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The co-existence of hot and cold gas in debris discs (Corrigendum)

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Due to a bad correction of telluric lines some Na I absorptions detected towards some stars were not mentioned in the original paper. This corrigendum presents a proper telluric subtraction, carried out with MOLECFIT¹ (Smette et al. 2015, Kausch et al. 2015).

Tables 3 and 4 from the original paper are rectified below with the corrected Na I absorptions shown in boldface text.

Figure 4 of the original paper showed an incorrect plot of the Na I D line features observed towards HD 138813. Figure 1 is the corrected version of the original paper's Fig. 4.

Below we summarize the corrected Na I absorptions of each concerned star:

- HD 9672: the Na I D absorption at 11.5 km s^{-1} coincides with the Ca II feature and the radial velocity of the ISM.
- HD 131488: besides the already reported non-photospheric absorptions at $\sim 5.3 \text{ km s}^{-1}$, a Na I D2 feature at -13.9 km s^{-1} is detected. A similar feature is detected towards field stars and most likely has an interstellar medium origin.
- HD 138813: two new non-photospheric features are detected in the Na I D lines (see Fig. 1). The approximately -22.2 km s^{-1} absorption is close to the Ca II K non-photospheric absorption and the G ISM cloud; thus, an interstellar origin is more plausible. A feature in emission at 0.1 km s^{-1} is detected in both Na I D lines at the radial velocity of the star; this feature is related to the star.

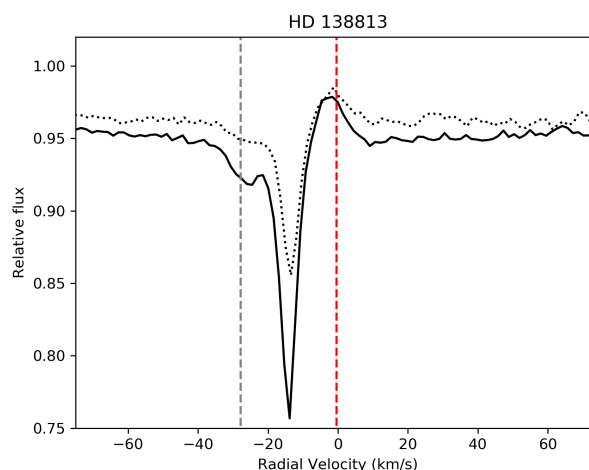


Fig. 1. Figure corrected for HD 138813 Na I D2 (black solid line) and D1 (black dotted line) lines. The radial velocities of the star (red dashed line) and of the ISM (grey dashed line) are also shown. Three Na I features are present, including an emission line at the radial velocity of the star.

- HD 156623: an emission Na I D feature is present at the radial velocity of the star. Figure 2 shows the emission feature in both Na I D lines.
- HD 172555: two narrow non-photospheric absorptions are detected. One of them, at approximately -20.4 km s^{-1} is close to the G cloud, and therefore possibly of ISM

¹ <https://www.eso.org/sci/software/pipelines/skytools/molecfi>

Table 3. Radial velocities and equivalent widths (EWs) of the Ca II H&K and Na I D non-photospheric absorptions, radial velocities of the stars, and projected velocities of ISM clouds in the Colorado model.

Stars with non-photospheric absorptions							
Star	v_{CaHK} (km s ⁻¹)	EW(K/H) mÅ	Δv_{CaHK} (km s ⁻¹)	v_{NaID} (km s ⁻¹)	EW(D2/D1) ^(c) mÅ	v_{rad} (km s ⁻¹)	v_{ISM} ^(d) (km s ⁻¹)
HD 9672 ^(a)	13.5 ± 2.3	10.6/6.0	7.4	11.5 ± 2.3	16.4/9.3	11.0 ± 2.0	11.01 (LIC)
HD 32297 ^(a)	22.7 ± 3.0	19.4/8.9	9.7	23.8 ± 2.5	93.0/84.0	19.7 ± 2.0	23.59 (LIC)
HD 110058 ^(a)	12.7 ± 3.3	27.0/24.1	6.8	12.5 ± 2.8	46.0/39.1	12.6 ± 2.4	-14.46 (G)
	1.2 ± 3.3	19.9/10.0	12.6	0.9 ± 2.8	34.0/18.9		
HD 131488 ^(a)	4.0 ± 2.7	5.7/-	9.6	5.3 ± 2.2	42.1/34.2	5.8 ± 1.5	-23.91 (G)
	-3.2 ± 2.7	4.0/-	4.2	-13.88 ± 2.2	7.2/-		
HD 131835 ^(a)	2.2 ± 2.7	0.7/-	2.3	-	<0.9	2.6 ± 1.4	18.56 (GEM)
	-5.9 ± 2.7	2.1/1.4	7.9	-	<0.9		
	-13.8 ± 2.7	8.3/4.1	7.4	-11.8 ± 2.0	41.0/32.1		
HD 138813	-27.5 ± 3.0	5.6/-	18.7	-22.2 ± 2.2	5.9/3.1	-0.4 ± 2.0	-27.82 (G)
				-12.0 ± 2.5	18.0/15.4		
				0.1 ± 2.0	-7.55/-5.2		
HD 146897	-8.0 ± 2.7	12.4/-	7.2	-8.8 ± 2.1	118.2/80.0	-4.0 ± 1.5	-29.19 (G)
	-30.0 ± 2.7	5.9/-	4.6	-	<0.8		
HD 156623 ^(a)	-15.0 ± 2.7	9.0/3.7	18.7	-1.8 ± 2.6	-10.6/-8.5	-0.2 ± 1.5	-24.89 (G)
	8.1 ± 2.7	4.3/-	6.0 ^(e)	-	<0.7		
HD 172555 ^(a)	2.3 ± 3.0	9.9/4.0	9.7	15.3 ± 2.1	8.0/-	2.6 ± 1.9	-16.84 (G)
				-20.4 ± 2.1	3.2/1.8		
HD 181296 ^(b)	-22.8 ± 3.8	3.9/2.2	8.4	-22.9 ± 2.4	4.0/-	-3.0 ± 3.0	-18.51 (G)

Notes. The FWHM velocity dispersion of the Ca II K lines are also given. ^(a)Stars with FEBs or red wings. ^(b)The line of sight towards this star does not traverse any ISM cloud in the Colorado model but it passes within 20° of several clouds. Among these, cloud G is the closest one in velocity. ^(c)Upper limits are shown for those stars without Na non-photospheric absorption. ^(d)Names within brackets are ISM clouds in the Colorado model (Redfield & Linsky 2008). ^(e)The velocity dispersion for this absorption is highly variable, and the value shown here is the value obtained from the median spectra.

Table 4. Summary of the non-photospheric absorption features of the observed cold gas-bearing debris disc stars.

Stars with non-photospheric absorptions							Angle (deg.) ^(c)
Star	Ca II			Na I			
	V_{star}	V_{ISM}	Neither	V_{CaII}	V_{star}	V_{ISM}	
HD 9672 ^(a)	Y	Y		Y	Y		70–90 (1,2,3)
HD 32297 ^(a)	Y	Y		Y	Y		80–88 (4,5)
HD 110058 ^(a)	Y		Y	Y	Y		~90 (6)
HD 131488 ^(a)	Y	Y		Y	Y		82 (7)
HD 131835 ^(a)	Y	Y		Y			75–83 (8,9,14)
HD 138813		Y		Y	Y ^(b)	Y	32 (10)
HD 146897	Y	Y		Y	Y		84 (11)
HD 156623 ^(a)			Y		Y ^(b)		34 (10)
HD 172555 ^(a)	Y					Y	75 (12)
HD 181296			Y	Y			>70 (13)

Notes. Columns 2–4: coincidences of the Ca II velocity components with the radial velocity of the star, Colorado model ISM clouds along the line of sight, or none of both. Columns 5–7: coincidences of the Na I velocity components with Ca II features, the radial velocity of the star, or the ISM. Column 8 gives the inclination angle of the debris disc associated with the stars. Empty spaces mean non-detections. ^(a)Stars with FEBs or red wings. ^(b)Features in emission.

References. ^(c)References for inclination angle: (1) Hughes et al. (2008); (2) Moór et al. (2015b); (3) Choquet et al. (2017); (4) Schneider et al. (2005); (5) Asensio-Torres et al. (2016); (6) Kasper et al. (2015); (7) Moór et al. (2017); (8) Hung et al. (2015); (9) Moór et al. (2015a); (10) Hales et al. (in prep.); (11) Thalmann et al. (2013); (12) Smith et al. (2012); (13) Smith et al. (2009); (14) Feldt et al. (2017).

origin. This feature was also reported by Kiefer et al. (2014). A weaker broad, variable feature might have been detected at ~15.3 km s⁻¹. It does not coincide with the Ca II absorption, the radial velocity of the star or the G cloud velocity vector. If confirmed, it would have a circumstellar origin.

– HD 181296: the absorption detected in Na I D2 coincides with the one observed in Ca II.

The only remarkable change in the results with respect to the original paper is the Na I emission towards HD 138813 and HD 156623. However, the analysis of those emissions are beyond

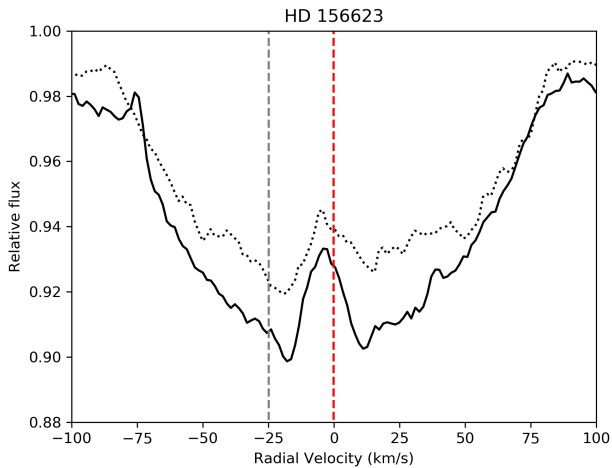


Fig. 2. Figure for HD 156623 showing the emission feature at the radial velocity of the star in both Na I D lines. The D2 component is shown in solid line while D1 is plotted in dotted line. The radial velocities of the star (red dashed line) and of the ISM (grey dashed line) are also shown.

the scope of the original paper, and we emphasize that the main conclusions are not affected.

References

- Asensio-Torres, R., Janson, M., Hashimoto, J., et al. 2016, *A&A*, **593**, A73
 Choquet, É., Milli, J., Wahhaj, Z., et al. 2017, *ApJ*, **834**, L12
 Feldt, M., Olofsson, J., Boccaletti, A., et al. 2017, *A&A*, **601**, A7
 Hughes, A. M., Wilner, D. J., Kamp, I., & Hogerheijde, M. R. 2008, *ApJ*, **681**, 626
 Hung, L.-W., Fitzgerald, M. P., Chen, C. H., et al. 2015, *ApJ*, **802**, 138
 Kasper, M., Apai, D., Wagner, K., & Robberto, M. 2015, *ApJ*, **812**, L33
 Kausch, W., Noll, S., Smette, A., et al. 2015, *A&A*, **576**, A78
 Kiefer, F., Lecavelier des Etangs, A., Augereau, J.-C., et al. 2014, *A&A*, **561**, L10
 Moór, A., Henning, T., Juhász, A., et al. 2015a, *ApJ*, **814**, 42
 Moór, A., Kóspál, Á., Ábrahám, P., et al. 2015b, *MNRAS*, **447**, 577
 Moór, A., Curé, M., Kóspál, Á., et al. 2017, *ApJ*, **849**, 123
 Redfield, S., & Linsky, J. L. 2008, *ApJ*, **673**, 283
 Schneider, G., Silverstone, M. D., & Hines, D. C. 2005, *ApJ*, **629**, L117
 Smette, A., Sana, H., Noll, S., et al. 2015, *A&A*, **576**, A77
 Smith, R., Churcher, L. J., Wyatt, M. C., Moerchen, M. M., & Telesco, C. M. 2009, *A&A*, **493**, 299
 Smith, R., Wyatt, M. C., & Haniff, C. A. 2012, *MNRAS*, **422**, 2560
 Thalmann, C., Janson, M., Buenzli, E., et al. 2013, *ApJ*, **763**, L29