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ERRATUM: "MEGAMASER DISKS REVEAL A BROAD DISTRIBUTION OF BLACK HOLE MASS IN SPIRAL GALAXIES" (2016, ApJL, 826, L32)

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Supporting material: machine-readable table

1. ERRORS IN THE "METHOD" FLAG IN TABLE 1

We identified errors in the "method" flag for a few galaxies in Table 1 of the published article. Those errors are corrected here. The only material error to the content of our paper is NGC 5494 (the Sombrero galaxy), which we erroneously identified as a maser galaxy. None of the conclusions change when we correctly flag NGC 5494 as a stellar dynamical black hole mass.

Table 1
Galaxy Sample

Galaxy (1)	D (2)	Type (3)	$M_{\rm BH}$ (4)	σ^* (5)	$M_{\rm tot}$ (6)	$M_{\rm 1kpc}$ (7)	Meth (8)
Mrk1029	124.0	3p	6.28 ± 0.13	2.12 ± 0.05	10.57 ± 0.05	10.08 ± 0.06	maser
NGC1320	49.1	3p	6.74 ± 0.16	2.15 ± 0.05	…	…	maser
J0437+2456	66.0	3p	6.45 ± 0.03	2.04 ± 0.05	10.57 ± 0.22	10.04 ± 0.04	maser
ESO558−G009	102.5	3p	7.22 ± 0.03	2.23 ± 0.05	…	…	maser
UGC6093	150.0	3p	7.41 ± 0.02	2.19 ± 0.05	11.21 ± 0.05	10.19 ± 0.08	maser
NGC5495	93.1	3p	7.00 ± 0.05	2.22 ± 0.05	…	…	maser
NGC5765b	113.0	3p	7.64 ± 0.05	2.21 ± 0.05	…	…	maser
IC2560	41.8	3	6.64 ± 0.06	2.15 ± 0.03	…	…	maser
NGC1068	15.9	3p	6.92 ± 0.25	2.18 ± 0.02	10.42 ± 0.58	10.63 ± 0.06	maser
NGC1194	58.0	2	7.85 ± 0.05	2.17 ± 0.07	10.81 ± 0.08	10.19 ± 0.09	maser
NGC2273	29.5	3p	6.93 ± 0.04	2.10 ± 0.03	…	…	maser
UGC3789	49.9	3p	6.99 ± 0.09	2.03 ± 0.05	…	…	maser
NGC2960	67.1	2p	7.03 ± 0.05	2.22 ± 0.04	10.98 ± 0.03	10.40 ± 0.03	maser
NGC3079	15.9	3p	6.40 ± 0.05	2.16 ± 0.02	10.38 ± 0.05	9.85 ± 0.09	maser
NGC3393	49.2	3p	7.20 ± 0.33	2.17 ± 0.03	…	…	maser
NGC4258	7.3	3	7.58 ± 0.03	2.06 ± 0.04	10.52 ± 0.04	10.00 ± 0.05	maser
Circinus	2.8	3p	6.06 ± 0.10	1.90 ± 0.02	…	…	maser
NGC4388	16.5	3p	6.86 ± 0.04	2.00 ± 0.04	10.43 ± 0.05	9.73 ± 0.06	maser
NGC6264	147.6	3p	7.49 ± 0.05	2.20 ± 0.04	11.01 ± 0.09	9.92 ± 0.08	maser
NGC6323	113.4	3p	7.00 ± 0.05	2.20 ± 0.07	11.03 ± 0.09	9.97 ± 0.05	maser
MW	0.008	3p	6.63 ± 0.05	2.02 ± 0.08	…	…	star
NGC0221	0.8	1	6.39 ± 0.19	1.89 ± 0.02	…	…	star
NGC0224	0.8	3	8.15 ± 0.16	2.23 ± 0.02	…	…	star

Note. Col. (1): Galaxy. We show the maser galaxies presented in this work (first seven), followed by literature maser galaxies, and then the remaining literature (Section 2.1). Logarithmic errors have been symmetrized. This shortened table is just a guide to form and content. Col. (2): Distance (Mpc). Col. (3): Morphological group (1 = elliptical, 2 = S0, 3 = spiral). Galaxies assumed to harbor pseudobulges (based on Saglia et al 2016 and assuming that all of our new megamasers harbor a pseudobulge component) are marked with a "p". Col. (4): Log black hole mass ($M_\odot$). Col. (5): Log stellar velocity dispersion, derived from this paper for the first seven objects, newly presented here. The rest of the measurements are taken from Saglia et al. (2016), aside from NGC 4395, NGC 1271, and NGC 1277; see Section 2.1. Col. (6): Log total stellar mass ($M_\odot$). Col. (7): Log stellar mass ($M_\odot$) contained within 1 kpc. Col. (8): Method used to measure the black hole mass. The $M_{\rm BH}$ measurement for the four galaxies marked with asterisks (*) should be treated with caution, since we cannot find a reference presenting the BH measurements.

(This table is available in its entirety in machine-readable form.)

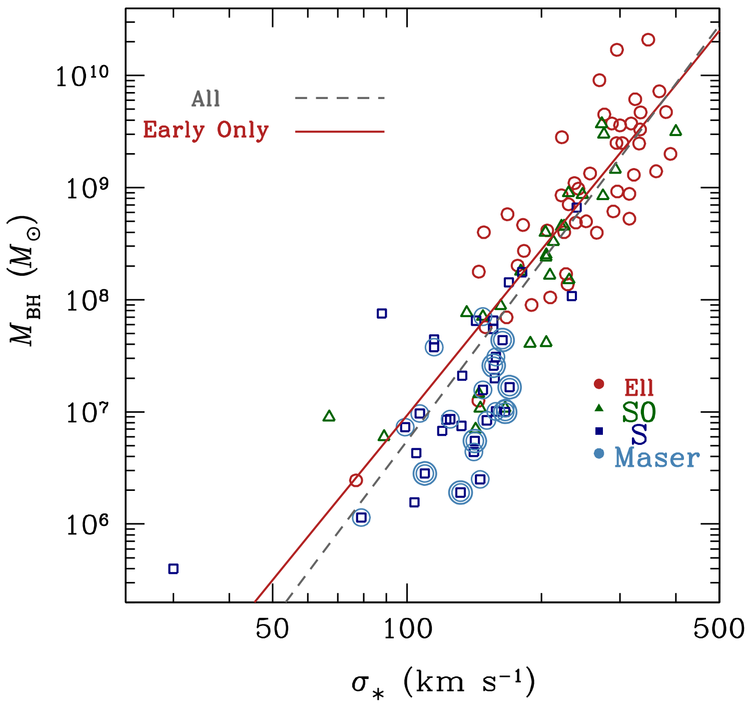

Figure 3. Relationship between σ_* and M_{BH}. We fit the entire sample (gray dashed line) and the early-type galaxies alone (red solid). Note the systematic offset to lower M_{BH} at a fixed σ_* for the megamaser disk galaxies. We show elliptical (red circles), S0 (green triangles), spiral (blue squares), and megamaser disk (blue circles); double circles indicate our new measurements.

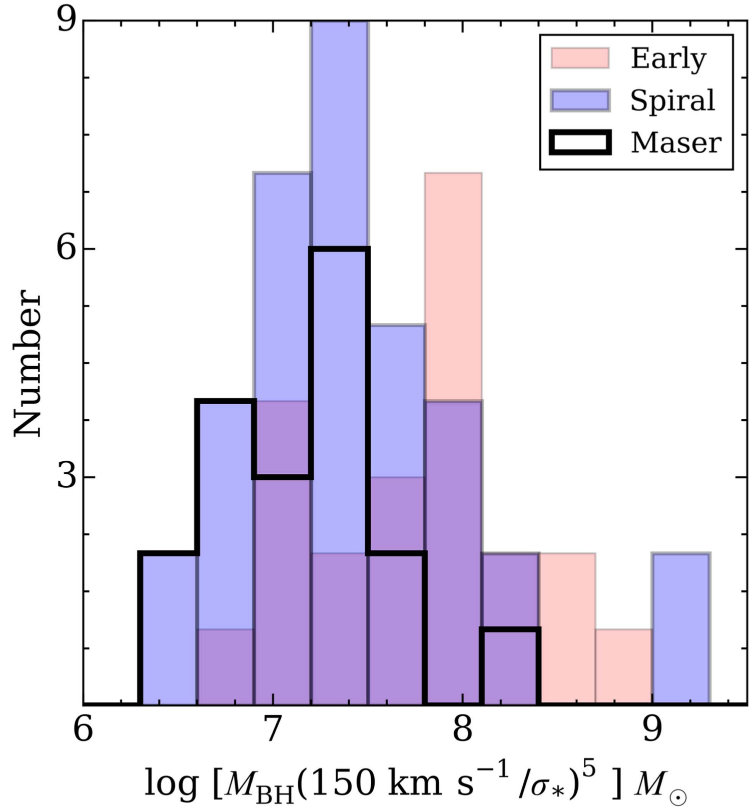

Figure 4. Distribution of M_{BH} at fixed σ_*. Megamaser galaxies (open) are offset to lower M_{BH} than the full spiral sample (blue filled) or the early-type galaxies (red filled).

Table 1 has been fixed to reflect correct "method" flags for all galaxies. The number of maser galaxies drops from 21 to 20 (note that NGC 4945 is not included in the Saglia et al. compilation) and the number of non-maser, non-S0 spiral galaxies is 17. Figures 3 and 4 from the published article were also marginally impacted and are reproduced here.

In addition, in moving the Sombrero galaxy out of the maser sample, the distributions in σ_* between the maser and non-maser samples change slightly, as do the difference in distribution of $(M_{\mathrm{BH}}/\sigma_*)^5$, as outlined below.

We reproduce PP2 and PP3 from Section 4.2, with revised numbers.

We now have marginally sufficient statistics to compare the distributions of maser and non-maser spirals. There are 20 megamaser disk galaxies (2 S0, 18 spiral) and 17 late-type (non-S0) spiral galaxies with M_{BH} measurements from non-maser dynamics. The maser and non-maser samples have indistinguishable distributions in σ_* according to an Anderson-Darling test with $P = 0.6$ of being drawn from the same distribution. Likewise, the distributions of bulge type are quite similar, with ∼75% of the non-maser and ∼85% of the megamaser disk galaxies hosted by pseudobulges (Table 1).

Calculating the net offset from our best-fit M_{BH}–σ_* relation for elliptical galaxies, we find $\Delta M_{\mathrm{BH}} = -0.60 \pm 0.14$ dex for the 20 megamaser disks, while we find no mean offset $\Delta M_{\mathrm{BH}} = -0.15 \pm 0.15$ dex for the 17 non-maser spirals (Figure 4). The maser and non-maser spirals are significantly different in $(M_{\mathrm{BH}}/\sigma_*)^5$; the Anderson-Darling test returns a probability $P = 0.007$ that they are drawn from the same distribution (Figure 4), even if we focus on just the 18 non-S0 maser disk galaxies or the maser and non-maser pseudobulge samples ($P = 0.02$). Finally, we examine the two samples non-parametrically in two dimensions using the Cramer Von-Mises test, and find that the maser and non-maser samples are different at 97% significance.