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A CATALOGUE OF *IJK* PHOTOMETRY OF PNe WITH DENIS

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Near-infrared photometry of planetary nebulae (PNe) allows the classification of those objects (Whitelock 1985; Peña & Torres-Peimbert 1987). We present the largest homogeneous sample.

The DENIS imaging survey (Epchtein et al. 1997) gives a nearly complete overview of the southern sky in the three NIR bands Gunn-I, J, and K_s. The images are taken simultaneously in all three bands, which leads to a very high accuracy in the colors of the objects independent from photometric errors. Photometry on the high resolution images allowed us a much better removal of the stellar background than the aperture photometries done in the past. The 135 objects presented here (see Table 1) form the largest homogeneous sample of NIR photometry of PNe so far. For the calibration of our photometry we used the DENIS online zero points, taking into account a small offset from the values derived at the Paris Data Analysis Center. The calculated magnitudes were dereddened using the extinction constants from Tylenda et al. (1992). Distances and linear radii were calculated from the 5 GHz flux using the method of Schneider & Buckley (1996). About one third of the objects overlap with measurements in the literature in the J and K band (no I band photometry exists up to now). The comparison shows clearly the expected effect: While the brighter objects correspond very well, about 30% of the fainter ones are systematically brighter in the older aperture photometries (Fig. 1). This is caused by uncleaned stellar background in those works. Thus, the effect is significantly stronger in K than in J. Especially the values from Persi et al. (1997) suffer from this effect. We also find a correlation with the Galactic longitude: The deviations increase towards the bulge. As already pointed out in the literature, there is a clear correlation of the K band photometry with the radio fluxes. In the J band, the correlation is not as good. Our J values are lower than expected, which is in clear contradiction with the results of Whitelock (1985). This effect is even stronger in the I band. These and other results will be discussed in more detail in a forthcoming paper.

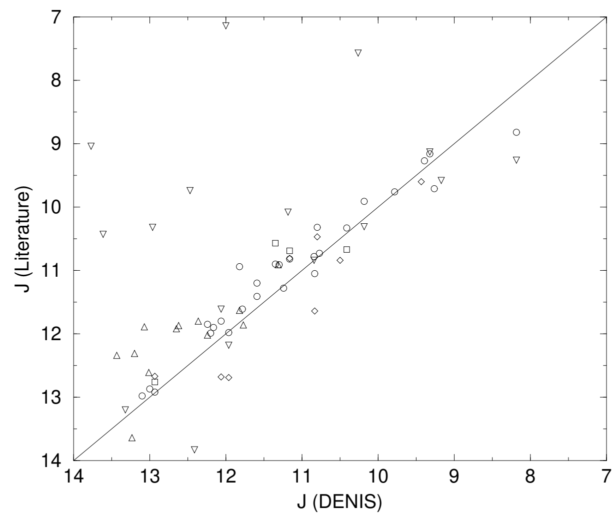

Fig. 1. Comparison of our measured J magnitudes to values from the literature: Whitelock 1985 (circles), Peña & Torres-Peimbert 1987 (squares), Persi et al. 1987 (triangles down), Preite-Martinez & Persi 1989 (triangles up), and Philips & Cuesta 1994 (diamonds).

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TABLE 1

CATALOGUE OF NIR PHOTOMETRIES OF PLANETARY NEBULAE.

PN G	Name	I	J	K_s	E_{B-V}	$(I-J)_0$	$(J-K)_0$	5 GHz [mJy]	Ref.	Distance [kpc]	Radius [pc]
000.0−06.8	H 1-62	13.62	13.08	12.96							
000.1+04.3	H 1-16	15.41	13.16	11.79	1.50	1.30	0.57				
000.3+12.2	IC 4634	12.25	11.35	10.76	0.25	0.74	0.45	100	2	3.14	0.064
000.3−04.6	M 2-28	15.47	13.86	12.89	0.83	1.09	0.53	10	1	7.82	0.091
000.7+04.7	H 2-11	16.45	13.94	12.38	2.15	1.15	0.41	28	4	7.09	
001.7+05.7	H 1-14	15.86	13.97	13.06	1.24	1.11	0.24	22	1	5.44	0.087
002.1−02.2	M 3-20	15.42	13.65	14.05	0.88	1.22	−0.87	40	1	4.56	0.073
002.2−02.7	M 2-23	13.42	11.97	11.68	0.45	1.17	0.05	41	2	4.09	0.084
002.4+05.8	NGC 6369	11.43	9.43	7.91	1.26	1.21	0.84	2002	1,2,3	0.70	0.064
002.6+08.1	H 1-11	15.03	13.65	12.79	0.70	0.94	0.48	13	1,2	6.40	0.099
002.9+06.5	PM 1-149	14.68	13.85	13.21				3.6	4	11.26	
003.2−06.2	M 2-36	13.95	12.96	12.62	0.30	0.80	0.18	25	1	4.81	0.094
003.4−04.8	H 2-43	14.95	11.66	8.60	0.86	2.75	2.60	25	1	4.59	0.100
003.9−14.9	Hb 7	13.11	12.42	11.99	0.19	0.57	0.33	30	1	6.03	0.058
004.0−03.0	M 2-29	14.51	13.70	12.42	0.58	0.45	0.97	8	1,2	9.41	0.082
004.2−04.3	H 1-60	14.47	13.56	12.93	0.42	0.65	0.41				
004.6+06.0	H 1-24	15.67	14.01	13.49	0.98	1.05	0.00	15	1,2	5.39	0.112
004.8−22.7	He 2-436	15.72	14.31	12.71	0.39	1.16	1.39	23	1,3	4.48	0.109
005.1−03.0	H 1-58	14.42	13.60	12.12	1.50	−0.13	0.68				
006.1+08.3	M 1-20	14.07	12.65	11.24	0.70	0.98	1.02	51	1,2	4.14	0.070
007.2+01.8	Hb 6	13.13	11.00	10.10	1.48	1.20	0.11	243	2	2.77	0.034
007.8−04.4	H 1-65	13.51	12.86	12.25	0.64	0.25	0.27	17	1	5.38	0.104
008.3−01.1	M 1-40	14.15	11.69	10.46	1.76	1.35	0.28	208	1,2	2.93	0.035
009.3+04.1	Th 4-6	16.05	14.27	13.39	0.65	1.37	0.53	6	4	8.85	
009.4−05.0	NGC 6629	11.36	10.50	9.82	0.63	0.46	0.34	275	2	1.82	0.068
010.1+00.7	NGC 6537	12.44	10.80	9.46	1.48	0.71	0.54	624	1	1.62	0.039
010.6+03.2	Th 4-10	15.88	13.92	14.00	0.85	1.42	−0.53				
010.7−06.7	Pe 1-13	14.94	13.96	13.36	0.46	0.69	0.36	3	1,2	8.60	0.158
010.8−01.8	NGC 6578	12.82	9.39	7.38	0.98	2.81	1.49	170	2,3	2.64	0.054
011.0−05.1	M 1-47	14.35	13.70	13.85	0.23	0.51	−0.27	14	1,2	7.22	0.080
011.1−07.9	SB 17	11.33	10.53	7.49							
011.3−09.4	H 2-48	11.94	11.54	10.98	0.49	0.09	0.29	66	1,2	5.71	0.028
011.7−00.0	M 1-43	13.66	12.78	11.69	1.82	−0.26	0.11				
011.9+04.2	M 1-32	13.22	11.74	10.39	1.04	0.83	0.79	61	2	3.80	0.070
012.2+04.9	PM 1-188	15.02	13.15	8.78							
013.1+04.1	M 1-33	13.79	12.30	11.29	1.04	0.83	0.45	60	1,2	4.52	0.053
014.2+04.2	Sa 3-111	14.59	10.36	8.28	1.82	3.07	1.10				
014.9+06.4	K 2-5	10.01	8.67	7.80	0.98	0.72	0.35				
015.4−04.5	M 1-53	12.52	11.34	10.39	0.72	0.72	0.56	53	1	4.34	0.063
015.9+03.3	M 1-39	14.18	12.03	10.83	1.82	1.01	0.22	98	2	3.79	0.046
016.0−04.3	M 1-54	13.81	12.91	11.73	0.64	0.50	0.83	38	1	3.47	0.109
018.9+03.6	M 4-8	14.84	13.46	12.45				19	1,2	10.11	
019.4−05.3	M 1-61	12.46	11.43	10.50	0.73	0.57	0.54	97	1,2	5.08	
019.7+03.2	M 3-25	14.73	12.69	11.20	1.78	0.92	0.53	76	1,2	4.48	0.042
019.7−04.5	M 1-60	13.94	12.36	11.51	1.07	0.91	0.27	48	2	3.65	0.088
019.8+05.6	CTS 1	15.61	13.83	12.78	1.52	0.81	0.24				
020.7−05.9	Sa 1-8	13.60	13.09	12.75	0.57	0.15	0.04	11	1,2	6.05	0.117
022.0−03.1	M 1-58	13.87	12.78	11.92	0.85	0.56	0.41	60	1	4.07	0.063
022.1−02.4	M 1-57	13.79	12.51	11.43	1.26	0.48	0.40	70	2	3.50	0.071
022.5+01.0	MaC 1-13	15.87	14.11	11.84	1.30	0.94	1.57				
023.9−02.3	M 1-59	13.32	11.83	10.89	1.11	0.79	0.35	108	2	3.77	0.042
025.9−02.1	Pe 1-15	13.63	12.65	11.67	1.02	0.33	0.44	8	2	8.18	0.099
025.9−10.9	Na 2	16.05	15.29	13.67	0.59	0.39	1.30				
027.3−02.1	Pe 1-18	15.04	12.76	12.29	1.95	1.05	−0.58	42	1,2	4.44	0.073
027.7+00.7	M 2-45	15.26	12.41	11.10	2.08	1.54	0.18	154	2	3.00	0.047
028.5+01.6	M 2-44	14.04	12.47	10.48	1.27	0.78	1.30	54	1,2	3.98	0.071
028.5+05.1	K 3-2	15.31	13.32	12.25	2.15	0.64	−0.09	31	1,2	4.13	0.100
029.2−05.9	NGC 6751	12.59	11.96	10.86	0.20	0.50	1.00	63	1,2,3	2.45	0.122
032.5−03.2	K 3-20	14.48	13.12	11.33	1.30	0.55	1.09				
032.9−02.8	K 3-19	15.61	13.67	12.69	1.50	1.00	0.17	23	1,2	9.64	
034.5−06.7	NGC 6778	12.83	11.96	11.50	0.38	0.64	0.25	55	1,2,3	2.87	0.110
206.4−40.5	NGC 1535	11.28	10.83	10.51	0.07	0.40	0.29	166	1	1.86	0.095
221.3−12.3	IC 2165	12.21	11.16	10.35	0.47	0.75	0.56	202	1	2.44	0.053
226.4−03.7	PB 1	14.55	13.61	13.32	0.85	0.40	−0.17	18	1,3	4.78	0.116
232.8−04.7	M 1-11	12.25	10.84	8.99	0.97	0.80	1.33	113	2	4.57	
234.8+02.4	NGC 2440	11.21	10.41	9.68	0.44	0.53	0.50	370	2	1.64	0.063
234.9−01.4	M 1-14	13.02	12.00	11.35	0.57	0.66	0.35	60	2	4.55	
235.3−03.9	M 1-12	13.08	12.06	10.54	0.55	0.67	1.23	41	2	6.99	
242.6−11.6	M 3-1	13.82	13.07	13.47	0.24	0.60	−0.53	24	1,2	4.20	0.114
248.8−08.5	M 4-2	14.57	13.72	12.69	0.24	0.70	0.90	19	1,2	5.83	0.088
249.0+06.9	SaSt 1-1	11.85	11.62	11.42							
253.9+05.7	M 3-6	12.26	11.59	11.21	0.42	0.41	0.16	75	2	3.46	0.069
258.1−00.3	He 2-9	13.43	11.59	10.12	1.41	0.95	0.71	170	3	3.26	
272.1+12.3	NGC 3132	9.58	9.26	8.53	0.10	0.26	0.68	230	1	1.45	0.105
274.1+02.5	He 2-34	13.03	9.17	4.28	1.82	2.72	3.91				
274.6+02.1	He 2-35	14.63	13.56	13.35	0.59	0.70	−0.11	24	1	5.94	0.072
279.6−03.1	He 2-36	10.52	9.78	9.41				90	2	2.16	0.115
261.0+32.0	NGC 3242	10.02	9.02	8.59	0.20	0.87	0.32	835	1	1.07	0.065
285.6−02.7	He 2-47	12.07	10.77	10.11	0.53	0.96	0.38	170	1	3.14	0.038
286.3−04.8	NGC 3211	12.91	12.20	11.78	0.22	0.57	0.30	80	1	2.57	0.100

TABLE 1

(CONTINUED)

PN G	Name	I	J	K_s	E_{B-V}	$(I-J)_0$	$(J-K)_0$	5 GHz [mJy]	Ref.	Distance [kpc]	Radius [pc]
292.8+01.1	He 2-67	14.39	13.00	12.39	0.71	0.93	0.23	41	1,3	5.03	0.061
294.6+04.7	NGC 3918	13.09	9.32	8.78	0.26	3.61	0.40	859	2,3	1.18	0.054
296.3−03.0	He 2-73	13.87	12.24	11.44	0.92	1.05	0.31	76	1,2,3	4.44	0.043
307.2−09.0	He 2-97	13.47	12.16	11.37	0.39	1.06	0.57	30	1,3	5.55	0.067
307.5−04.9	MyCn 18	12.39	11.24	10.64	1.19	0.40	−0.04	106	1,2	3.96	0.038
311.4+02.8	He 2-102	14.15	13.10	12.48	0.82	0.53	0.17	33	1,2	4.25	0.093
320.3−28.8	He 2-434	13.47	13.16	12.59	0.17	0.20	0.48				
320.9+02.0	He 2-117	13.52	11.31	9.90	1.76	1.10	0.46	267	2	2.68	0.032
321.3+02.8	He 2-115	13.55	11.78	10.45	1.56	0.78	0.49	156	1,2	3.74	0.027
322.4−00.1	Pe 2-8	14.93	11.82	10.05	2.60	1.47	0.37	100	1,2	5.16	0.020
324.2+02.5	He 2-125	14.58	13.46	12.49	1.19	0.36	0.34				
325.0+03.2	He 2-129	14.79	13.07	11.41	1.30	0.90	0.96	35	1,2	7.65	0.030
325.8+04.5	He 2-128	14.00	12.96	12.06	0.77	0.55	0.49	40	1,2	5.07	0.061
327.1−02.2	He 2-142	12.18	10.26	8.80	1.13	1.21	0.86	65	1,2,3	4.84	0.042
327.8+10.0	NGC 5882	11.11	10.18	9.54	0.25	0.76	0.51	334	1,2	1.78	0.060
327.8−01.6	He 2-143	14.96	12.36	11.08	2.08	1.29	0.15	120	1,2	3.49	0.044
327.8−06.1	He 2-158	14.19	13.77	12.94	0.33	0.21	0.65				
330.7+04.1	Cn 1-1	10.02	8.93	7.56	0.66	0.67	1.02				
331.0−02.7	He 2-157	14.26	13.20	12.10	1.04	0.40	0.54	30	1	6.67	0.048
331.7−01.0	Mz 3	11.32	8.18	4.33	1.37	2.28	3.11	649	1,2,3	1.16	0.070
332.2+03.5	Wray 16-199	15.20	13.26	12.16							
332.9−09.9	He 3-1333	10.17	9.49	6.67	0.59	0.31	2.50				
334.3−09.3	IC 4642	13.23	12.62	12.46	0.33	0.40	−0.02	60	1,2	2.75	0.110
334.8−07.4	SaSt 2-12	10.46	9.71	9.29	0.39	0.50	0.21				
336.2+01.9	Pe 1-6	14.95	13.23	12.29	1.37	0.86	0.20	40	1,2	3.54	0.103
336.3−05.6	He 2-186	14.24	13.01	11.87	0.61	0.85	0.82	21	1,2	7.49	0.054
336.9+08.3	StWr 4-10	14.82	14.28	14.13	0.92	−0.04	−0.35				
338.8+05.6	He 2-155	13.56	12.47	11.77	0.64	0.68	0.36	70	1,2	2.79	0.098
340.9−04.6	Sa 1-5	16.39	15.06	14.12	1.04	0.67	0.38				
342.1+27.5	Me 2-1	13.72	12.93	12.37	0.08	0.74	0.52	30	2	5.17	0.075
342.8−06.6	Cn 1-4	13.52	13.15	12.75	0.29	0.19	0.24				
343.4+11.9	H 1-1	15.74	14.87	13.69	0.35	0.66	0.99				
343.5−07.8	PC 17	13.83	13.21	12.92	0.47	0.32	0.04				
345.0+03.4	Vd 1-4	16.24	14.44	12.67	0.72	1.34	1.39				
345.9−11.2	ESO 279-14	13.30	12.31	11.43							
347.7+02.0	Vd 1-8	15.65	13.27	11.74	1.82	1.24	0.55				
348.8−09.0	He 2-306	14.24	13.66	12.93	0.29	0.41	0.57				
350.9+04.4	H 2-1	11.94	11.18	10.20	0.68	0.33	0.61	61	2	4.26	0.058
351.1+04.8	M 1-19	14.27	13.00	12.37	0.79	0.77	0.20	26	1,2	4.78	0.093
352.8−00.2	H 1-13	13.72	10.87	9.24	2.21	1.45	0.44	>620	2		
352.9−07.5	Fg 3	12.08	11.30	10.60	0.46	0.49	0.46	107	1	4.77	0.023
353.3+06.3	M 2-6	14.47	13.48	12.76	0.53	0.66	0.43	17	4	5.38	
354.2+04.3	M 2-10	14.78	13.25	12.62	1.09	0.84	0.05	9.1	2	8.68	0.084
355.2−02.5	H 1-29	14.76	13.47	12.54	1.00	0.67	0.39				
355.9−04.2	M 1-30	13.74	12.82	12.02	0.64	0.52	0.45	31	2	5.49	0.067
356.2−04.4	Cn 2-1	13.33	11.77	10.87	0.47	1.27	0.65	49	2	6.05	0.035
356.5−03.9	H 1-39	14.30	13.34	12.63	1.02	0.32	0.17	13	2	7.12	0.086
357.1+01.2	K 6-2	15.17	12.10	10.47							
357.2+07.4	M 4-3	15.10	13.43	12.76	0.98	1.06	0.15	28	2	4.68	0.091
357.4−03.5	M 2-18	14.45	12.77	11.62	0.87	1.13	0.69	17	1,2	6.59	0.080
358.2+03.6	M 3-10	14.57	12.95	11.93	1.07	0.95	0.44	29	1	6.60	0.051
358.3+01.2	Bl B	15.79	13.29	11.43	3.26	0.44	0.11				
358.3−02.5	Al 2-O	14.40	12.46	10.66				37	4	6.68	
358.3−21.6	IC 1297	12.86	12.03	10.98	0.12	0.74	0.99				
358.8+00.0	Te 2022	12.06	10.10	8.61							

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