

A CATALOG OF STELLAR VELOCITY DISPERSIONS. II. 1994 UPDATE

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ABSTRACT

A catalog of central velocity dispersion measurements is presented, current through 1993 September. The catalog includes 2474 measurements of 1563 galaxies. A standard set of 86 galaxies is defined, consisting of galaxies with at least three reliable, concordant measurements. It is suggested that future studies observe some of these standard galaxies so that different studies can be normalized to a consistent system. All measurements are reduced to a normalized system using these standards.

Subject headings: catalogs—galaxies: kinematics and dynamics

1. INTRODUCTION

Central stellar velocity dispersions have provided a means of probing the structure and dynamics in galaxies for many years now. Much active research continues bearing on the shapes, mass, sizes, and structure of galaxies and clusters of galaxies using velocity dispersions as a tool.

Several studies have been done trying to define a “second parameter” (in addition to luminosity) or fundamental plane to describe galaxies, elliptical galaxies in particular. Central velocity dispersion is often put forth as a candidate for this, starting with Faber & Jackson (1976, hereafter FJ), who discovered a correlation between central velocity dispersion and luminosity in their sample of galaxies. This has been continued with, for example, Djorgovski & Davis (1987), who point out that it is formally a “minimum manifold” problem, i.e., what is the minimum number of parameters needed to characterize the observed properties of galaxies? More recently, Bender et al. (1992) have done work in describing a fundamental plane for elliptical galaxies, using central velocity dispersion as one of the principal components. Investigations in this area have led to specializations, such as studies of only the most luminous, so-called brightest cluster galaxies (BCGs), such as Oegerle & Hoessel (1991) and Lauer & Postman (1992). Work has been done on the opposite end as well, that is, low-luminosity and dwarf elliptical galaxies (Bender & Nieto 1990; Peterson & Caldwell 1993). Studies have also been done investigating this fundamental plane in cluster environments (Bell & Whitmore 1989; Zepf & Whitmore 1993).

One can make use of velocity dispersion as a distance indicator if one assumes that it can be used either as a second parameter (e.g., Jacoby, Ciardullo, & Ford 1990) or as part of a fundamental plane in conjunction with another observed value, such as surface brightness (Pierce 1989) or integrated surface brightness (Dressler 1987).

For over a decade, large central velocity dispersions have been used as dynamical evidence of black holes (Kormendy & Richstone 1992; Kormendy 1988b; Dressler 1984b; Tonry 1984b).

Central velocity dispersions, especially in large quantities, can be used statistically to constrain models or as input to

models (e.g., Kent & Falco 1988; Tenjes, Einasto, & Haud 1991).

These are just a few of the many dozens of papers that have been published within the last decade using stellar velocity dispersions. In 1985, B. Whitmore, J. Tonry, and I published a catalog of central stellar velocity dispersions that was an attempt to collect all of the published velocity dispersion measurements then available through the literature, or generously supplied to us through private communication. This catalog (Whitmore et al. 1985, hereafter Paper I) consisted of 1096 measurements of 725 galaxies. Since that time, of course, much observational work has been done on this topic. The updated catalog presented here comprises 2474 measurements of 1563 galaxies. Most notable for sheer number among the many high-quality sources are Davies et al. (1987, hereafter 7Sam), with 462 measurements, Lucey & Carter (1988, hereafter LC), with 151 measures, and Dressler, Faber, & Burstein (1988, hereafter DFB), with 132. In fact, it should be noted that these three studies account for just over half of the new entries in the catalog.

As in Paper I, the primary goals of this paper are as follows:

1. Compile a database of dispersion measurements for quick reference and use in statistical studies.
2. Compare various studies to determine the relative accuracies and normalizing factors.
3. Provide a reference system for the measurement of stellar velocity dispersions by establishing a set of standard galaxies.

2. COMPILATION OF STELLAR VELOCITY DISPERSIONS

Table 1 contains the compilation of central stellar velocity dispersions through 1993 September 1. Much effort has been made to make this as current and accurate a listing as possible.

In compiling these values, it was noted that some studies in existence at the time had been overlooked by Paper I. For example, Richstone & Morton (1975), Jenkins (1981), and Angione et al. (1980) were omitted. It is hoped that any such omissions in this update will be pointed out and sent the author, so that the catalog can be corrected.

Table 1 shows the adopted value for the central velocity dispersion (σ) for each galaxy, listed alphabetically, except that

TABLE 1
CATALOG OF VELOCITY DISPERSIONS

Name	Type	σ	Name	Type	σ	Name	Type	σ	Name	Type	σ
N 16	S0	184	N 686	S0	155	N1309	Sbc	84	N2305	E2	214
N 57	E	314	N 687	S0	241	N1316	S0	243	N2310	S0	114
N 80	S0	277	N 701	SBc	76	N1326	SB0	120	N2314	E3	294
N 83	E	240	N 704B		157	N1332	S0	332	N2320	E	322
N 97	E	120	N 708	E	241	N1339	E	160	N2325	E4	133
N 128	S0	167	N 718	Sa	127	N1344	E5	159	N2329	S0	270
N 137	S0	213	N 720	E5	243	N1351	S0	143	N2336	Sbc	156
N 147	E5	22	N 736	E	226	N1353	SBb	83	N2340	E	253
N 179	S0	238	N 741	E0	303	N1357	Sab	119	N2344	Sc	139
N 185	E3	22	N 742	E0	172	N1358	S0/a	159	N2380	S0	188
N 194	E	206	N 750	E	204	N1374	E	186	N2434	E0	204
N 196	SB0	203	N 751	E	200	N1375	S0	53	N2476	E	187
N 205	E5	23	N 753	Sbc	102	N1379	E	119	N2502	S0	173
N 221	E2	77	N 759	E	270	N1380	S0	225	N2513	E	251
N 224	Sb	174	N 772	Sb	125	N1380B		96	N2549	S0	159
N 227	S0	267	N 777	E1	335	N1381	S0	161	N2563	S0	260
N 274	S0	74	N 794	S0	269	N1386	SB0	187	N2613	Sb	177
N 307	S0	314	N 801	Sc	136	N1395	E2	245	N2629	S0	283
N 311	S0	286	N 821	E6	207	N1398	SBab	205	N2634	E1	172
N 312	E2	256	N 822	E	154	N1399	E1	308	N2636	E0	83
N 315	E	300	N 825	Sa	103	N1400	S0	260	N2639	Sa	188
N 323	E0	342	N 833	Sa	317	N1403	S0	168	N2646	SB0	222
N 379	S0	244	N 883	S0	301	N1404	E1	250	N2655	S0/a	163
N 380	E2	275	N 890	S0	231	N1407	E0	272	N2663	E	280
N 382	E	151	N 891	Sb	120	N1417	Sb	134	N2672	E1	307
N 383	S0	264	N 934	S0	236	N1419	E	133	N2673	E0	155
N 385	S0	179	N 936	SB0	189	N1426	E4	155	N2675	E	252
N 386	E3	60	N 949	Sb	68	N1427	E	155	N2681	S0/a	111
N 392	S0	260	N 990	E	179	N1439	E1	162	N2683	Sb	140
N 404	S0	54	N 993	S0	176	N1453	E2	289	N2685	SB0	114
N 410	E	294	N1004	E	219	N1461	S0	210	N2692	SBab	156
N 426	E	279	N1008	E	108	N1515	Sbc	102	N2693	E3	326
N 430	E	310	N1016	E	283	N1521	E3	240	N2694	E1	140
N 448	S0	90	N1023	SB0	216	N1537	S0	158	N2695	S0	191
N 467	S0	247	N1024	Sab	158	N1543	SB0	158	N2699	E	131
N 471	S0	110	N1026	S0	191	N1549	E0	210	N2732	S0	171
N 474	S0	169	N1029	S0/a	159	N1553	S0	0	N2749	E3	259
N 488	Sb	193	N1052	E4	222	N1566	Sbc	109	N2759	S0	292
N 499	S0	235	N1058	Sc	60	N1573	E	287	N2768	E6	205
N 501	PEC	162	N1060	S0	305	N1574	S0	199	N2769	Sa	157
N 502	S0	74	N1068	Sb	148	N1587	E	220	N2775	Sab	175
N 507	S0	327	N1079	S0/a	156	N1588	E	127	N2778	E	180
N 508	E0	262	N1084	Sc	91	N1595	E3	116	N2781	S0	145
N 524	S0	242	N1101	S0	157	N1596	S0	197	N2782	Sa	146
N 529	S0	216	N1107	S0	256	N1600	E3	342	N2783	E	301
N 533	E3	301	N1129	E	334	N1601	S0	117	N2784	S0	245
N 535	S0	160	N1132	E	244	N1603	E	102	N2787	SB0	195
N 541	S0	195	N1161	S0	288	N1620	Sbc	116	N2800	E	270
N 545	S0	243	N1172	E	110	N1638	S0	135	N2802	S	182
N 547	E1	243	N1175	S0	235	N1653	E	254	N2803	S	201
N 548	E	116	N1199	E3	207	N1667	Sc	173	N2804	S0	205
N 564	E	235	N1201	S0	165	N1700	E4	243	N2810	E	214
N 584	E4	230	N1209	E6	247	N1713	E	254	N2815	SBb	202
N 596	E	168	N1260	S0/a	218	N1726	S0	228	N2824	S0	122
N 598	Scd	36	N1270	E	380	N1808	Sa	148	N2831	E0	229
N 613	SBbc	125	N1272	E	330	N1889	E	99	N2832	E2	310
N 628	Sc	65	N1273	S0	243	N1930	S0	194	N2841	Sb	232
N 631	E	214	N1274	E3	184	N1961	Sc	254	N2844	Sa	113
N 636	E3	166	N1278	E	252	N2012	S0	217	N2852	Sa	181
N 641	S0	250	N1282	E	226	N2073	S0	137	N2855	S0/a	240
N 661	E	167	N1283	E1	235	N2205	S0	238	N2859	SB0	177
N 665	S0	190	N1289	SB0	77	N2217	SB0	232	N2865	E3	177
N 670	S0	99	N1291	SB0/a	186	N2268	Sbc	76	N2872	E2	284
N 677	E	240	N1293	E0	233	N2271	S0	146	N2880	SB0	142
N 679	S0	257	N1298	E	174	N2292	S0	137	N2887	S0	278
N 680	E	217	N1300	SBbc	136	N2293	S0	257	N2888	E	86
N 681	Sab	138	N1302	SB0/a	158	N2300	S0	254	N2903	Sbc	106

TABLE 1—Continued

Name	Type	σ	Name	Type	σ	Name	Type	σ	Name	Type	σ
N2904	S0	230	N3310	Sbc	110	N3862	E	257	N4284	Sbc	130
N2911	S0	233	N3311	E2	192	N3872	E5	256	N4290	SBab	143
N2940	S0	334	N3312	Sb	221	N3873	E	239	N4291	E	278
N2944	SBc	160	N3315	S0	187	N3875	S0/a	154	N4292	SB0	53
N2945	S0	270	N3316	SB0	196	N3894	E4	258	N4296	S0	195
N2950	SB0	183	N3334	S0	293	N3898	Sab	202	N4303	Sbc	96
N2954	E	218	N3348	E0	239	N3900	S0	118	N4308	E	87
N2962	S0	192	N3351	SBb	101	N3904	E2	199	N4318	E	100
N2967	Sc	190	N3352	S0	208	N3923	E4	241	N4321	Sbc	94
N2974	E4	201	N3368	Sab	114	N3938	Sc	30	N4324	S0	89
N2985	Sab	134	N3375	S0	142	N3940	E	206	N4339	E0	114
N2986	E2	261	N3377	E5	148	N3944	S0	111	N4340	SB0	113
N2991	S0	277	N3379	E1	209	N3945	SB0	165	N4342		241
N2992	Sa	108	N3384	SB0	170	N3962	E1	220	N4350	S0	189
N2994	S0	182	N3392	E	150	N3990	S0	170	N4365	E3	261
N2996	S0	223	N3393	SBa	184	N3998	S0	304	N4371	SB0	125
N2998	Sc	79	N3411	E	305	N4002	S0	192	N4373	S0	233
N3031	Sab	170	N3412	SB0	108	N4003	SB0	276	N4374	E1	296
N3032	S0	80	N3414	S0	248	N4008	E5	206	N4377	S0	141
N3051	SB0	230	N3425	S0	275	N4015		158	N4378	Sa	183
N3059	SBbc	53	N3467	S0	217	N4022	S0	84	N4379	S0	70
N3065	S0	167	N3468	S0	282	N4024	S0	148	N4382	S0	192
N3070	E	230	N3474	S	155	N4026	S0	195	N4386	S0	191
N3078	E2	237	N3489	S0	138	N4033	E6	125	N4387	E	112
N3079	SBc	150	N3491	S0	208	N4036	S0	193	N4388	Sb	119
N3087	E	272	N3504	Sab	120	N4061	E	459	N4394	SBb	138
N3090	E	254	N3516	SB0	235	N4062	Sc	97	N4406	E3	250
N3091	E3	295	N3557	E3	261	N4065	E	249	N4417	SB0	84
N3098	S0	119	N3562	E	268	N4070	E	120	N4429	S0	182
N3102	S0	166	N3569	S0	300	N4073	E	264	N4431	S0	68
N3106	S0	130	N3583	SBb	136	N4077	SB0	246	N4434	E	115
N3108	S0	204	N3585	E7	218	N4087	S0	236	N4435	SB0	168
N3115	S0	264	N3593	S0/a	77	N4105	E3	253	N4442	SB0	217
N3115 DW1		29	N3599	S0	79	N4106	SB0	181	N4448	SBab	179
N3121	E	264	N3605	E4	96	N4111	S0	139	N4450	Sab	126
N3136	E	235	N3606	E0	205	N4121	E	117	N4457	S0/a	99
N3136B	E	165	N3607	S0	241	N4125	E6	232	N4458	E0	106
N3145	SBbc	159	N3608	E2	203	N4128	S0	210	N4459	S0	178
N3147	Sbc	268	N3609	Sab	199	N4138	S0	161	N4461	SB0	164
N3156	S0	87	N3610	E5	162	N4150	S0	85	N4464	S	121
N3158	E3	354	N3612	Sdm	198	N4151	Sab	178	N4467	E2	83
N3163	S0	213	N3613	E6	205	N4168	E2	186	N4468	S0	76
N3166	S0/a	114	N3617	E	87	N4169	S0	219	N4472	E2	303
N3168	E	253	N3623	Sa	170	N4179	S0	167	N4472 DW6		27
N3179	S0	232	N3626	S0	142	N4187	E	294	N4472 DW8		34
N3190	Sa	195	N3627	Sb	184	N4192	Sab	140	N4473	E5	193
N3193	E2	191	N3628	Sb	175	N4200	S0	80	N4476	S0	81
N3198	SBc	65	N3640	E3	182	N4203	S0	165	N4477	SB0	177
N3200	Sc	165	N3641	E	164	N4213	E	256	N4478	E2	143
N3203	S0	138	N3642	Sbc	137	N4216	Sb	210	N4486	E0	333
N3222	SB0	192	N3658	S0	174	N4227	S0	259	N4486*		550
N3223	Sb	155	N3665	S0	190	N4229	S	201	N4486B	E0	185
N3226	E2	208	N3706	S0	274	N4231	S0	138	N4489	E	62
N3227	Sa	159	N3710	E	203	N4232	SBb	154	N4494	E1	160
N3237	S0	145	N3716	S0	151	N4239	E	63	N4501	Sb	171
N3238	S0	157	N3719	Sbc	155	N4254	Sc	147	N4503	SB0	118
N3245	S0	224	N3731	E	176	N4258	Sbc	167	N4510	E	53
N3250	E4	263	N3759	S0	109	N4259	S0	151	N4513	S0	130
N3257	S0	124	N3767	SB0	117	N4261	E2	326	N4515	S0	91
N3258	E1	271	N3812	E	181	N4262	SB0	188	N4521	S0/a	170
N3260	E	190	N3817	SB0/a	130	N4267	SB0	160	N4526	S0	267
N3268	E2	226	N3818	E5	198	N4270	S0	195	N4528	S0	107
N3277	Sab	215	N3824	Sa	213	N4271	S0	240	N4536	Sbc	193
N3286	E	351	N3837	E	315	N4272	E	158	N4548	SBb	135
N3300	S0	146	N3838	S0/a	153	N4274	SBab	137	N4550	SB0	83
N3305	E0	154	N3841	S	209	N4278	E1	250	N4551	E	113
N3308	S0	193	N3842	E	321	N4281	S0	270	N4552	E	269
N3309	E3	236	N3853	E	172	N4283	E0	105	N4556	E	234

TABLE 1—Continued

Name	Type	σ	Name	Type	σ	Name	Type	σ	Name	Type	σ
N4564	E	160	N4872	SB0	209	N5332	S0	254	N5839	S0	133
N4565	Sb	136	N4874	E0	267	N5333	SB0	183	N5845	E	244
N4569	Sab	109	N4876	E5	183	N5342	S0	188	N5846	E0	252
N4570	S0	186	N4881	E	205	N5347	SBab	103	N5846A	E2	182
N4578	S0	127	N4886	E0	177	N5357	E	186	N5852	S	274
N4579	Sb	189	N4889	E4	395	N5363	IRR	198	N5854	SB0	144
N4581	E	141	N4898E		134	N5365	SB0	232	N5857	SBb	158
N4589	E2	228	N4898W		202	N5370	SB0	135	N5864	SB0	165
N4594	Sa	249	N4906	E3	165	N5380	S0	156	N5865	S0*	240
N4596	SB0	146	N4914	E	224	N5382	S0	163	N5866	S0	174
N4598	SB0	92	N4915	E0	208	N5384	S0	200	N5879	Sbc	92
N4608	SB0	157	N4923	S0	195	N5389	S0/a	167	N5898	E0	216
N4616	E	168	N4926	S0	261	N5397	S0	247	N5903	E2	217
N4621	E5	230	N4927	S0	282	N5400	S0	362	N5953	Sa	94
N4623	SB0	89	N4936	E0	278	N5419	E	312	N5966	E	174
N4636	E0	207	N4946	E	199	N5421	SB	113	N5982	E3	256
N4638	S0	132	N4952	E	266	N5423	S0	117	N6003	S0	184
N4645	E	181	N4955	E2	212	N5424	S0	189	N6008	SBb	23
N4645B	S0	163	N4956	S0	153	N5444	E	220	N6018	S0	141
N4648	E3	224	N4957	E3	240	N5445	S0	144	N6020	E	196
N4649	E2	339	N4958	SB0	173	N5454	S0	186	N6021	E	219
N4650A	S0/a	75	N4970	S0	200	N5457	Scd	78	N6051	E	226
N4660	E	185	N4971	S0	178	N5459	S0	217	N6086	E	325
N4661	E	143	N4976	E4	159	N5481	E	140	N6095	S0	254
N4673	E1	222	N4993	S0	204	N5482	S0	279	N6107	E	195
N4692	E	243	N5004	S0	235	N5485	S0	161	N6109	S	248
N4694	SB0	41	N5007	S0	186	N5490	E	274	N6127/8		225
N4696	E1	248	N5011	E1	244	N5513	S0	138	N6137	E	293
N4696B	S0	257	N5017	E	174	N5516	S0	334	N6146	E	252
N4696D	SB0	161	N5018	E3	208	N5525	S0	231	N6158	E	186
N4697	E6	181	N5029	E	221	N5532	S0	290	N6158COMP		93
N4698	Sab	169	N5044	E0	233	N5544	SB0/a	59	N6160	E	234
N4699	Sb	215	N5048	S0	189	N5546	E	283	N6166	E2	321
N4706	S0	238	N5061	E0	196	N5557	E1	259	N6166B		157
N4709	E1	235	N5077	E3	273	N5575	S0	280	N6166C		131
N4725	Sab	155	N5082	SB0	198	N5576	E3	190	N6166CG		117
N4729	E	152	N5084	S0	211	N5582	E	150	N6166FCOM		132
N4733	E	75	N5087	S0	294	N5596	S0	152	N6166NCOM		177
N4736	Sab	136	N5090	E2	268	N5598	S0	196	N6173	E	240
N4742	E4	103	N5090A	S0	184	N5626	S0	254	N6217	SBbc	131
N4743	S0	121	N5101	SB0/a	158	N5629	S0	261	N6269	E	224
N4754	SB0	200	N5102	S0	82	N5631	S0	135	N6305	SB0	175
N4760	E0	248	N5114	S0	192	N5638	E1	165	N6314	Sa	192
N4762	SB0	147	N5124	E6	250	N5642	E	184	N6340	S0/a	137
N4767	E	202	N5127	E	189	N5670	S0	166	N6359	S0	186
N4782	E0	340	N5129	E	262	N5676	Sbc	112	N6384	Sbc	124
N4783	E0	266	N5140	S0	199	N5684	S0	112	N6407	S0	286
N4786	E	294	N5153	E1	183	N5687	S0	189	N6411	E	176
N4789	S0	266	N5170	Sc	88	N5701	SB0/a	117	N6482	E	286
N4807	S0	205	N5180	S0	210	N5702	S0	157	N6483	E4	218
N4816	S0	224	N5193	E	234	N5707	Sab	114	N6487	E	337
N4824		159	N5194	Sbc	113	N5710	E	231	N6500	Sab	168
N4826	Sab	160	N5195	IRR	157	N5718	S0	222	N6548	SB0	298
N4827	S0	270	N5198	E1	197	N5728	Sa	209	N6557	S0	229
N4830	S0	176	N5206	SB0	49	N5746	Sb	213	N6623	E	244
N4831	S0	153	N5216	E0	143	N5754	SBb	167	N6653	E1	218
N4839	E	284	N5223	E	187	N5761	S0	154	N6673	S0	132
N4840	E1	242	N5228	S0	350	N5770	SB0	123	N6684	SB0	110
N4841	Dbl*	234	N5250	S0	132	N5771	E	91	N6702	E	181
N4841A	E	263	N5266	S0	175	N5773	S	175	N6703	S0	177
N4841B	E	239	N5273	S0	52	N5791	E6	224	N6721	E	268
N4850	S0	173	N5297	Sc	113	N5796	E0	290	N6733	S0	242
N4854	SB0	174	N5302	SB0	167	N5799	S0	134	N6746	S0	258
N4860	E2	251	N5304	E	209	N5812	E0	202	N6758	E	269
N4864	E2	192	N5322	E3	229	N5813	E1	230	N6776	E	208
N4866	S0	228	N5328	E1	303	N5820	S0	187	N6799	S0	159
N4867	E3	221	N5329	E	254	N5831	E3	168	N6849	SB0	198
N4869	E3	198	N5331	Dbl*	207	N5838	S0	290	N6851	E	181

TABLE 1—Continued

Name	Type	σ	Name	Type	σ	Name	Type	σ	Name	Type	σ
N6868	E2	285	N7711	S0	181	1330-314		233	A0136-0801		66
N6869	S0	146	N7720	E	344	1354+15		102	A1060-S023		124
N6876	E3	230	N7720B		219	1425-352		288	A1060-S037		124
N6909	E	127	N7720N		214	1426+14		69	A1060-S046		114
N6951	Sbc	96	N7720S		396	1439+39		118	A1060-S053		202
N6958	E	222	N7742	Sb	100	1439-196		176	A1060-S061		220
N6987	E0	255	N7743	SB0	85	1444+32		291	A1060-S066		98
N7002	E1	247	N7746	S0	205	1444+34		118	A1060-S068		133
N7013	S0/a	88	N7768	E	320	1455+38		186	A1060-S070		114
N7014	E	263	N7778	E	207	1520-410		210	A1060-S080		89
N7029	E6	197	N7783		192	1554+48		300	A1060-S083		120
N7052	E	275	N7785	E5	259	1557+48		209	A1060-S096		126
N7070A	IRR	100	N7814	Sab	167	159-41		189	A1060-S107		87
N7075	E	252	N7824	Sab	266	159-43		252	A1060-S119		111
N7083	Sbc	74	0136-0801		66	159-46		166	A1060-S135		119
N7097	E5	200	0140-658		252	159-63		149	A1060-S144		96
N7117	S0	251	0148-836		188	159-83		202	A1060-S154		128
N7118	S0	186	0152-00		176	159-89		170	A1060-S190		78
N7144	E0	170	0205+0154		191	160-159		230	A1060-S195		92
N7145	E0	133	0205+0155		138	160-22		261	A1060-S201		152
N7171	SBb	73	0247-833		196	160-23		178	A1177-BCG		278
N7173	E	210	0358-606		267	160-27		171	A1185-BCG		195
N7176	E	218	0410-291		214	1602+49		155	A1216-BCG		230
N7177	Sb	127	0422-476		169	1603-180		244	A1228-BCG		287
N7180	S0	93	0422-536		291	1604+16		212	A1249-4		125
N7192	E	184	0449-324		255	1636+36		436	A1377-BCG		275
N7196	E	274	0459-449		194	1927-645		207	A1631-BCG		248
N7200	E	194	0526-398		262	2012-494		181	A1656-BCG		396
N7217	Sab	132	0540-479		234	2012-616		279	A1656D107		69
N7236	S0	197	0550-380		241	2026-645		264	A1656D125		166
N7237	S0	180	0558-553		229	2031-418		181	A1656D153		133
N7237/C		233	0657-498		210	2048-300		193	A1656D193		119
N7331	Sb	154	0909+53		230	2059-673		183	A1656D207		146
N7332	S0	140	0911+30		199	2147-465		202	A1656D87		79
N7371	S0/a	155	0919+34		234	2149-276		257	A1775-BCG		320
N7377	S0	154	0923+46		154	2151-557		274	A1795-BCG		285
N7385	E	257	0959+13		245	2226-357		267	A1853		170
N7391	E	281	1001+22		339	2239-431		238	A1904-BCG		290
N7435	SBa	169	1006+15		207	2241-582		184	A194-DR22		86
N7436A		352	1013-341		241	2316-395		219	A194-DR23		216
N7436B		232	1033+38		194	2335-477		264	A194-DR26		70
N7454	E4	121	1035-285		172	3C 218		307	A194-DR28		80
N7457	S0	77	1038-368		215	A 76-BCG		235	A194-DR29		142
N7458	E	145	1044+39		361	A 85-BCG		320	A194-DR30		127
N7479	SBc	109	1046-194		213	A 119-BCG		305	A194-DR33		157
N7499	S0	301	1047+36		180	A 150-BCG		244	A194-DR34		213
N7503	E2	228	1057+46		151	A 151-BCG		317	A194-DR35		147
N7506	SB0	149	1057+50		167	A 160-BCG		199	A194-DR36		149
N7507	E0	217	1101+16		214	A 168-BCG		252	A194-DR42		240
N7537	Sbc	118	1112+31		265	A 189-BCG		236	A194-DR43		256
N7541	SBbc	67	1129+28		162	A 193-BCG		365	A194-DR44		149
N7562	E2	279	1132+51		274	A 194-BCG		245	A194-DR45		130
N7576	S0	37	1136+10		248	A 246-BCG		239	A194-DR50		154
N7578A	S0	280	1154+32		164	A 261-BCG		406	A194-DR52		111
N7578B	E1	214	1200-433		218	A 399-BCG		229	A194-DR53		243
N7578B/C		195	1205+25		191	A 400-BCG		295	A194-DR55		91
N7585	S0	218	1208-337		179	A 401		479	A194-DR56		172
N7600	S0	223	1233+73		137	A 401-BCG		366	A194-DR57		80
N7603B		133	1237-202		200	A 496-BCG		267	A194-DR62		80
N7606	Sb	159	1241-339		183	A 505-BCG		407	A1983-BCG		245
N7612	S0	196	1246-40		39	A 634-BCG		241	A1991-BCG		255
N7617	S0	137	1246-41		69	A 671-BCG		313	A2022-BCG		280
N7619	E	312	1252-266		305	A 754-BCG		352	A2029-cD		374
N7626	E	273	1257-439		340	A 779-BCG		358	A2052-BCG		238
N7631	Sb	115	1301-301		189	A 957-BCG		329	A2063-BCG		220
N7660	E	207	1304-202		266	A 978-BCG		260	A2079-BCG		249
N7664	Sc	103	1324+15		157	A 993-BCG		260	A2089-BCG		279
N7681	S0	165	1330+71		192	A 994-BCG		329	A2107-BCG		333

TABLE 1—Continued

Name	Type	σ	Name	Type	σ	Name	Type	σ	Name	Type	σ
A2147-BCG		301	Cen-DR22		131	DC1842-WR35		146	ESO 443-G24	S0	287
A2151-BCG		286	Cen-DR23		138	DC1842-WR39		227	ESO 443-G43	S0	113
A2152-BCG		295	Cen-DR24		111	DC1842-WR44		118	ESO 446-G49	S0	137
A2197-BCG		252	Cen-DR27		106	DC1842-WR42		156	ESO 462-G15	E3	292
A2199-BCG		302	Cen-DR28		261	DC1842-WR41		240	ESO 467-G54	S0	252
A2199-S18		199	Cen-DR29		110	DC23-032		282	ESO 484-G28	E	135
A2199-S24		92	Cen-DR35		73	DC23-042		221	ESO 501-G27		102
A2199-S26		179	Cen-DR36		86	DC23-044		155	ESO 501-G21		154
A2199-S30		235	Cen-DR39		253	DC23-045		110	ESO 501-G49	S0	114
A2199-S33		296	Cen-DR40		89	DC23-052		53	ESO 501-G47		125
A2199-S34		151	Cen-DR44		210	DC23-054		117	ESO 507-G25	S0	244
A2199-S43		218	Cen-DR49		138	DC23-055		160	ESO 507-G46	E2	180
A2199-S44		202	Cen-DR50		141	DC23-056		264	ESO 507-G45		325
A2199Z34A		211	Cen-DR52		58	DC23-058		256	ESO 509-G8	E	269
A2255-BCG		285	Cen-DR56		145	DC23-060		110	ESO 511-G23	S0	275
A2256-BCG		280	Cen-DR58		169	DC23-070		134	ESO 512-G18	S0	196
A2366-BCG		390	Cen-DR60		50	ESO 005-G10		291	ESO 514-G3	E	125
A2399-BCG		280	Cen-E44		37	ESO 005-G7		134	ESO 552-G52	E	174
A2457-BCG		391	Cen-J316		233	ESO 019-G6		142	ESO 553-G2	S0	242
A2589-BCG		345	Cen-JF6		54	ESO 040-G2		178	ESO 567-G51	E	140
A2634-DR102		215	Coma-DR 24		230	ESO 069-G14		236	ESO 569-G1	E	154
A2634-DR107		227	Coma-DR 27		101	ESO 071-G13		134	ESO 574-G12	E	167
A2634-DR38		285	Coma-DR 81		152	ESO 093-G3		216	ESO 575-G13	E	266
A2634-DR55		272	Coma-DR 87		74	ESO 105-G4	S0	232	ESO 575-G43	S0	239
A2634-DR56		236	Coma-DR 96		185	ESO 105-G7	S0	221	ESO 576-G67	S0	183
A2634-DR57		263	Coma-DR107		59	ESO 115-G8	E1	305	ESO 580-G26	S0	92
A2634-DR58		201	Coma-DR125		157	ESO 137-G10	S0	209	ESO 581-G16	E6	172
A2634-DR61		141	Coma-DR136		160	ESO 137-G6	E1	392	G 14		24
A2634-DR69		221	Coma-DR140		171	ESO 137-G8	S0	268	I 171	E	178
A2634-DR71		192	Coma-DR153		128	ESO 139-G45	SB0	238	I 179	E	213
A2634-DR73		192	Coma-DR156		102	ESO 171-G81		273	I 310	S0	230
A2634-DR74		207	Coma-DR161		180	ESO 185-G27	S0	167	I 331	S	173
A2634-DR75		173	Coma-DR193		117	ESO 208-G21	S0	168	I 342	Scd	77
A2634-DR76		218	Coma-DR204		130	ESO 218-G2	E2	238	I 708	E	276
A2634-DR77		327	Coma-DR207		144	ESO 221-G26	E5	138	I 767	E	53
A2634-DR78		98	Coma-DR210		173	ESO 235-G49	E	210	I 794	E	52
A2634-DR79		191	Coma-DR238		105	ESO 235-G85	Sa	130	I 832	E	209
A2634-DR80		182	D 9		159	ESO 237-G35	E0	273	I 838		190
A2634-DR82		144	D 27		114	ESO 264-G31	E	247	I 843	S0	247
A2670-BCG		407	D 45		238	ESO 267-G11	S0	180	I 844	S0	129
A2670-BGC		399	D 49		95	ESO 268-G4	S0	289	I 874	SB0	123
A2675-BCG		270	D 50		98	ESO 269-G72	E4	212	I 882	S	221
A569A		225	D 136		181	ESO 269-G80	S0	176	I 962	S	149
A569B		260	DC1842# 1	E1	40	ESO 270-G14	S0	169	I 988	E	192
ARP 255		160	DC1842# 2	S	105	ESO 286-G59	S0	256	I1459	E	316
ARP 323		217	DC1842# 4	S0	122	ESO 318-G21	E	152	I1625	S0	255
AWM 4		277	DC1842# 5	S	201	ESO 322-G101		159	I1696	E	168
BO 4		148	DC1842# 8	Sa	125	ESO 322-G38	S0	204	I1963		101
BO 12		154	DC1842# 9	S0	90	ESO 322-G51	SB0	175	I2006	S0	122
BO 23		208	DC1842#12	S0	145	ESO 322-G59		231	I2082	S0	265
BO 24		279	DC1842#13	E2	224	ESO 322-G75	S0	147	I2311	E0	221
BO 25		158	DC1842#14	S0	133	ESO 323-G15	S0	143	I2530	S	159
BO 29		166	DC1842#17	S0	78	ESO 323-G23	S	149	I2623	E	140
BO 30		234	DC1842#18	E1	181	ESO 323-G34	E5	242	I2955	PEC	200
BO 41		233	DC1842#19	E3	256	ESO 323-G89	S0	229	I2977	IRR	218
BO 46		190	DC1842#20	S0	194	ESO 376-G7	S0	210	I2989		160
BO 51		120	DC1842#21	SB0	128	ESO 381-G29	S	93	I3010	SB0	93
BO 61		242	DC1842#25	Sa	87	ESO 381-G47	S0	172	I3152	S0	166
BO 66		201	DC1842#29	E2	108	ESO 382-G34	S0	88	I3328	E	27
BO105		224	DC1842#33	S	111	ESO 384-G13	S0	83	I3370	E2	196
BO154		107	DC1842#35	S	42	ESO 384-G19	S0	149	I3393	S0	55
CART-COMP3		98	DC1842#36	S0	68	ESO 384-G49	E	171	I3896	E	237
CR 32		237	DC1842#37	E0	95	ESO 385-G17	E4	150	I3900	SB0	270
CR 36		218	DC1842#38	Sb	142	ESO 386-G11	E	233	I3947	S0	142
Cen-DR14		70	DC1842#44	S0	113	ESO 386-G31		275	I3957	S0	149
Cen-DR17		25	DC1842#53	S0/a	107	ESO 386-G41	S	194	I3959	E3	195
Cen-DR19		211	DC1842#54	Sa	99	ESO 409-G12	E	190	I3986	S0	305
Cen-DR20		123	DC1842-WR23		211	ESO 415-G26	S0	126	I4011	E	104

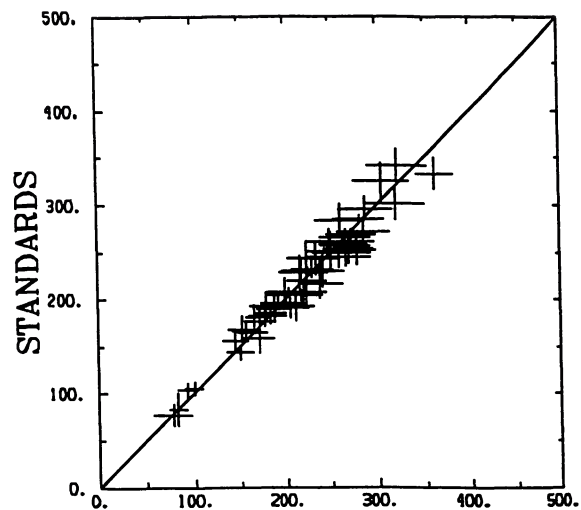
TABLE 1—Continued

Name	Type	σ	Name	Type	σ	Name	Type	σ	Name	Type	σ
I4012	E	179	Klem44-DR45		143	Pavo2-DR15		183	TURNER 141B		233
I4021	E	157	Klem44-DR41		149	Pavo2-DR17		91	TURNER 145B		136
I4045	E4	212	Klem44-DR44		170	Pavo2-DR18		187	TURNER 150B		162
I4051	E0	221	Klem44-DR43		195	Pavo2-DR19		308	TURNER 150A		221
I4062		295	Klem44-DR42		224	Pavo2-DR20		274	U 818	S0	176
I4133	E	164	Klem44-DR53		66	Pavo2-DR21		123	U 986	E0*	120
I4180	SB0	67	Klem44-DR52		81	Pavo2-DR23		90	U10069	S0*	241
I4197	S0	192	Klem44-DR54		121	Pavo2-DR25		113	U10103	E0*	226
I4200	S0	211	Klem44-DR51		159	Pavo2-DR26		103	U10314	E0*	157
I4293	S0	249	Klem44-DR59		176	Pavo2-DR27		46	U11772	S0*	249
I4296	E	316	Klem44-DR55		178	Pavo2-DR28		127	U11810	Sb*	60
I4329	S0	285	Klem44-DR50		212	Pavo2-DR29		101	U1475	E2*	271
I4351	Sb	128	Klem44-DR58		267	Pavo2-DR30		102	U1556	SBb*	122
I4421	E	205	Klem44-DR56		275	Pavo2-DR33		119	U1994	S0*	130
I4424	S	209	Klem44-DR69		86	Pavo2-DR34		48	U2070	S0*	228
I4451	E	236	Klem44-DR67		106	Pavo2-DR36		77	U3596	S0*	210
I4453	S0	162	Klem44-DR66		111	Pavo2-DR37		200	U3642	S0*	224
I4464	S0	172	Klem44-DR61		128	Pavo2-DR38		208	U3816	S0*	294
I4704	S0	261	Klem44-DR68		129	Pavo2-DR44		91	U4551	S0*	174
I4718	Sb	121	Klem44-DR60		145	Pavo2-DR45		157	U4956		185
I4742	E1	214	Klem44-DR62		158	Pavo2-DR46		135	U4972		232
I4765	E4	298	Klem44-DR65		224	Pavo2-DR50		75	U4974		195
I4767	S0	128	Klem44-DR74		100	Pavo2-DR53		69	U5043	S0*	186
I4784	S0	261	Klem44-DR79		139	TURNER 12B		185	U5171	S0*	221
I4797	E	232	Klem44-DR70		140	TURNER 13B		204	U5178	S0*	249
I4842	E	195	Klem44-DR76		145	TURNER 19A		184	U5334	S*	164
I4864	Sa	199	Klem44-DR77		214	TURNER 21A		166	U5337	SBa*	188
I4889	E5	166	Klem44-DR81		102	TURNER 21B		384	U5443	Db1*	251
I4926	E	241	Klem44-DR82		112	TURNER 24A		314	U6695	Sa*	227
I4943	E	166	Klem44-DR83		132	TURNER 27A		118	U6973	Sab	127
I4947	E1	303	Klem44-DR80		170	TURNER 27B		194	U7436		45
I5105	E	342	M87 DW1		35	TURNER 28A		171	U7835	S0*	183
I5328	E4	196	MKW 1S		205	TURNER 33B		170	U8129	E0	234
I5350	E	229	MKW 2		414	TURNER 33A		194	U8375	Sa*	162
I5362	S0	218	MKW 2S		300	TURNER 54B		167	U8779	E4*	293
II Zw 55		211	Mark 3		248	TURNER 73A		236	U8784	S0*	148
K564-3		225	Mark 78		114	TURNER 80B		280	U9114	E2*	168
Klem44-DR16		177	Mark 176		148	TURNER 82B		191	U9168	S0*	209
Klem44-DR26		154	Mark 348		185	TURNER 83A		221	U9170	S0*	193
Klem44-DR27		156	NG 47		27	TURNER 86B		121	U9276	S0*	167
Klem44-DR29		170	PER101		93	TURNER 86A		160	U9457	S0*	169
Klem44-DR33		91	PER152		173	TURNER 92A		165	U9573	S*	104
Klem44-DR37		91	PER153		144	TURNER 94B		196	UKS 0151-498		256
Klem44-DR34		101	PER163		174	TURNER 95B		107	VCC 32		50
Klem44-DR39		133	PER164		174	TURNER 97A		169	VCC 351		63
Klem44-DR38		169	PER195		166	TURNER 107A		190	VCC1073		54
Klem44-DR35		170	PER199		197	TURNER 108B		232	VCC1192		68
Klem44-DR32		316	Pavo2-DR08		140	TURNER 111A		84	VCC1297		192
Klem44-DR46		115	Pavo2-DR09		95	TURNER 121A		200	VV 54		204
Klem44-DR40		125	Pavo2-DR12		158	TURNER 125A		260	VV215		278
Klem44-DR49		130	Pavo2-DR13		231	TURNER 129B		213			
Klem44-DR47		133	Pavo2-DR14		127	TURNER 134B		284			

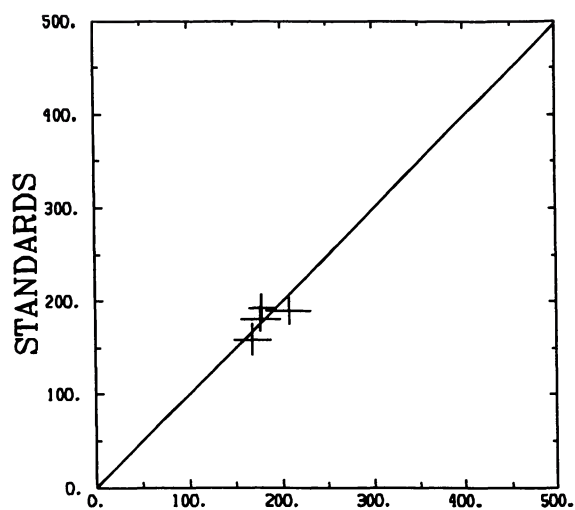
the NGC (N) objects are listed first, as they are likely to be the most popular. The first column gives the galaxy identification. The hierarchy of identification, if more than one exists for a galaxy, is NGC, IC, UGC, ESO. The second column lists the Hubble type from the Third Reference Catalogue of Bright Galaxies by de Vaucouleurs et al. (1991, hereafter RC3), or (indicated with an asterisk) Nilson (1973). The next column lists the adopted value for the central velocity dispersion (σ) kilometers per second, using scaled values and weighted averages as discussed below. The underlying source values for each

galaxy are not listed owing to space limitations. They are available, however, in the electronic version of the catalog.

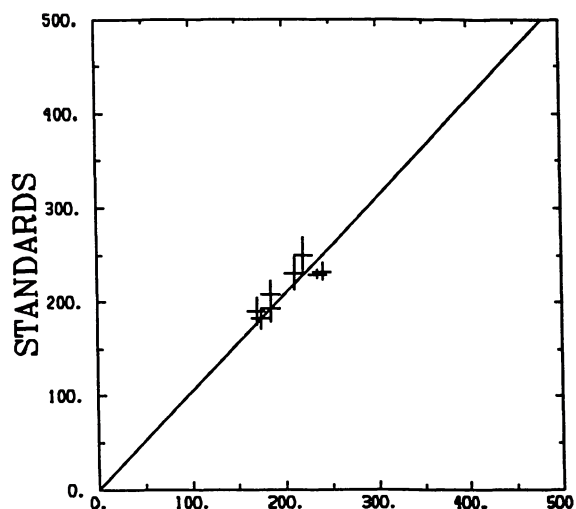
Figure 1 shows the comparison of several studies with the standard galaxies (discussed in the next section). From these comparisons, scaling factors were derived to bring the source set into better agreement with the standards. Given the intrinsic measurement errors in the data, it appeared that a one-parameter least-squares fit was all that was necessary or justified. The only exception to this was FJ, where an additive zero-point offset and nonunit slope was used, as in Paper I. The derived



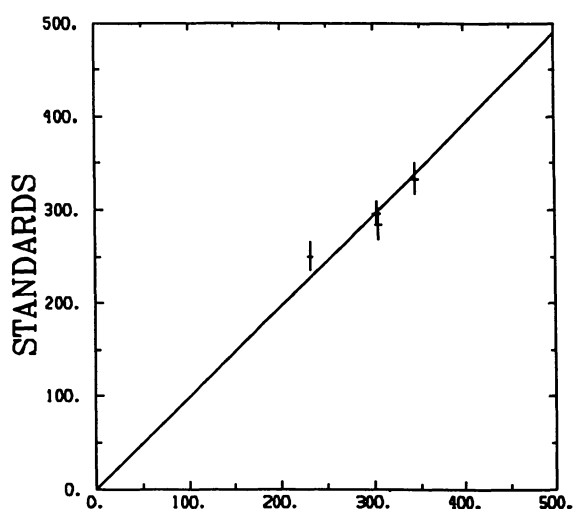
7Sam



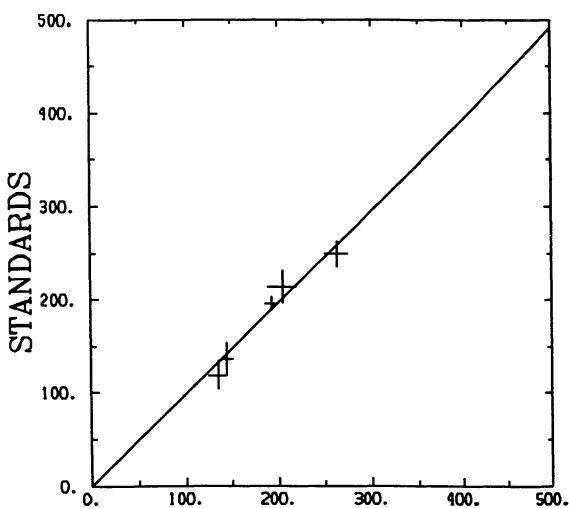
BCGR



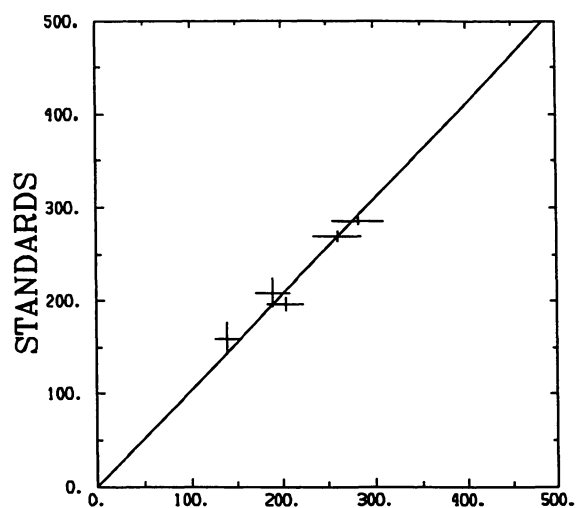
Ben1



DB



DBD



DFB

FIG. 1.—Comparison of several studies with the standard galaxies. Only studies with at least four galaxies in common were compared. Both axes are in units of kilometers per second.

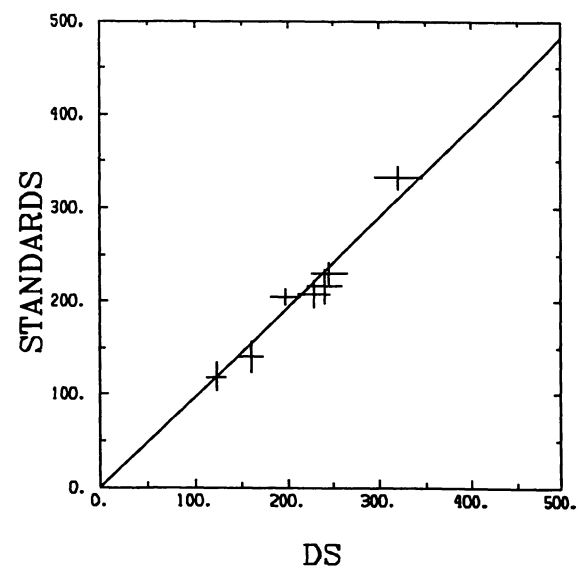
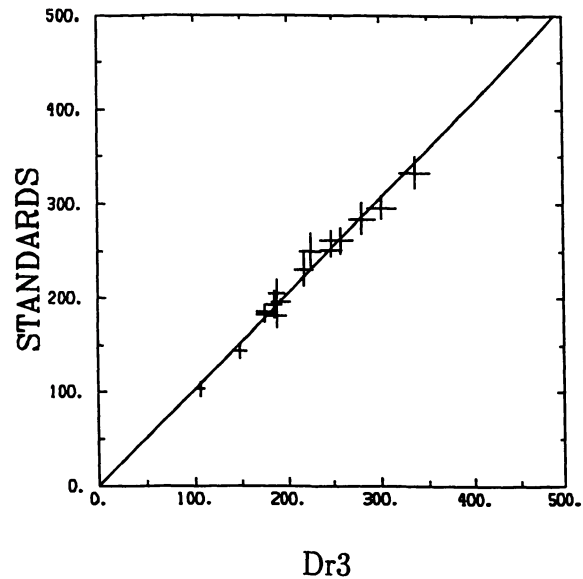
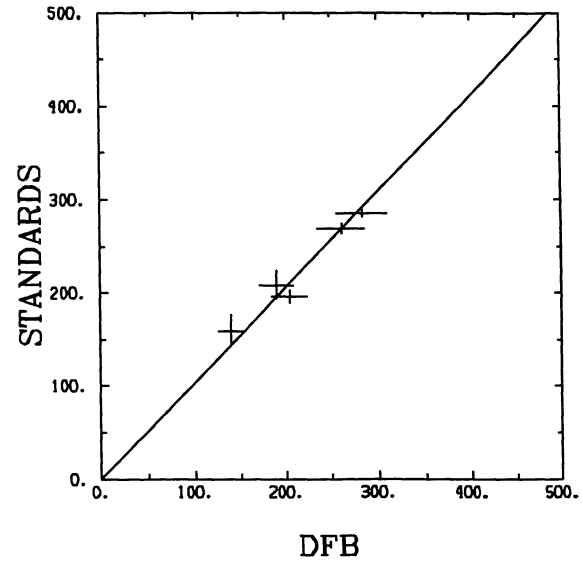
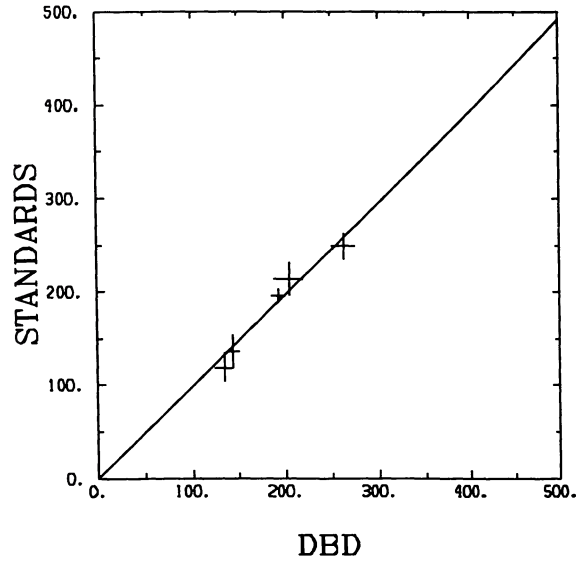
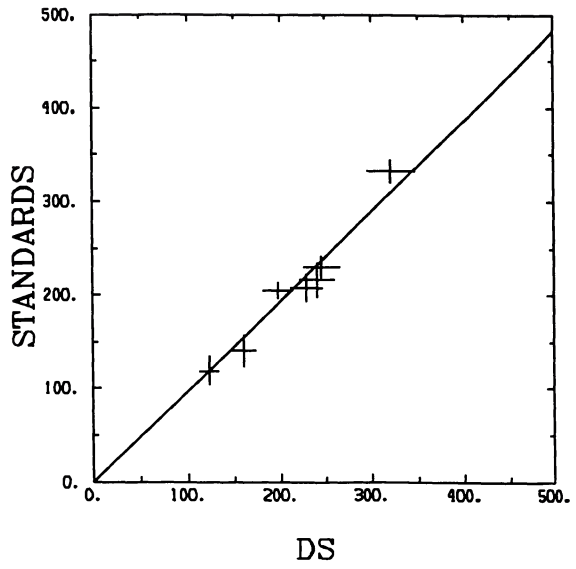
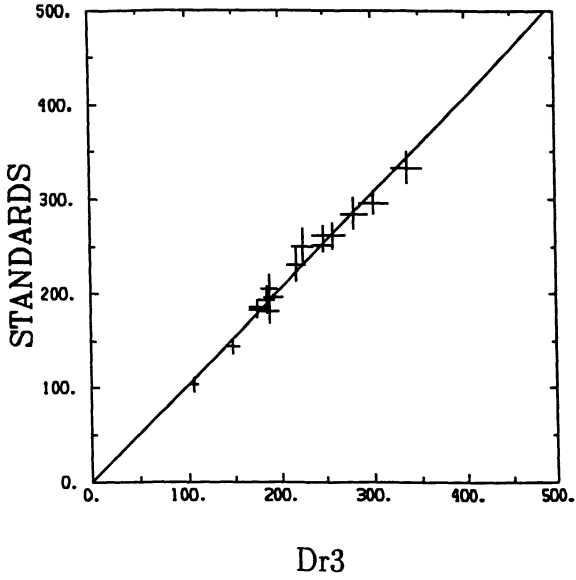


FIG. 1—Continued

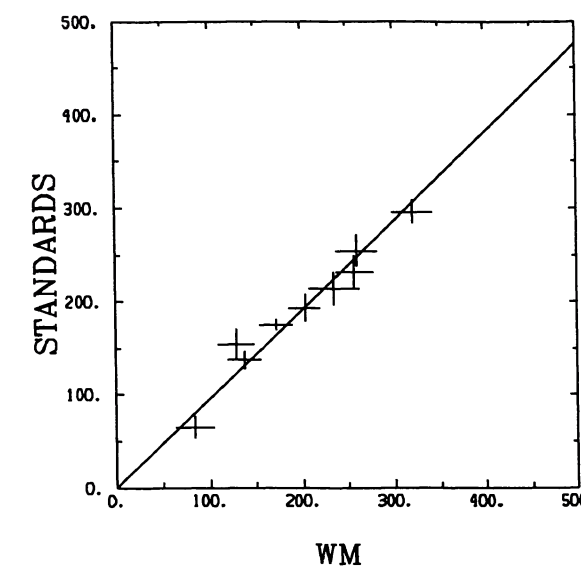
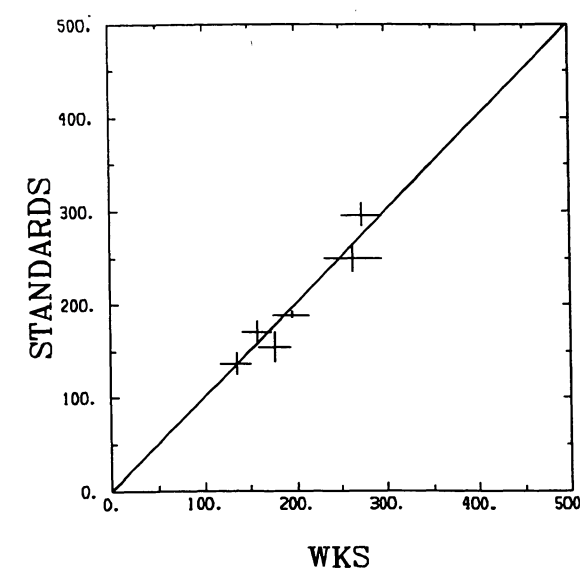
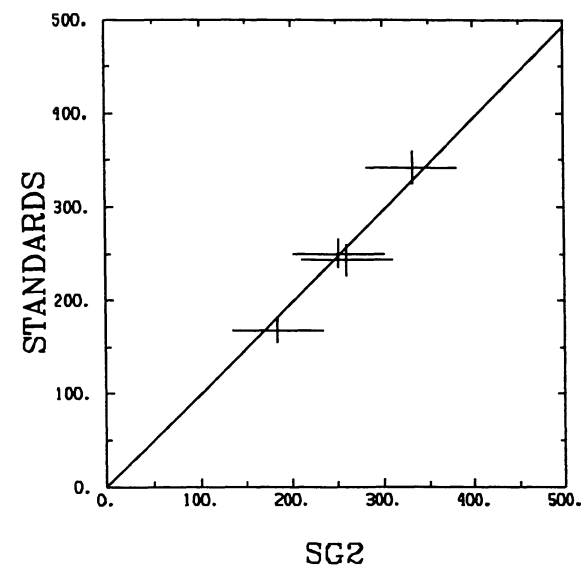
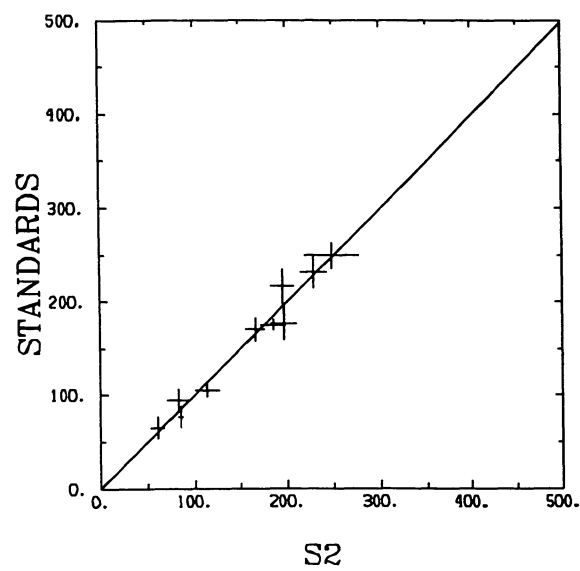
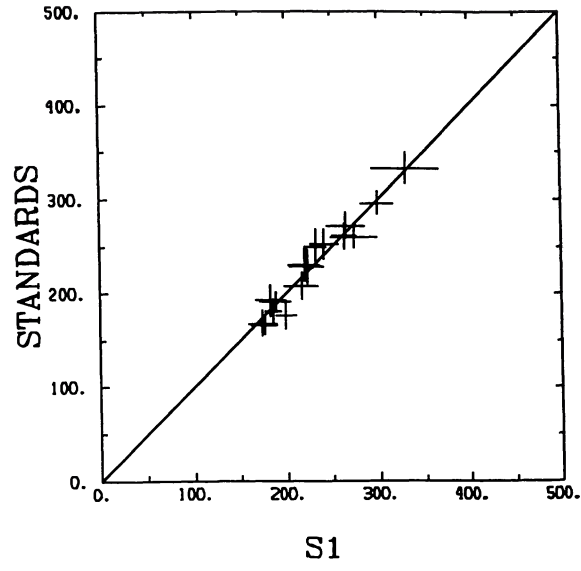
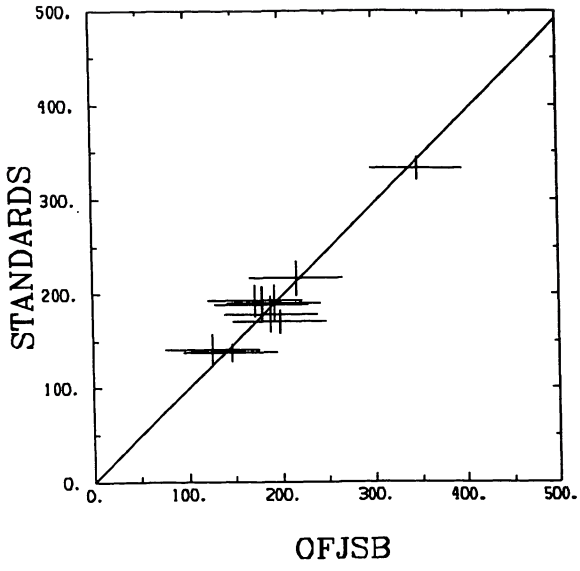
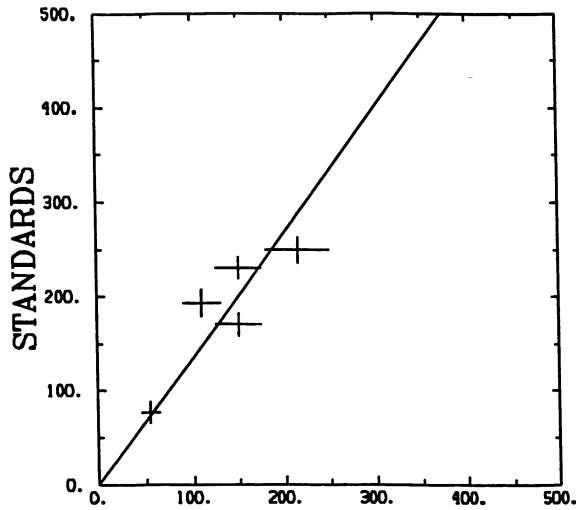
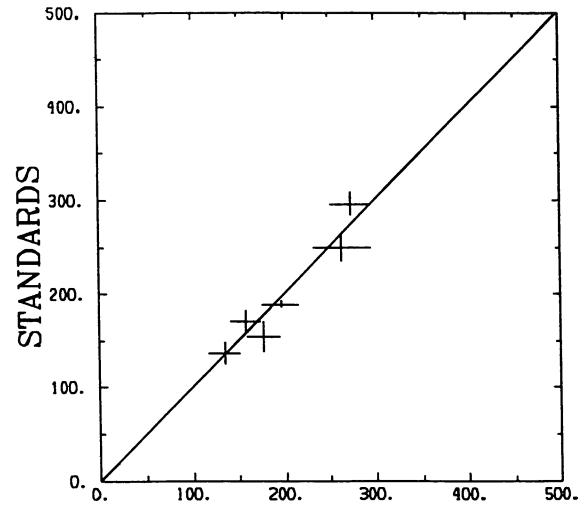


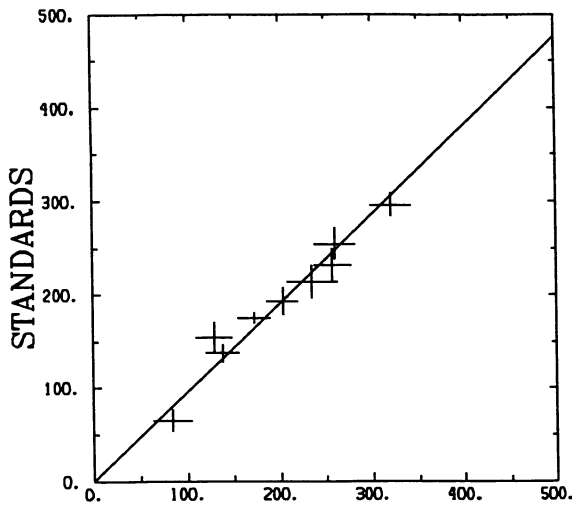
FIG. 1—Continued



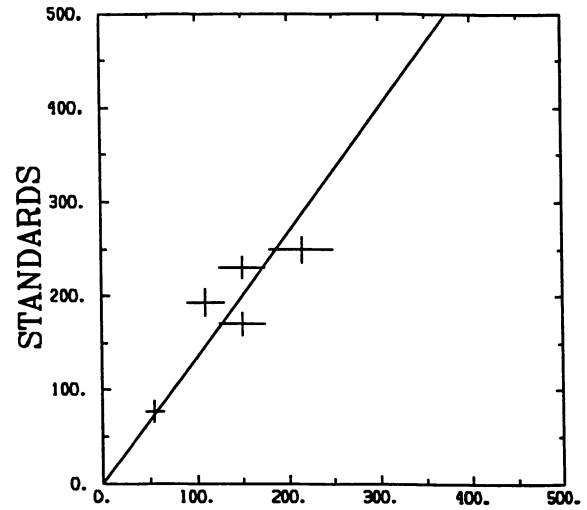
Wi1



WKS



WM



Wi1

FIG. 1—Continued

scale factors and offset are listed in Table 2. As in Paper I, it should be emphasized that *the scaled values of the velocity dispersions were used only in the calculation of the adopted central velocity dispersion. The source values listed in the electronic version of the catalog are as they appeared in the original paper.*

A weighted average was calculated for the adopted central dispersion measurement by using the inverse of the quoted error as the weight, with two general exceptions:

1. For values with quoted internal errors of less than 10 km s^{-1} , we adopted an error of 10 km s^{-1} for computational purposes. While formal internal errors of only a few kilometers per second are possible, the systematic errors dominate at this level.

2. Many authors did not give errors for their measurements. These values were somewhat arbitrarily assigned error values of 50 km s^{-1} , except for those of FJ, which were assigned an

error of 20 km s^{-1} , and Schechter & Gunn (1979), where were assigned an error of 30 km s^{-1} .

Table 3 shows the source codes and various observational parameters for the different studies. In some cases, the authors used heterogeneous sets of data (different detectors, telescopes, apertures, wavelength regions, etc.). Those studies have multiple entries, but to find out precisely which galaxy was done which way in such a study, one must refer back to the paper. A blank entry in columns (4)–(12) indicates that the authors did not supply that information. An explanation of the columns follows. Column (1) is the code for source study. Column (2) is the reference for source study (for full reference, see list at the end of this paper). Column (3) is an indicator as to whether the authors derived an extended dispersion profile. “PRO” indicates that they did derive such a profile, and a blank indicates that they did not. Column (4) is the FWHM of the narrowest comparison line, expressed in kilometers per

TABLE 2
SCALE FACTORS

Source ^a	Factor	σ_{FIT}	N
7Sam ⁱ	0.998	12.7	59
BCGR	0.994	16.8	4
Ben1	1.040	15.9	8
DB	0.979	19.4	4
DBD	0.981	12.4	5
DFB	1.029	14.6	5
DS	0.962	16.8	7
Dr3	1.020	9.6	16
FIH	1.058	9.7	7
FJ	0.964 ^b	31.4	8
K1	1.022	13.7	4
Ki	0.623	45.0	6
LGzCT	0.971	5.2	6
M1	0.612	30.2	6
MK	1.009	8.5	8
MK2	0.999	16.2	18
OFJSB	0.979	15.9	9
S1	1.000	11.1	16
S2	0.993	12.6	10
SG2	0.984	17.0	4
SSBS	1.029	9.5	6
T1	0.994	21.0	5
T4	0.996	9.4	4
TD	0.971	12.2	51
TDT	1.001	17.0	9
WBM	1.020	8.7	4
WHLD	0.964	9.5	6
WK	0.983	18.6	9
WKS	1.003	18.8	6
WM	0.951	15.9	9
Wil	1.335	42.4	5

^a For key to source abbreviations, see Table 3.

^b Plus an additive constant of -66.8 km s^{-1} .

second. This is proportional to the instrumental resolution, which is generally defined as an instrumental “velocity dispersion” $\sigma_{\text{INSTR}} = \text{FWHM}/2.35$. If the FWHM or instrumental dispersion is not given in the paper, the stated grating dispersion in angstroms per millimeter is listed. Columns (5)–(6) are the width and length of the aperture used for the central velocity dispersion measurement, in arcseconds. Columns (7)–(9) are the telescope parameters. “Size” is the diameter of the primary used, in meters, “place” describes the observatory, and “detector” describes the detector used (see notes to Table 3). Column (10) is the code for the analysis technique used (see notes to Table 3). Columns (11)–(12) are the wavelength range and minimum and maximum wavelengths, in angstroms. If only one value is listed, the paper only reported a central wavelength and no range.

A number of different analysis techniques have been used over the years to measure σ . The three dominant techniques currently are cross-correlation, as in Tonry & Davis (1979, hereafter TD), Fourier quotient, as in Sargent et al. (1977, hereafter S1), and Fourier correlation, as in Bender (1990, hereafter Ben3). All have their relative merits and adherents, and when compared, all yield similar, consistent results. Systematic differences that are seen are usually the result of instrumental differences or template star mismatches rather than technique. Furthermore, the first two techniques make the as-

sumption that the velocity distribution along the line of sight either is a Gaussian or is well fitted by one. There has been recent concern over non-Gaussian distribution along the line of sight, but the best assessment is that it is a minor effect at best (Bender, Saglia, & Gerhard 1994). A good review of the major analysis techniques is found in Ben3, where the Fourier correlation method is introduced.

3. STANDARD GALAXIES FOR VELOCITY DISPERSION MEASUREMENTS

As stated above, one of the primary goals of this paper is to identify a set of standard galaxies for velocity dispersion measurement. This should provide a means of some standardization, so that different studies can be intercompared.

The first step was to consider all galaxies with three or more measurements. As with Paper I, we then chose those galaxies whose measurements agreed well. The threshold standard deviation for inclusion into the standard set was 30 km s^{-1} for Paper I. With more measurements in this study, a lower value could be used and still retain an adequate number of standard galaxies. This paper’s standard deviation threshold was 20 km s^{-1} . Even with this more stringent requirement, 86 galaxies qualified, and they are listed in Table 4.

It is important to recall that *the standard deviation value for each standard should not be interpreted as a measure of the accuracy of the derived velocity dispersion*. It is simply an indication of how well, or poorly, the individual values agree.

Note that the values adopted for the standards are also listed in Table 1. They were, however, calculated in a slightly different manner than the other values in Table 1. This is because weighted averages were used with unscaled values for the standards, but scaled values were used for the nonstandard galaxies in Table 1. Since the standard galaxies were used to determine the scaling, calculating their adopted values this way avoids circular definitions.

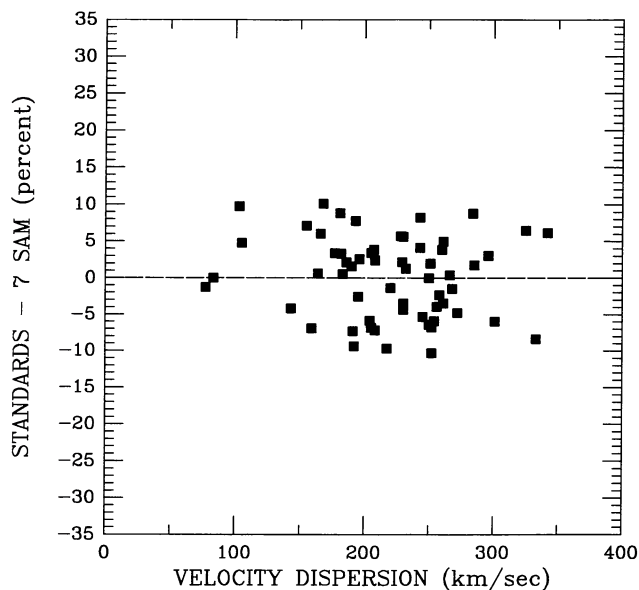


FIG. 2.—A detailed comparison of the differences between the standard galaxies and the 7Sam set.

TABLE 3
 SOURCE STUDY PARAMETERS

Code (1)	Reference (2)	Ext Prof? (3)	Inst. Disp. (km/s) (4)	Width Length (5)	Aperture Length (6)	Size (7)	Place (8)	Telescope Device (9)	Method Code (10)	Wavelength Min Max (11) (12)	
7sam	Davies et al. (1987)		215.0	1.5	4.0	3.0	Lick	IDS	3	4100	6300
			115.0	2.0	4.0	2.5	LCO	Reticon	3	4200	4700
			110.0	2.0	7.0	3.9	AAAT	IPCS	3	4200	6100
			85.0	4.0	4.0	2.5	LCO	Reticon	3	4900	5400
			150.0	2.3	4.2	2.1	KPNO	IIDS	3	4500	6300
ABJT	Angione et al. (1980)		145.0 *	3.0		2.1	McDonald	Photo	1	4210	4400
BBF1	Burbridge et al. (1961a)		75.0 *	3.0	4.5	2.1	McDonald	Photo	1	4210	4400
BBF2	Burbridge et al. (1961b)		75.0 *	3.0	5.0	2.1	McDonald	Photo	1	4210	4400
BBRS	Bertola et al. (1984)		140.0	1.0	3.8	4.0	KPNO	Photo	2	4000	4400
BCGR	Bertola et al. (1988)					2.1	KPNO	CIT/PH	2		
BDI	Binney et al. (1990)		150.0	1.1	2.5	4.0	CTIO	Photo	2	3900	4500
Ben1	Bender (1988a)		140.0			3.5	Calar Alto	BC Spec	3	4600	5500
Ben2	Bender (1988b)		150.0			3.5	Calar Alto	BC Spec	3	4600	5500
Ben3	Bender (1990)		70.0	1.8		3.5	Calar Alto	BC Spec	15	4600	5500
Ben4	Bender et al. (1992)		150.0			3.5	Calar Alto	BC Spec	3	4600	5500
BFG	Bettoni et al. (1990)			1.5		2.2	ESO	BC Spec	2	4900	5700
BH	Borne & Hoessel (1988)		235.0	2.0		2.1	KPNO	HGVS	2	3875	4590
BN	Bender & Nieto (1990)		50.0	2.7	270.0	2.2	ESO	BC Spec	15	4700	5700
Bot1	Bottema (1988)		60.0	2.6	240.0	2.5	La Palma	IntDisSpec	3	4692	5664
Bot2	Bottema (1990)		38.0	1.2	180.0	3.6	ESO	BC Spec/CCD	3	4842	5259
Bot3	Bottema (1992)		106.0	1.8	292.0	2.2	ESO	BC Spec	3	4875	5296
BPN	Bender et al. (1991)		68.0	1.5	240.0	3.5	Calar Alto	Twin Spec	15	4820	5370
BR	Brandt & Roosen (1969)		145.0 *	2.0	3.0	2.1	McDonald	Photo	1	4280	4330
BRBH	Bower et al. (1993)		85.0	1.0	288.0	2.5	LCO	Med Spec	3	4917	5974
			121.0	1.7	282.0	2.4	MDM	Med III Spec	3	5158	6593
			34.0	1.0	174.0	5.0	Palomar	Dbl Spec	3	4927	5374
BVF	Bottema et al. (1987)		36.5	2.6	210.0	1.9	Mt. Stromlo	BC Spec/PCA	2	4909	5374
BVV	Bottema et al. (1991)		60.0	2.7	240.0	2.5	La Palma	IntDisSpec	3	4643	5685
C	Caldwell (1984)		145.0		4.0	4.0	KPNO	Photo	2	3800	4400
CB	Caldwell & Bothun (1987)		150.0			4.0	CTIO	SIT	2	3750	5000
CEEIG	Carter et al. (1981)		145.0	6.7	5.0	3.9	AAAT	IPCS	11	4320	5550
CKR	Caldwell et al. (1986)		66.0 *	1.5		4.0	CTIO	Photo	2	3650	5600
CFWSM	Carter et al. (1988)		8.0			3.6	CFHT	PCD	2	4030	6000
CS	Carter & Sadler (1990)		70.0	5		2.5	La Palma	IntDisSpec	2	5000	6000
D	Davies (1984)		275.0	1.5	4.7	3.9	AAAT	IPCS	10	4200	6350
DB	Davies & Birkinshaw (1988)		235.0	2.5	300.0	4.0	KPNO	CryoCam	2	4810	5390
DBD	DeSouza et al. (1993)		65.0	4.0		1.6	Brazil	Cass Spec	2	4310	4335
De	De Vaucouleurs (1974) and private communications			3.7	14.8				12		
DEFIS	Davies et al. (1983)		350.0	2.5	1.4	4.0	KPNO	HGVS	2	4140	4490
			120.0	2.0	2.4	3.9	AAAT	IPCS	2	4650	5672
DFB	Dressler et al. (1991)		75.0	2.0	2.0	2.5	LCO	Med Spec	2	4850	6075
DI	Davies & Illingworth (1983)		360.0	2.3	1.5	4.0	CTIO	Photo	2	3860	4540
			340.0	2.0	2.5	4.0	KPNO	HGVS	2	3890	4570
DI2	Davies & Illingworth (1986)		150.0	2.3		4.0	CTIO	Photo	2	3860	4540
DM	Davies & Morton (1982)		60.0	1.0	4.2	3.9	AAAT	IPCS	2	5200	5500
DR	Dressler & Richstone (1988)		25.0	1.0	30.0	5.0	Palomar	Dbl Spec	2	4800	5700
				1.0	30.0	5.0	Palomar	Dbl Spec	2	8300	9000

TABLE 3—Continued

Code	Reference	Ext Prof? (3)	Inst. Disp. (km/s) (4)	Width (5)	Aperture Length (6)	Size (7)	Place (8)	Telescope	Device (9)	Method Code (10)	Wavelength Min (11)	Wavelength Max (12)
Dr1	Dressler (1979)	PRO	650.0	4.0	1.5	5.0	Palomar	SIT		3	3875	4415
Dr2	Dressler (1980)		205.0	1.0	1.0	2.5	LCO	Reticon		2	3300	7000
Dr3	Dressler (1984a)		200.0	4.0	4.0	2.5	LCO	Reticon		2	4000	6000
Dr4	Dressler (1984b)	PRO	85.0	6.0	16.0	2.5	LCO	Reticon		2	4000	6000
DS	Dressler & Sandage (1983) and private communications		115.0	2.0	1.7	2.5	LCO	Reticon		2	8450	8700
EEC1	Efstathiou et al. (1980)	PRO	145.0	2.0	4.0	2.5	LCO	Reticon		15	4800	5400
EEC2	Efstathiou et al. (1982)	PRO	120.0	3.0	2.7	3.9	AAT	IPCS		7	5000	6000
FBD	Faber et al. (1977)	PRO	150.0	3.0	2.5	3.9	AAT	IPCS		2	4200	5540
FIH	Faber et al. (1986)	PRO	130.0 *	4.0	4.0	3.0	Lick	IDS		14	5780	6020
FJ	Franx et al. (1988)	PRO	90.0	2.0	120.0	5.0	Palomar	Dbl Spec		2	8400	8700
HIMV	Faber & Jackson (1976) Heckman, et. al. (1985)	PRO	50.0	1.5	4.0	3.6	ESO	BC Spec/CCD		15	4740	5620
IK	Illingworth & Kormendy in Kormendy and Illingworth (1983)	PRO	400.0	2.0	4.0	3.0	Lick	IDS		6	4700	6000
IM	Illingworth & McElroy in Kormendy and Illingworth (1983)	PRO	140.0	2.7	174.0	1.5	Palomar	CIT/PH		2	3850	4550
IMS	Illingworth, Mould, & Skillman in Kormendy and Illingworth (1983)	PRO	270.0	2.8	252.0	1.9	Mt. Stromlo	CCD		2	4400	5900
IS	Illingworth (1983)					4.0	KPNO	HGVS		2		
IS	Illingworth & Schechter (1982)	PRO	60.0	2.0	174.0	4.0	KPNO	HGVS		2		
JD	Jarvis & Dubath (1988)	PRO	70.0	2.0	174.0	3.6	ESO	BC Spec/CCD		3	4860	5750
JDMB	Jarvis et al. (1988)	PRO	65.0 *	3.0	80.0	4.0	KPNO	HGVS		3	4700	6600
Ken	Jenkins (1981)		44.0 *	3.0	96.0	4.0	CTIO	SIT		3	4900	6100
JP	Jarvis & Peletier (1991)	PRO	150.0	.5	2.5	3.6	ESO	EFOSC1		2	4650	6463
JS	Jenkins & Scheuer (1980)	PRO	33.0 *	2.0	2.7	3.9	AAT	IPCS		3	5000	6000
K1	Kormendy (1982)	PRO	235.0	2.0	2.7	2.1	KPNO	HGVS		2	3880	4410
K2	Kormendy (1983)	PRO	140.0	1.4	1.4	2.5	LCO	Reticon		2	4065	4150
K3	Kormendy (1984)	PRO	235.0	1.4	2.7	2.1	KPNO	HGVS		2	3880	4410
K4	Kormendy (1988a)	PRO	140.0	1.3	.9	4.0	CTIO	Photo		2	3840	4490
K5	Kormendy (1988b)	PRO	28.0	.4	114.0	4.0	CTIO	Photo		2	3880	4485
Ken	Kormendy (1990)	PRO	57.0	.5	120.0	3.6	CFHT	Hertz Spec		2	5107	5414
KGf	Knapp et al. (1978)	PRO	142.0	1.5	162.0	3.6	CFHT	Hertz Spec		2	5064	5684
KI	King (1979)	PRO	170.0	1.7	312.0	4.5	MMT	Red Spec		3	5100	5500
KI	Kormendy & Illingworth (1982)	PRO	170.0	1.7	312.0	4.0	KPNO	CryoCam		3	4940	5400
KM	Kormendy & McClure (1993)	PRO	140.0	2.0	4.0	4.0	KPNO	HGVS		2	4060	4410
KR	Kormendy & Richstone (1992)	PRO	235.0	.5	114.0	2.1	KPNO	HGVS		2	3880	4410
		PRO	20.0	.5	120.0	3.6	CFHT	Hertz Spec		2	8365	8730
		PRO	48.0	.5	120.0	3.6	CFHT	Hertz Spec		2	5067	5667
		PRO	48.0	.5	120.0	3.6	CFHT	PCD		2	5067	5667

TABLE 3—Continued

Code (1)	Reference (2)	Ext Prof? (3)	Inst. Disp. (km/s) (4)	Width (5)	Aperture Length (6)	Size (7)	Place (8)	Telescope Device (9)	Method Code (10)	Wavelength Min Max (11) (12)
Iau	Laurikainen (1990)	PRO	291.0	2.0	2.7	2.5	La Palma	IntDisSpec		3300 7000
LC	Lucey & Carter (1988)		130.0	2.7	2.7	3.9	AAAT	IPCS	2	4650 5650
LGCT	Lucey et al. (1991a)		190.0	1.8	1.8	4.2	La Palma	FLEX	2	4800 5600
IGzCT	Lucey et al. (1991b)	PRO	220.0	2.0	180.0	2.5	La Palma	IntDisSpec	2	4800 5600
LNKD	Larsen et al. (1983)	PRO	150.0	3.0	207.0	3.9	AAAT	IPCS	15	5000 6000
M1	Minkowski (1962)		85.0 *			5.0	Palomar	Photo	1	
			40.0 *	2.0		5.0	Palomar	Photo	1	4200 4400
M2	Minkowski, R. in De Vaucouleurs (1974)									
MAB	Morton et al. (1977)		70.0	1.0	2.4	5.0	Palomar	SEC	1	4170 4420
Mad1	Madejsky (1991a)			1.5	100.0	.9	KPNO	CIT/PH	2	4600 5500
Mad2	Madejsky (1991b)			1.5	100.0	.9	KPNO	CIT/PH	2	4600 5500
MBM	Madejsky et al. (1991)	PRO	140.0	1.5	1.5				15	4500 5400
Mc1	McElroy (1983)	PRO	180.0	9.2		.9	KPNO	CIT/PH	2	3890 4475
		PRO	300.0	2.0		4.0	KPNO	Photo	2	3890 4475
Mc1	Morton & Chevalier (1972)		65.0	1.4	3.2	5.0	Palomar	SEC	1	4186 4364
Mc2	McElroy (1984)	PRO	180.0	9.2		.9	KPNO	CIT/PH	2	3890 4475
MC2	Morton & Chevalier (1973)		60.0	1.4	2.8	5.0	Palomar	SEC	1	4185 4415
ME	Morton & Elmergreen (1976)		50.0	.7	2.2	5.0	Palomar	SEC	8	4160 4385
MK	Malumuth & Kirshner (1981)		210.0	4.0	10.0	1.5	MGH	Reticon	2	4150 5680
MK2	Malumuth & Kirshner (1985)		210.0	4.0	10.0	1.5	MGH	Reticon	2	4150 5680
MT	Morton & Thuan (1973)	PRO		.7	1.6	5.0	Palomar	SEC	1	4960 5300
NBDDP	Nieto et al. (1990)	PRO				2.2	Calar Alto		15	
OFJ5B	Ore et al. (1991)		260.0	1.5	4.0	3.0	Lick	IDS	3	4900 5800
OH	Oegerle & Hoessel (1991)	PRO	175.0	2.0	84.0	2.1	KPNO	Goldcam	2	4600 6600
P	Pritchett (1978)		175.0	9.0	36.0	.9	KPNO	Reticon	13	8450 8750
PC	Peterson & Caldwell (1993)		7.6			4.0	CTIO	Ech/CCD	2	8500 5450
PNS	Prugniel et al. (1987)		33.0 *	1.5		3.6	CFHT	Pd	2	4950 5450
			85.0	1.5	4.5	3.6	CFHT	Pd	2	5090 5310
PS	Peller & Simien (1982)	PRO	9.0 *	2.5		1.9	OHP	Photo	6	4000 4500
RM	Richstone & Morton (1975)		18.0 *	1.3	27.0	3.6	ESO	EFOSC1	1	3880 4120
RS	Richstone & Sargent (1972)		150.0	3.2	12.5	5.0	Palomar	Photo	4	4000 4400
S1	Schechter (1980)		180.0	4.2	4.2	1.5	Mt. Hopkins	Reticon	2	4500 5560
S2	Schechter (1983)		120.0	3.2	12.5	2.1	KPNO	IIDS	2	4000 4700
SB	Smith & Bicknell (1983)	PRO	33.0 *	2.6	145.6	3.9	AAAT	IPCS	10	5000 5600
SCHL	Sharples et al. (1983)							IPCS	15	4777 6067
Se1	Selfort in Bender et al. (1992)		300.0	.9	7.0	5.0	Palomar	SIT	2	3642 5246
SG1	Schechter & Gunn (1978)	PRO	160.0	2.5	2.5	5.0	Palomar	SIT	2	3950 5550
SG2	Schechter & Gunn (1979)		45.0 *			4.0	KPNO	CryoCam	2	4400 5400
Sh	Sharp (1986)		30.0	2.0	2.0	1.9	OHP	Photo	1	4000 4500
SFM	Simien et al. (1979)		35.0 *	1.6	240.0	5.0	Palomar	IPCS	2	3980 4300
SSBS	Sargent et al. (1977)		145.0	2.0	14.8	3.6	ESO	IPCS	2	3432 4835
SUB	Schechter et al. (1984)		250.0	1.6	4.5	2.5	La Palma	IntDisSpec	3	4645 5694
SWC	Shaw et al. (1993)	PRO	55.0	1.0	2.4	4.0	CTIO	Photo	9	4000 5600
SWR	Schweizer et al. (1983)	PRO	330.0	1.0	5.4	5.0	Palomar	IPCS	2	4000 4283
SYBSL	Sargent et al. (1978)	PRO	270.0	1.1	6.7	4.0	KPNO	IPCS	2	3805 4670
Sz	Schweizer (1981)					4.0	CTIO	SIT	1	5600 6300

TABLE 3—Continued

Code	Reference	Ext Prof?	Inst. Disp.	Width	Aperture	Size	Place	Telescope	Method	Wavelength
(1)	(2)	(3)	(km/s)	(5)	Length	(7)	(8)	Device	Code	Min Max
			(4)		(6)			(9)	(10)	(11) (12)
T1	Tonry (1981)		120.0	3.2	12.5	1.5	Mt. Hopkins	Reticon	3	5000 6000
T2	Tonry (1984a)	PRO	125.0	2.0	3.0	5.0	Palomar	CCD	2	3700 4800
		PRO	90.0	2.0	3.0	5.0	Palomar	CCD	15	5850 6450
		PRO	270.0	3.2	12.5	1.5	Mt. Hopkins	Reticon	3	4400 6900
T3	Tonry (1984b)	PRO	140.0	2.0	3.0	5.0	Palomar	CCD	15	5000 5650
T4	Tonry (1984c)	PRO	270.0	3.2	12.5	1.5	Mt. Hopkins	Reticon	3	4400 6900
T5	Tonry (1985)	PRO	70.0	2.0	120.0	5.0	Palomar	CCD	3	4950 6250
TD	Tonry & Davis (1981) and private communications		270.0	3.2	12.5	1.5	Mt. Hopkins	Reticon	3	4400 6900
TDT	Terlevich et al. (1990)	PRO	150.0	2.0	144.0	2.5	La Palma	IntDisSpec	3	7900 9300
VF	van der Kruit & Freeman (1984)					1.9	Mt. Stromlo	CCD	16	4800 5400
W1	Whitmore (1980)	PRO	125.0	3.0	10.0	1.5	MGH	Reticon	2	4400 5200
		PRO	125.0	3.0	3.0	1.5	MGH	Reticon	2	4400 5200
WA	Wagner & Appenzeller (1988)		60.0			3.5	Calar Alto	BC Spec	2	4700 5500
WBM	Wagner et al. (1988)	PRO	54.0	2.2	147.0	3.5	Calar Alto	BC Spec	3	4600 5500
WHL	White et al. (1983)		270.0	3.2	12.5	1.5	Mt. Hopkins	Reticon	3	4400 6900
W11	Williams (1977)		115.0			1.5	Palomar	CIT/PH	1	3800 6800
W12	Williams (1981)	PRO	47.0 *	2.0	1.3	2.1	KPNO	CIT/PH	2	3700 4600
W13	Wilson in Illingworth (1977)									
WK	Whitmore & Kirshner (1981)		270.0	2.8	10.0	1.5	MGH	Reticon	2	4150 5550
WKS	Whitmore et al. (1979)		210.0	2.8	10.0	1.5	MGH	Reticon	2	4150 5550
WM	Whitmore & Malumuth (1984)		300.0	3.0	5.0	1.5	MGH	Reticon	2	4150 5650
WMS	Whitmore et al. (1987)	PRO	3.5 *	1.5	30.0	4.0	CTIO	Photo	2	4100 4540
WR	Whitmore & Rubin (1985)		350.0	2.0	4.0	2.5	LCO	Reticon	2	4150 5640
			180.0	2.0	4.0	2.5	LCO	Reticon	2	4100 5550
			180.0	2.0	4.0	2.5	LCO	Reticon	2	4050 5500
WRF	Whitmore et al. (1984)	PRO	200.0	2.4	4.2	4.0	KPNO	HGVS	2	4700 5450
		PRO	200.0	2.4	8.4	4.0	KPNO	HGVS	2	4700 5450
YSBLH	Young et al. (1978)	PRO	170.0	1.0	5.9	4.0	KPNO	IPCS	2	3900 4500

TABLE 4
STANDARD GALAXIES

Name	σ	ϵ	N	Name	σ	ϵ	N
A496-BCG	267	11	3	NGC 4321	94	12	3
A2147-BCG	301	6	3	NGC 4340	113	6	3
IC 3959	195	3	3	NGC 4350	189	18	3
IC 4329	285	5	4	NGC 4365	261	14	6
NGC 221	77	12	15	NGC 4374	296	13	15
NGC 533	301	17	3	NGC 4382	192	17	5
NGC 545	243	17	3	NGC 4406	250	19	14
NGC 584	230	12	4	NGC 4459	178	19	4
NGC 596	168	14	4	NGC 4467	83	18	3
NGC 628	65	12	4	NGC 4473	193	15	7
NGC 636	166	11	5	NGC 4478	143	8	7
NGC 750	206	8	3	NGC 4486	333	17	13
NGC 821	207	15	6	NGC 4565	136	18	3
NGC 1023	216	19	7	NGC 4579	189	4	3
NGC 1068	148	5	3	NGC 4589	228	19	4
NGC 1278	252	14	3	NGC 4594	249	14	7
NGC 1316	243	18	3	NGC 4596	146	7	3
NGC 1332	332	13	3	NGC 4621	230	18	6
NGC 1395	245	12	3	NGC 4697	181	13	9
NGC 1400	260	12	4	NGC 4736	136	12	3
NGC 1407	272	14	4	NGC 4742	103	8	3
NGC 1426	155	12	5	NGC 4783	266	8	4
NGC 1587	220	13	3	NGC 4839	284	17	5
NGC 1600	342	18	4	NGC 4860	251	8	3
NGC 1700	243	17	6	NGC 4876	183	9	3
NGC 2300	254	17	3	NGC 4881	205	15	3
NGC 2768	205	9	4	NGC 4926	261	11	3
NGC 2775	175	6	4	NGC 4976	159	17	3
NGC 2841	232	18	4	NGC 5018	208	16	3
NGC 2859	177	19	3	NGC 5061	196	7	3
NGC 3031	170	13	9	NGC 5090	268	6	3
NGC 3098	119	16	3	NGC 5322	229	5	3
NGC 3193	191	11	3	NGC 5576	190	15	4
NGC 3226	208	4	3	NGC 5746	213	18	3
NGC 3311	192	16	3	NGC 5813	230	13	4
NGC 3640	182	11	3	NGC 5846	252	16	6
NGC 3641	164	1	3	NGC 5982	256	8	3
NGC 3665	190	19	3	NGC 6086	325	19	3
NGC 3894	258	4	3	NGC 6340	137	9	3
NGC 4125	232	10	5	NGC 6703	177	16	4
NGC 4168	186	6	6	NGC 7331	154	16	6
NGC 4278	250	15	6	NGC 7332	140	17	3
NGC 4283	105	7	3	NGC 7507	217	17	4

It is important to use discretion when choosing galaxies for use as standards. Some of the galaxies listed fulfill our empirical selection criteria but are believed to have steep velocity dispersion gradients in their inner regions. This makes their measured value somewhat dependant on aperture size and seeing. NGC 221 (Whitmore 1980) and NGC 4486 (Jarvis & Peletier 1991) are examples of standards where some such problems may arise. It may be helped somewhat by using an aperture which is approximately the same size as the average used in this sample (about $2'' \times 4''$).

An alternate method of using standards might be to adopt the measurements from a particularly good study. In Paper I, no suitable study could be identified. This time, however, it is clear that 7Sam can be used in this way. It has 59 galaxies in common with the standards (out of 86). Its scale factor is within 0.3% of unity. The standard deviation of the fit to the standards is low (12.7 km s^{-1}). A close look at the differences

between 7Sam and the standards (Fig. 2) reveals no obvious systematics. Thus, it could be efficacious to use 7Sam as a standard set, especially in view of the large number of galaxies in that study. The 7Sam set contains no spiral galaxies later than S0, which may pose a problem in standardization with studies looking exclusively at spirals. For a full description of the 7Sam sample selection, see Faber et al. (1989).

4. CORRELATIONS TO OTHER GALAXY PARAMETERS

Once one has a large collection of measurements like this, it is interesting to compare them to other such collections of galactic parameters.

One such large source of such parameters is the RC3. Among the many parameters listed in the RC3 is T , which is a numerical index of stage along the Hubble sequence. Figure 3 shows a comparison of central velocity dispersion as a function of T .

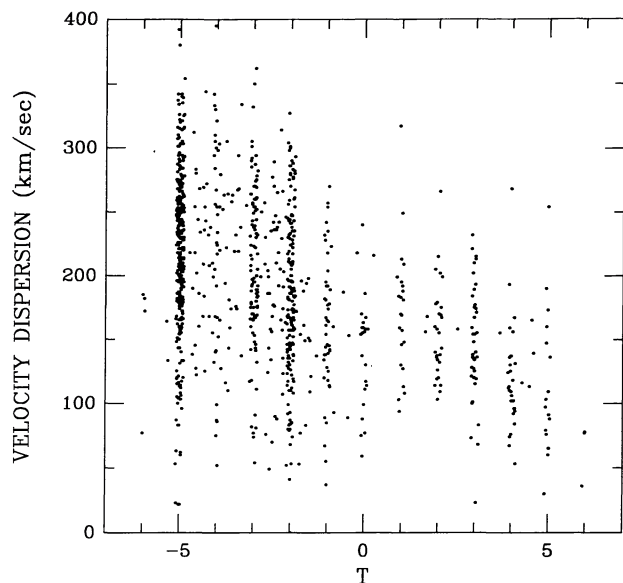


FIG. 3a

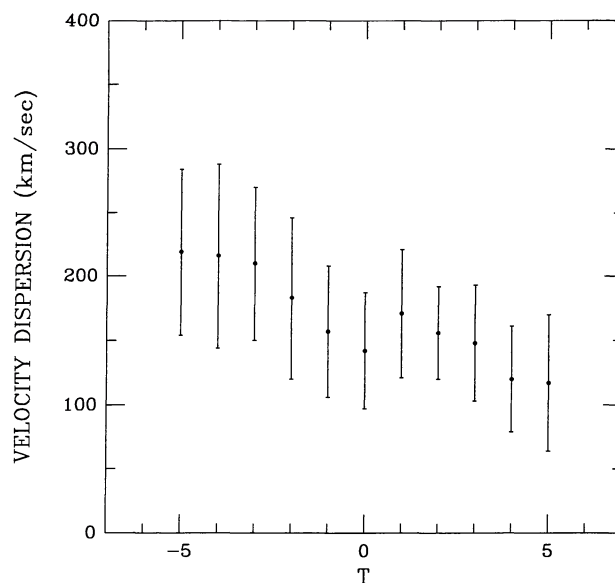


FIG. 3b

FIG. 3.—Central velocity dispersion as a function of T (from de Vaucouleurs et al. 1991). (a) Raw distribution by T (the points have been artificially spread in the T direction to reduce overplotting); (b) is binned in unit T bins, showing the average and spread at each T value.

Of the 1563 galaxies in this catalog, 948 have T values listed in the RC3. Figure 3a shows the raw distribution by T (the points have been artificially spread in the T direction to reduce overplotting); Figure 3b is binned in unit T bins, showing the average and spread (calculated as if it were a standard deviation) at each T value.

As was seen in Paper I, velocity dispersion appears to decline with decreasing bulge size, or from elliptical types toward late spiral types. There is a slight rise in this data at around $T \approx 1-2$. This could indicate a lack of lower mass spiral galaxies near this morphological type rather than a systematic increase in average mass. This effect was seen by Sandage, Binggeli, & Tammann (1985) in their sample of Virgo Cluster galaxies. They show that the luminosity functions for galaxies of this type range tend to show more bright galaxies than the sur-

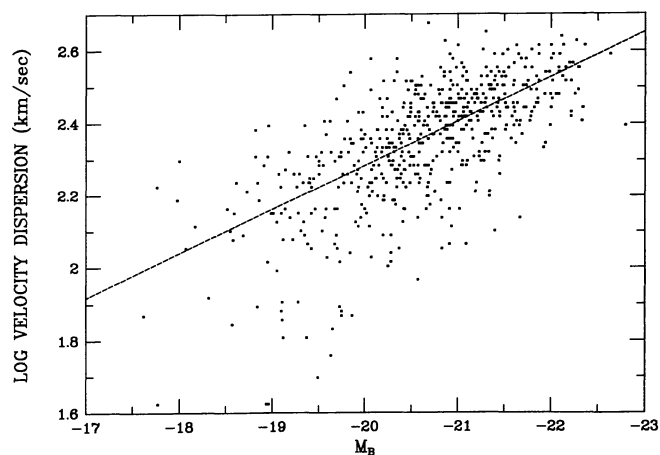


FIG. 4.—Faber-Jackson plot of $\log \sigma$ vs. M_{B_T} for 594 elliptical and lenticular galaxies ($T \leq -1$).

rounding types, especially if one includes dS0 types in the S0 bin (see especially their Fig. 21).

One of the classic papers in this field is FJ, where the $L \sim \sigma^4$ correlation is first described. One can use the magnitudes and distances given in the RC3 to look at that correlation with this catalog's velocity dispersions. For the luminosity, the total "face-on" magnitude corrected for extinction and redshift, B_T^0 , and the weighted mean of the neutral hydrogen and optical velocities, corrected to the Galactic standard of rest, V_{GSR} , were used. To try to avoid Hubble flow problems for nearby galaxies, a somewhat arbitrary velocity cutoff of $V_{GSR} = 1500$ km s $^{-1}$ was used. If only galaxies considered to be ellipticals ($T \leq -4.0$) are used, one gets 293 galaxies. The line of best fit for this data set has a slope corresponding to $L \sim \sigma^{4.04 \pm 0.2}$. Including lenticular galaxies ($T \leq -1.0$) increases the number of galaxies to 594 without significantly increasing the error in the fit and yields an exponent of 3.92 ± 0.08 . For this latter case, $\log \sigma$ versus $M_{B_T}^0$ is plotted in Figure 4.

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If I am notified of any errors or omissions in Table 1, I will correct any such problem in the electronic version of the catalog. An electronic version of the catalog is available from the author or from the Astronomical Data Center at NASA/Goddard Space Flight Center.

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