$1.9^{+1.4}_{-0.8}$

NOTE. — *Column (1)*: Galaxy name. *Column (2)*: Morphological type (E=elliptical, S0=lenticular, Sp=spiral, merger). The morphological classification of four galaxies is uncertain (E/S0 or S0/Sp). The presence of a bar is indicated. *Column (3)*: Distance. *Column (4)*: Black hole mass. *Column (5)*: Absolute 3.6 μm spheroid magnitude. *Column (6)*: Spheroid major-axis Sérsic index. Spheroid magnitudes and Sérsic indices come from our state-of-the-art multicomponent galaxy decompositions (*Paper I*), which include bulges, disks, bars, spiral arms, rings, haloes, extended or unresolved nuclear sources and partially depleted cores, and that – for the first time – were checked to be consistent with the galaxy kinematics. The uncertainties were estimated with a method that takes into account systematic errors, which are typically not considered by popular 2D fitting codes.

TABLE 2
LINEAR REGRESSION ANALYSIS OF THE $L_{\rm sph} - n_{\rm sph}$ DIAGRAM.

Subsample (size)	**Regression**	$\boldsymbol{\alpha}$	$\boldsymbol{\beta}$	$\langle \log n_{\rm sph} \rangle$	$\boldsymbol{\epsilon}$	$\boldsymbol{\Delta}$
	$MAG_{\rm sph}/[\rm mag] = \alpha + \beta\big(\log n_{\rm sph} - \langle \log n_{\rm sph,maj} \rangle\big)$					
All (62)	BCES $(Y\|X)$	-23.88 ± 0.15	-7.17 ± 0.80	0.51	–	1.18
	mFITEXY $(Y\|X)$	-23.95 ± 0.13	-6.70 ± 0.45	0.51	$0.56^{+0.15}_{-0.10}$	0.98
	`linmix_err` $(Y\|X)$	-23.92 ± 0.15	-6.40 ± 0.57	0.51	0.74 ± 0.13	1.07
	BCES $(X\|Y)$	-23.88 ± 0.14	-6.70 ± 0.51	0.51	–	1.11
	mFITEXY $(X\|Y)$	-23.94 ± 0.14	-7.50 ± 0.52	0.51	$0.59^{+0.17}_{-0.11}$	1.23
	`linmix_err` $(X\|Y)$	-23.94 ± 0.16	-7.51 ± 0.62	0.51	0.81 ± 0.16	1.23
	BCES Bisector	-23.88 ± 0.14	-6.93 ± 0.60	0.51	–	1.14
	mFITEXY Bisector	-23.94 ± 0.13	-7.08 ± 0.34	0.51	–	1.16
	`linmix_err` Bisector	-23.93 ± 0.16	-6.91 ± 0.42	0.51	–	1.14
Elliptical (30)	BCES $(Y\|X)$	-25.46 ± 1.12	38.47 ± 114.45	0.76	–	6.37
	mFITEXY $(Y\|X)$	-25.74 ± 0.18	-9.74 ± 1.59	0.76	$0.24^{+0.32}_{-0.24}$	0.94
	`linmix_err` $(Y\|X)$	-25.65 ± 0.21	-7.87 ± 2.15	0.76	0.61 ± 0.22	1.06
	BCES $(X\|Y)$	-25.46 ± 0.23	-10.73 ± 3.21	0.76	–	1.29
	mFITEXY $(X\|Y)$	-25.74 ± 0.20	-10.42 ± 1.79	0.76	$0.22^{+0.38}_{-0.22}$	1.29
	`linmix_err` $(X\|Y)$	-25.72 ± 0.28	-10.92 ± 2.70	0.76	0.73 ± 0.34	1.33
	BCES Bisector	-25.46 ± 0.20	0.03 ± 0.05	0.76	–	1.14
	mFITEXY Bisector	-25.74 ± 0.19	-10.07 ± 1.19	0.76	–	1.26
	`linmix_err` Bisector	-25.68 ± 0.25	-9.15 ± 1.74	0.76	–	1.16
Lenticular (11)	BCES $(Y\|X)$	-22.08 ± 1.66	33.52 ± 98.87	0.33	–	6.09
	mFITEXY $(Y\|X)$	-22.11 ± 0.24	-6.31 ± 2.45	0.33	$0.42^{+0.28}_{-0.17}$	0.71
	`linmix_err` $(Y\|X)$			0.33		
	BCES $(X\|Y)$	-22.08 ± 0.19	-6.83 ± 1.16	0.33	–	0.71
	mFITEXY $(X\|Y)$	-21.94 ± 0.44	-13.16 ± 7.91	0.33	$0.61^{+0.60}_{-0.56}$	1.39
	`linmix_err` $(X\|Y)$			0.33		
	BCES Bisector	-22.08 ± 0.30	0.06 ± 0.05	0.33	–	1.09
	mFITEXY Bisector	-22.05 ± 0.35	-8.55 ± 2.79	0.33	–	0.84
	`linmix_err` Bisector			0.33	–	
Spiral (17)	BCES $(Y\|X)$	-22.33 ± 0.26	-5.31 ± 5.83	0.18	–	1.15
	mFITEXY $(Y\|X)$	-22.22 ± 0.19	-2.17 ± 0.98	0.18	$0.53^{+0.24}_{-0.13}$	0.72
	`linmix_err` $(Y\|X)$	-22.26 ± 0.24	-1.53 ± 1.88	0.18	0.71 ± 0.22	0.78
	BCES $(X\|Y)$	-22.33 ± 0.26	-5.19 ± 3.77	0.18	–	1.13
	mFITEXY $(X\|Y)$	-22.28 ± 0.44	-9.08 ± 5.31	0.51	$1.12^{+0.54}_{-0.31}$	1.83
	`linmix_err` $(X\|Y)$	-22.24 ± 0.71	-11.12 ± 13.59	0.18	1.95 ± 2.47	2.24
	BCES Bisector	-22.33 ± 0.26	-5.25 ± 3.38	0.18	–	1.14
	mFITEXY Bisector	-22.23 ± 0.33	-3.60 ± 1.29	0.18	–	0.92
	`linmix_err` Bisector	-22.25 ± 0.53	-2.88 ± 2.66	0.18	–	0.84

TABLE 3
LINEAR REGRESSION ANALYSIS OF THE $L_{\rm sph} - n_{\rm sph}$ DIAGRAM.

Subsample (size)	**Regression**	$\boldsymbol{\alpha}$	$\boldsymbol{\beta}$	$\langle \log n_{\rm sph} \rangle$	$\boldsymbol{\epsilon}$	$\boldsymbol{\Delta}$
Early-type (43)	BCES $(Y\|X)$	-24.55 ± 0.22	-11.84 ± 2.29	0.64	–	1.50
	mFITEXY $(Y\|X)$	-24.74 ± 0.14	-8.86 ± 0.66	0.51	$0.27^{+0.20}_{-0.27}$	0.87
	`linmix_err` $(Y\|X)$	-24.70 ± 0.17	-8.28 ± 0.87	0.64	0.58 ± 0.17	0.98
	BCES $(X\|Y)$	-24.55 ± 0.14	-8.25 ± 0.63	0.64	–	0.96
	mFITEXY $(X\|Y)$	-24.74 ± 0.14	-9.13 ± 0.68	0.64	$0.23^{+0.25}_{-0.23}$	1.08
	`linmix_err` $(X\|Y)$	-24.73 ± 0.18	-9.08 ± 0.87	0.64	0.60 ± 0.21	1.07
	BCES Bisector	-24.55 ± 0.17	-9.73 ± 1.05	0.64	–	1.14
	mFITEXY Bisector	-24.74 ± 0.14	-8.99 ± 0.48	0.64	–	1.06
	`linmix_err` Bisector	-24.72 ± 0.17	-8.66 ± 0.63	0.64	–	1.02
Bulge (30)	BCES $(Y\|X)$	-22.25 ± 0.20	-5.88 ± 3.06	0.26	–	1.16
	mFITEXY $(Y\|X)$	-22.19 ± 0.14	-2.99 ± 0.73	0.26	$0.52^{+0.18}_{-0.10}$	0.75
	`linmix_err` $(Y\|X)$	-22.20 ± 0.17	-2.48 ± 1.21	0.26	0.67 ± 0.15	0.83
	BCES $(X\|Y)$	-22.25 ± 0.20	-5.85 ± 1.83	0.26	–	1.15
	mFITEXY $(X\|Y)$	-22.17 ± 0.25	-7.65 ± 2.43	0.26	$0.87^{+0.30}_{-0.18}$	1.46
	`linmix_err` $(X\|Y)$	-22.16 ± 0.31	-7.80 ± 3.89	0.26	1.18 ± 0.65	1.48
	BCES Bisector	-22.25 ± 0.20	-5.87 ± 2.06	0.26	–	1.16
	mFITEXY Bisector	-22.18 ± 0.20	-4.34 ± 0.84	0.26	–	0.96
	`linmix_err` Bisector	-22.19 ± 0.25	-3.83 ± 1.39	0.26	–	0.91

NOTE. — For each subsample, we indicate $\langle \log n_{\rm sph} \rangle$, its average value of spheroid Sérsic index. In the last two columns, we report ϵ, the intrinsic scatter, and Δ, the total rms scatter in the $L_{\rm sph}$ direction. all - mergers - outliers Both the early- and late-type subsamples do not contain the two galaxies classified as S0/Sp and the two galaxies classified as mergers (45+17=66-2-2).

TABLE 4
Linear regression analysis of the $M_{\rm BH} - n_{\rm sph}$ diagram.

Subsample (size)	**Regression**	α	β	$\langle \log n_{\rm sph} \rangle$	ϵ	Δ
	$\log(M_{\rm BH}/[{\rm M}_\odot]) = \alpha + \beta(\log n_{\rm sph} - \langle \log n_{\rm sph} \rangle)$					
All (62)	BCES $(Y\|X)$	8.14 ± 0.08	3.56 ± 0.38	0.51	–	0.60
	mFITEXY $(Y\|X)$	8.18 ± 0.06	3.27 ± 0.21	0.51	$0.22^{+0.10}_{-0.07}$	0.45
	`linmix_err` $(Y\|X)$	8.17 ± 0.06	3.17 ± 0.24	0.51	0.29 ± 0.07	0.56
	BCES $(X\|Y)$	8.14 ± 0.08	3.56 ± 0.25	0.51	–	0.60
	mFITEXY $(X\|Y)$	8.18 ± 0.06	3.51 ± 0.23	0.51	$0.23^{+0.10}_{-0.07}$	0.60
	`linmix_err` $(X\|Y)$	8.17 ± 0.07	3.49 ± 0.26	0.51	0.30 ± 0.07	0.60
	BCES Bisector	8.14 ± 0.08	3.56 ± 0.29	0.51	–	0.60
	mFITEXY Bisector	8.18 ± 0.06	3.39 ± 0.15	0.51	–	0.58
	`linmix_err` Bisector	8.17 ± 0.07	3.33 ± 0.18	0.51	–	0.57
Elliptical (30)	BCES $(Y\|X)$	8.80 ± 0.53	-18.16 ± 53.99	0.76	–	3.02
	mFITEXY $(Y\|X)$	8.90 ± 0.10	4.47 ± 0.88	0.76	$0.29^{+0.14}_{-0.10}$	0.56
	`linmix_err` $(Y\|X)$	8.84 ± 0.12	3.56 ± 1.35	0.76	0.44 ± 0.12	0.59
	BCES $(X\|Y)$	8.80 ± 0.18	8.00 ± 2.55	0.76	–	1.01
	mFITEXY $(X\|Y)$	8.92 ± 0.15	6.85 ± 1.75	0.76	$0.36^{+0.20}_{-0.15}$	0.89
	`linmix_err` $(X\|Y)$	8.89 ± 0.20	6.96 ± 2.49	0.76	0.63 ± 0.30	0.89
	BCES Bisector	8.80 ± 0.11	-0.03 ± 0.10	0.76	–	0.64
	mFITEXY Bisector	8.91 ± 0.13	5.42 ± 0.85	0.76	–	0.73
	`linmix_err` Bisector	8.85 ± 0.16	4.73 ± 1.30	0.76	–	0.67
Lenticular (11)	BCES $(Y\|X)$	7.75 ± 0.58	-11.51 ± 31.78	0.33	–	2.11
	mFITEXY $(Y\|X)$	7.65 ± 0.12	3.78 ± 1.20	0.33	$0.00^{+0.00}_{-0.00}$	0.26
	`linmix_err` $(Y\|X)$			0.33		
	BCES $(X\|Y)$	7.75 ± 0.13	3.54 ± 0.99	0.33	–	0.46
	mFITEXY $(X\|Y)$	7.65 ± 0.12	3.78 ± 1.20	0.33	$0.00^{+0.00}_{-0.00}$	0.49
	`linmix_err` $(X\|Y)$			0.33		
	BCES Bisector	7.75 ± 0.13	-0.09 ± 0.15	0.33	–	0.48
	mFITEXY Bisector	7.65 ± 0.12	3.78 ± 0.85	0.33	–	0.49
	`linmix_err` Bisector			0.33	–	
Spiral (17)	BCES $(Y\|X)$	7.18 ± 0.28	6.78 ± 6.62	0.18	–	1.23
	mFITEXY $(Y\|X)$	7.24 ± 0.13	4.48 ± 0.90	0.18	$0.13^{+0.42}_{-0.13}$	0.52
	`linmix_err` $(Y\|X)$	7.22 ± 0.16	3.57 ± 1.36	0.18	0.39 ± 0.19	0.70
	BCES $(X\|Y)$	7.18 ± 0.23	5.48 ± 1.93	0.18	–	0.99
	mFITEXY $(X\|Y)$	7.24 ± 0.14	4.62 ± 0.96	0.18	$0.13^{+0.43}_{-0.13}$	0.85
	`linmix_err` $(X\|Y)$	7.21 ± 0.21	4.86 ± 1.64	0.18	0.45 ± 0.31	0.89
	BCES Bisector	7.18 ± 0.25	6.06 ± 3.66	0.18	–	1.10
	mFITEXY Bisector	7.24 ± 0.14	4.55 ± 0.66	0.18	–	0.84
	`linmix_err` Bisector	7.22 ± 0.19	4.12 ± 1.07	0.18	–	0.77
Early-type (43)	BCES $(Y\|X)$	8.54 ± 0.10	4.07 ± 0.87	0.64	–	0.65
	mFITEXY $(Y\|X)$	8.58 ± 0.07	3.32 ± 0.34	0.64	$0.24^{+0.10}_{-0.07}$	0.45
	`linmix_err` $(Y\|X)$	8.57 ± 0.08	3.12 ± 0.43	0.64	0.32 ± 0.08	0.53
	BCES $(X\|Y)$	8.54 ± 0.09	3.95 ± 0.55	0.64	–	0.63
	mFITEXY $(X\|Y)$	8.59 ± 0.08	3.88 ± 0.43	0.64	$0.26^{+0.11}_{-0.08}$	0.62
	`linmix_err` $(X\|Y)$	8.59 ± 0.09	3.82 ± 0.50	0.64	0.35 ± 0.10	0.61
	BCES Bisector	8.54 ± 0.10	4.01 ± 0.63	0.64	–	0.64
	mFITEXY Bisector	8.59 ± 0.07	3.58 ± 0.27	0.64	–	0.58
	`linmix_err` Bisector	8.58 ± 0.08	3.44 ± 0.33	0.64	–	0.56

Note. — For each subsample, we indicate $\langle \log n_{\rm sph} \rangle$, its average value of spheroid Sérsic index. In the last two columns, we report ϵ, the intrinsic scatter, and Δ, the total rms scatter in the $L_{\rm sph}$ direction. all - mergers - outliers Both the early- and late-type subsamples do not contain the two galaxies classified as S0/Sp and the two galaxies classified as mergers (45+17=66-2-2).