A&A 543, C1 (2012)
DOI: 10.1051/0004-6361/201117910e

Astronomy & Astrophysics

Corrigendum

A far-infrared survey of bow shocks and detached shells around AGB stars and red supergiants

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A&A 537, A35 (2012), DOI: 10.1051/0004-6361/201117910

Key words. stars: AGB and post-AGB – circumstellar matter – infrared: ISM – hydrodynamics – stars: mass-loss – errata, addenda

Two errors have appeared in the original published version of this article. A copy-and-paste error resulted in two subsequent LSR space motion corrections to the values for CW Leo reported in the original Table 1. The correct values are given here in Table 1. The second error resulted from the omission of the "square" term for the distance in the actual computation of the dust mass following Eq. (5) ($M_{\rm dust} = \frac{d^2\ F_\nu}{\kappa(\nu)\ B_\nu(T)}$). This correction results in a, distance dependent, increase of dust mass by approximately two orders of magnitude. The complete corrected original Table 5 is reproduced in this erratum. Only the values in Cols. 9 and 10 have changed.

The above corrections give total observed gas and dust masses ranging from 0.002 to 0.56 $M_\odot$. These corrections change in part the conclusions arrived at in the final paragraph of Sect. 3.3. In particular, we note that the inferred total mass of gas and dust is significantly higher than the potential mass swept-up from interstellar medium (ISM). The estimated swept-up ISM mass, $M_{\rm ISM}$, ranges from $\sim10^{-5}$ to 10^{-1} $M_\odot$. These results indicate that on average only a few percent of the observed dust in the bow shock region originates from the surrounding medium. For individual objects, notably CW Leo and α Ori, the contribution from ISM dust could be as much as 10–25%, while for others it is estimated to be even less than one percent (Table 5). These corrections now show that the derived masses are consistent with dust emission being predominantly from stellar wind grains trapped in the wind-ISM interaction rather than from interstellar grains, which is consistent with hydrodynamical modeling as discussed recently for α Ori by e.g. Mohamed et al. (2012) and Mackey et al. (2012). Note that the derived dust masses are sensitive not only to the adopted dust temperature, but also the dust opacity law, and the adopted gas-to-dust ratio. These uncertainties together potentially introduce an order of magnitude uncertainty to the derived total dust and gas mass. For example, an increase in dust temperature results in a decrease of the dust mass, thus increasing the relative importance of the ISM contribution.

Table 1. LSR proper motion, space velocity, position angle and inclination for CW Leo.

Target	μ (mas yr^{-1})	$\upsilon_\star$ (km s^{-1})	PA (°)	i (°)
CW Leo	53.1	41.0 km s^{-1}	64.5	–37.4

Acknowledgements. We thank Dr. Anthony Marston for alerting us to the error in the dust mass calculation.

References

Harper, G. M., Brown, A., & Guinan, E. F. 2008, AJ, 135, 1430
Mackey, J., Mohamed, S., Neilson, H. R., Langer, N., & Meyer, D. M.-A. 2012, ApJ, 751, L10
Mohamed, S., Mackey, J., & Langer, N. 2012, A&A, 541, A1

Table 5. Aperture flux of observed bow shocks (Class I and II) and detached rings (Class III).

IRAS id	Object	Class	Radius^{a}		Dust annulus	Flux (Jy)		$M_{\mathrm{dust+gas}}$^{b} (10^{-2} $M_{\odot}$)		M_{ISM}^{c}	M_{ISM}^{d}
			(″)	(pc)	(″)	70 μm	160 μm	70 μm	160 μm	(10^{-4} $M_{\odot}$)	(10^{-4} $M_{\odot}$)
00248+3518	AQ And	I+III	52	0.21	40–62 (circle)	2.20 ± 0.01	1.28 ± 0.01	19.4	16.3	1.1	4.4
01159+7220	S Cas	III	50^{e}	0.23	32–64	2.26 ± 0.01	1.11 ± 0.02	26.0	18.5	12	54
01246-3248	R Scl	I	54^{j}	0.10	51–68 (arc)	1.27 ± 0.01	0.49 ± 0.01	1.4	0.8	0.1	0.3
		III	14^{f}	0.03							
02168-0312	*o* Cet	I	82^{j}	0.04	70–150 (arc)	47.64 ± 0.03	9.75 ± 0.05	5.2	1.5	0.5	0.2
03374+6229	U Cam	III	7^{f}	0.02							
		II	57/62^{i}	0.12/0.13	80–140	2.87 ± 0.02	2.44 ± 0.05	6.9	8.5	40	1110
03507+1115	NML Tau	I	85	0.10	95–130 (arc)	5.23 ± 0.02	3.04 ± 0.03	4.1	3.4	3.5	62
04459+6804	ST Cam	II	67/84^{i}	0.14/0.17	84–122	1.28 ± 0.02	0.61 ± 0.03	2.9	2.0	3.1	2.2
05028+0106	W Ori	I/III	92	0.17	70–120	1.99 ± 0.02	0.62 ± 0.03	3.7	1.7	8.2	32
05418-4628	W Pic	I	34^{j}	0.08	62–90	0.78 ± 0.01	0.25 ± 0.02	2.6	1.2	2.7	13
05524+0723	α Ori^{l}	I	397^{j}	0.25	510–660 (arc)	56.68 ± 0.19	22.64 ± 0.38	28.5	16.5	64	155
06331+3829	UU Aur	I	82^{j}	0.14	100–140 (arc)	5.44 ± 0.02	2.50 ± 0.03	8.2	5.4	14	88
09448+1139	R Leo	I	93^{j}	0.03	94–134	6.31 ± 0.02	1.92 ± 0.03	0.4	0.2	0.1	2.1
09452+1330	CW Leo^{k}	I	507^{j}	0.29	560–710 (arc)	6.88 ± 0.08	11.13 ± 0.11	1.3	3.0	76	31
							6.00 ± 0.13		1.6		
10329-3918	U Ant	III	42	0.06	30–55 (circle)	16.32 ± 0.01	4.68 ± 0.01	15.2	6.3	0.4	5.3
10350-1307	U Hya	I+III	114	0.12	100–133 (circle)	17.44 ± 0.03	9.33 ± 0.03	9.8	7.6	1.7	0.03
10416+6740	VY UMa	II	38/46^{i}	0.07/0.09	38–88	3.60 ± 0.01	2.33 ± 0.02	6.7	6.3	0.7	2.5
10580-1803	R Crt	II	~140	0.18	165–270	5.07 ± 0.07	6.42 ± 0.11	4.5	8.2	21	58
12427+4542	Y CVn	III	~190	0.30	150–260	5.14 ± 0.07	3.79 ± 0.10	6.9	7.3	7.7	2.9
13001+0527	RT Vir	I			50–140 (circle)	5.15 ± 0.03	3.30 ± 0.04	1.2	1.1	0.6	
13269-2301	R Hya	I	96^{j}	0.05	200–245 (arc)	4.65 ± 0.02	1.93 ± 0.03	0.9	0.6	3.8	12
13462-2807	W Hya	III	68,230^{g}	0.03, 0.12	70–108 (ellipse)	21.28 ± 0.02	6.08 ± 0.03	3.0	1.2	0.2	0.1
14003-7633	θ Aps	I	76^{j}	0.04	118–146 (arc)	2.15 ± 0.01	0.76 ± 0.02	0.4	0.2	1.3	0.4
15094-6953	X Tra	III	150^{h}	0.18	60–210	9.70 ± 0.08	6.89 ± 0.12	16.3	16.7	106	21
16011+4722	X Her	I	45^{j}	0.03	40–90 (ellipse)	9.17 ± 0.01	3.23 ± 0.02	2.2	1.1	0.2	0.2
17389-5742	V Pav	II	97/100^{i}	0.17/0.18	95–140	1.30 ± 0.03	1.50 ± 0.04	2.3	3.8	21	12
18476-0758	S Sct	III	70	0.13	30–90 (circle)	14.09 ± 0.02	8.85 ± 0.03	27.2	24.7	13	
19126+3247	W Aql	II	45/75^{i}	0.07/0.12	36–86 (ellipse)	11.10 ± 0.02	4.25 ± 0.03	16.6	9.2	5.8	144
19233+7627	UX Dra	II	76/54^{i}	0.14/0.10	50–110	2.89 ± 0.01	1.11 ± 0.03	5.6	3.1	4.4	2.5
19314-1629	AQ Sgr	I	57	0.09	50–100	3.44 ± 0.02	2.53 ± 0.02	4.9	5.3	5.4	3.7
19390+3229	TT Cyg	III	33	0.07	26–43 (circle)	1.74 ± 0.01	0.86 ± 0.01	4.3	3.1	1.3	21
20038-2722	V1943 Sgr	I	66^{j}	0.06	50–130 (arc)	5.98 ± 0.03	2.30 ± 0.03	3.0	1.7	2.6	0.8
20075-6005	X Pav	I	50^{j}	0.07	94–122	5.74 ± 0.01	2.69 ± 0.02	4.4	2.3	3.1	19
20141-2128	RT Cap	III	92	0.13	62–118	2.21 ± 0.02	0.91 ± 0.04	2.4	1.4	4.0	15
20248-2825	T Mic	I			40–100 (ellipse)	5.48 ± 0.02	0.58 ± 0.03	3.2	0.5	1.2	
21358+7823	S Cep	III	90	0.18	70–130	2.14 ± 0.03		4.6		11	142
21419+5832	μ Cep	I	78^{j}	0.15	100–150	28.64 ± 0.04	11.5 ± 0.12	56.4	32.8	56	637
21439-0226	EP Aqr	I	43^{j}	0.03	45–68	3.68 ± 0.01	0.99 ± 0.01	0.6	0.2	0.1	1.2
23438+0312	TX Psc	III	16^{f}	0.02							
		I	38^{j}	0.05	12–58 (ellipse)	4.79 ± 0.01	1.07 ± 0.02	4.7	1.5	0.2	0.7
23558+5106	R Cas	I	97^{j}	0.06	100–160 (arc)	8.35 ± 0.01	3.52 ± 0.04	1.7	1.1	2.5	2.9

Notes. Irregular Class IV is excluded. $^{(a)}$ Radii of rings and fermata derived from the azimuthally averaged radial profiles (Fig. 1). $^{(b)}$ Derived from Eq. (1) using the total integrated flux at 70 and 160 μm, respectively, adopting a gas-to-dust ratio of 200 and a dust temperature of 30 K. $^{(c)}$ $M_{\mathrm{ISM}} = \frac{4}{3}\pi r^3\ \rho_{\mathrm{ISM}}$, with n_{H} taken from Eq. (5). $^{(d)}$ M_{ISM}, with n_{H} taken from the local densities inferred from the measured stand-off distance and Eq. (2); Tables 1 and 2. $^{(e)}$ Central source is offset by 0″ RA, 5″ Dec. $^{(f)}$ Ring radius from the deconvolved image. $^{(g)}$ Inner and outer (at 160 μm) rings, respectively. $^{(h)}$ Central source is offset by 12″ RA, 5″ Dec. $^{(i)}$ Radial distances are quoted for both north and south arcs (east-west for W Aql). $^{(j)}$ Projected distance *A* (Fig. 6). $^{(k)}$ CW Leo has been observed two times at 160 μm. $^{(l)}$ Updated distance to 197 pc (Harper et al. 2008).