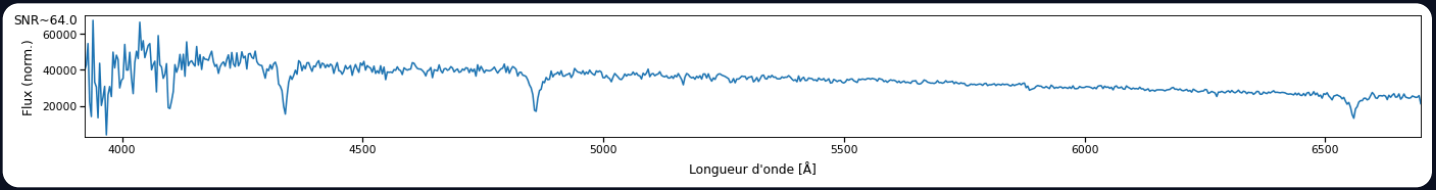
Rapport - Analyse Spectrométrique HD30685 - 16-10-2025 - A2_20251016T231130.dat

RV (CCF) : -27.3 km/s (brute=+188.5, lin=-28.9, quad=-25.7, mode=linear, qual=OK)



Session

	=== Session ===
Fichier .DAT	HD30685 - 16-10-2025 - A2_20251016T231130.dat
Fichier .FITS	HD30685 - 16-10-2025 - A2_20251016T231130.fit

Objet etudié	HD30685
Date de prise de vue	2025-10-16T23:02:58.654

Instrument	UVEX4i-600l-500nm-35um
Spectroscope	UVEX4i
Réseau de	600 lignes
Réseau blazé à	500.0 nm
Largeur fente	35.0 µm

Télescope	Vixen VC200L
Observateur	François BERNIER - Astroghost
Classe spectrale	A2
- Lettre	A
- Sous-classe	2
- Luminosité	—

Paramètres d'analyse

Résolution de lecture (Å)	0.501
Tolérance clustering (Å)	0.050
Sensibilité raies fortes	0.200
Seeing utilisé (arcsec)	5.00

Données spectrales (.DAT)

Points	17839
Lambda min (A)	3922.321

Lambda max (A)	6698.463

Indicateurs

SNR	64.0
Teff	9000 K
Hα	ligne très faible (EW ≈ 0.00 Å)
RV (CCF) utilisée	-27.3 km/s (brute=+188.5, lin=-28.9, quad=-25.7, mode=linear, qual=OK)
z (CCF) utilisé	-0.000091 (brute=+0.000629, lin=-0.000096, quad=-0.000086)
R_th (géométrie prise en compte)	878
R_th,seeing(résolution max possible)	878
η_seeing	1.000
R (λ/FWHM) — médiane	878 (min 878, max 878, n=283)
R_eff	878
Δλ_eff(λ_ref	5310 Å) ≈ 6.05 Å
Na D (Δ	5.97 Å) : limite (Δλ_eff@5892≈6.71 Å)

Vérification classe spectrale (pics principaux)

Classe de référence	Type A

Couverture utilisée pour la concordance : [3933.66 6687.00] Å

— Pics principaux sélectionnés (max 25)

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
K	K	3934.00	0.000	0.001		
Ca	II	H	3968	Ca	II	3968.47
H	epsilon	H	epsilon	3970.00	0.001	0.001
N	II	N	II	3995.00	0.000	0.001
He	I	He	I	4027.00	0.000	0.001
NH2	NH2	4056.00	0.001	0.001		
N	IV	N	IV	4058.00	0.000	0.001
Sr	II	Sr	II	4077.00	0.000	0.001
Si	IV	4089	Si	IV	4088.86	0.000
Hδ	4101	H	I	4101.74	0.000	0.001
H	delta	H	delta	4102.00	0.001	0.001
He	II	+	H	delta	He	II
Si	IV	4116	Si	IV	4116.10	0.000
He	I	4121	He	I	4120.99	0.000
He	II	He	II	4200.00	0.000	0.001
CN	4215	band	CN	4215.00	0.000	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
Ca	I	Ca	I	4227.00	0.001	0.001
C	II	C	II	4267.00	0.000	0.001
CH	G	band	4300	CH	4300.00	0.001
Hγ	(Balmer)	Hγ	(Balmer)	4340.47	0.000	0.001
He	II	+	H	gamma	He	II
H	gamma	H	gamma	4341.00	0.001	0.001
CN	CN	4380.00	0.000	0.001		
He	I	4388	He	I	4387.93	0.000
He	I	He	I	4471.00	0.001	0.001
He	I	4471	He	I	4471.50	0.000
Mg	II	4481	Mg	II	4481.23	0.001
Fe	II,III,	Mg	II	Fe	II,III,	Mg
He	II	He	II	4511.00	0.000	0.001
Ti	II	Ti	II	4534.00	0.001	0.001
He	II	4541	He	II	4541.59	0.000
Ti	II/Fe	II	Ti	II/Fe	II	4550.00
Si	III	4552	Si	III	4552.62	0.000
Ba	II	Ba	II	4554.00	0.001	0.001
Si	III	4568	Si	III	4567.84	0.000
Si	III	4575	Si	III	4574.76	0.001
Fe	II/Cr	II	Fe	II/Cr	II	4585.00
Swan	-	C2	Swan	-	C2	4600.00
N	V	N	V	4603.00	0.000	0.001
N	V	N	V	4619.00	0.001	0.001
N	III	4634	(em)	N	III	4634.14
N	III	4640	(em)	N	III	4640.64
N	III	N	III	4641.00	0.000	0.001
C	III	4647–51	C	III	4647.42	0.001
C	III/IV	C	III/IV	4650.00	0.000	0.001
Fe	I	Fe	I	4667.00	0.000	0.001
He	II	He	II	4686.00	0.000	0.001
C2	Swan	C2	Swan	4737.00	0.000	0.001
SiC2	SiC2	4767.00	0.001	0.001		
TiO	TiO	4775.00	0.000	0.001		
SiC2	SiC2	4807.00	0.000	0.001		
SiC2	SiC2	4832.00	0.000	0.001		
CH4	CH4	4860.00	0.000	0.001		
Hβ	4861	H	I	4861.33	0.001	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
H	beta	H	beta	4861.00	0.001	0.001
SiC2	SiC2	4867.00	0.001	0.001		
Fe	II,III,	Si	II	Fe	II,III,	Si
SiC2	SiC2	4909.00	0.000	0.001		
He	I	He	I	4921.00	0.000	0.001
Fe	I/II	Fe	I/II	4919.00	0.000	0.001
Fe	II	Fe	II	4924.00	0.001	0.001
N	V	N	V	4933.00	0.000	0.001
TiO	bands	4950–5190	TiO	4950.00	0.000	0.001
SiC2	SiC2	4957.00	0.001	0.001		
[O	III]	[O	III]	4959.00	0.001	0.001
SiC2	SiC2	4977.00	0.000	0.001		
TiO	TiO	4990.00	0.001	0.001		
Swan	-	C2	Swan	-	C2	5000.00
[O	III]	[O	III]	5007.00	0.001	0.001
Fe	I/II	Fe	I/II	5012.00	0.000	0.001
Fe	II	Fe	II	5018.00	0.000	0.001
Si	II	Si	II	5100.00	0.001	0.001
Mg	Mg	5167.00	0.000	0.001		
C2	Swan	C2	Swan	5165.00	0.000	0.001
Fe	II	Fe	II	5169.00	0.001	0.001
Mg	I	b	5172	Mg	I	5172.68
Mg	Mg	5173.00	0.001	0.001		
Mg	Mg	5184.00	0.000	0.001		
Mg	I	b	5183	Mg	I	5183.60
TiO	TiO	5190.00	0.000	0.001		
Fe	II	Fe	II	5198.00	0.000	0.001
Fe	II	Fe	II	5235.00	0.001	0.001
Fe	I/Ca	I	Fe	I/Ca	I	5270.00
Fe	II	Fe	II	5276.00	0.001	0.001
N	III	N	III	5314.00	0.000	0.001
Fe	II	Fe	II	5317.00	0.001	0.001
ZrO	ZrO	5404.00	0.001	0.001		
He	II	He	II	5411.00	0.000	0.001
CH4	CH4	5430.00	0.000	0.001		
TiO	bands	5448–5670	TiO	5448.00	0.000	0.001
TiO	TiO	5480.00	0.000	0.001		
Si	II	Si	II	5500.00	0.000	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
Fe	II	Fe	II	5535.00	0.001	0.001
ZrO	ZrO	5545.00	0.001	0.001		
O	V	O	V	5572.00	0.001	0.001
O	I	O	I	5577.00	0.000	0.001
ZrO	ZrO	5629.00	0.000	0.001		
C2	Swan	C2	Swan	5636.00	0.000	0.001
TiO	TiO	5640.00	0.000	0.001		
O	VII	O	VII	5670.00	0.000	0.001
N	II	N	II	5679.00	0.001	0.001
Na	I	5682.633	Na	I	5682.63	0.001
Na	I	5688.205	Na	I	5688.20	0.000
C	III	C	III	5696.00	0.000	0.001
ZrO	ZrO	5718.00	0.001	0.001		
N	II	N	II	5755.00	0.000	0.001
CH4	CH4	5760.00	0.000	0.001		
DIB	DIB	5780.00	0.000	0.001		
DIB	DIB	5797.00	0.000	0.001		
C	IV	C	IV	5801.00	0.000	0.001
He	I	He	I	5875.00	0.000	0.001
He	I	He	I	5876.00	0.000	0.001
NaI	NaI	5889.00	0.001	0.001		
Na	I	D2	5889.95	Na	I	5889.95
NaI	NaI	5890.00	0.001	0.001		
Na	I	D	(5889–5896)	Na	I	5891.58
NaI	NaI	5896.00	0.001	0.001		
TiO	TiO	5930.00	0.001	0.001		
CH4	CH4	5960.00	0.001	0.001		
Swan	-	C2	Swan	-	C2	6005.00
Swan	-	C2	Swan	-	C2	6059.00
O	VIII	O	VIII	6068.00	0.000	0.001
Swan	-	C2	Swan	-	C2	6122.00
Ba	II	6141.713	Ba	II	6141.71	0.000
Si	II	Si	II	6150.00	0.001	0.001
ZrO	ZrO	6154.00	0.000	0.001		
Na	I	6154.226	Na	I	6154.23	0.000
TiO	bands	6159–6395	TiO	6159.00	0.001	0.001
Na	I	6160.747	Na	I	6160.75	0.001
CH4	CH4	6190.00	0.000	0.001		

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
CN	CN	6206.00	0.000	0.001		
ZrO	ZrO	6229.00	0.000	0.001		
TiO	TiO	6250.00	0.000	0.001		
ZrO	ZrO	6261.00	0.001	0.001		
CN	CN	6259.00	0.000	0.001		
O2	a	band	6276–6287	O2	6276.00	0.000
O2	a	band	~6277	O2	6277.00	0.000
O2	a	band	(repère)	O2	6280.00	0.001
O2	a	band	(repère)	O2	6283.00	0.000
O	I	O	I	6300.00	0.000	0.001
ZrO	ZrO	6350.00	0.000	0.001		
CN	CN	6355.00	0.000	0.001		
CN	CN	6358.00	0.000	0.001		
O	I	O	I	6364.00	0.000	0.001
ZrO	ZrO	6378.00	0.000	0.001		
CaH	6385	band	CaH	6385.00	0.001	0.001
Ca	I	6439.075	Ca	I	6439.07	0.000
ZrO	ZrO	6475.00	0.001	0.001		
ZrO	ZrO	6494.00	0.000	0.001		
Ba	II	6496.897	Ba	II	6496.90	0.001
CN	CN	6502.00	0.000	0.001		
H	alpha	H	alpha	6563.00	0.000	0.001
TiO	bands	6651–6852	TiO	6651.00	0.001	0.001
CN	CN	6656.00	0.000	0.001		
CH4	CH4	6680.00	0.000	0.001		
He	II	He	II	6683.00	0.000	0.001
He	I	He	I	6687.00	0.000	0.001

Attendus pour Type A	14 raies/ranges
Correspondances mesurées	11 / 14
	Taux de correspondance ≈ 79%
	Tolérance de correspondance ±0.75 Å

Correspondances	(attendu ↔ mesuré ; Δλ en Å)

nom_attendu	λ_ref [Å]	λ_to [Å]	λ_mes [Å]	Δλ [Å] id_raie
H alpha	6563.00	—	6563.00	0.000 H alpha
H beta	4861.00	—	4861.00	0.000 H beta
H gamma	4341.00	—	4341.00	0.000 H gamma
H delta	4102.00	—	4102.00	0.000 H delta

nom_attendu	λ_ref [Å]	λ_to [Å]	λ_mes [Å]	Δλ [Å] id_raie
H epsilon	3970.00	—	3970.00	0.000 H epsilon
K	3934.00	—	3934.00	0.000 K
H	3968.00	—	3968.47	0.470 Ca II H 3968
Hδ 4101	4101.74	—	4101.74	0.000 Hδ 4101
Hγ 4340	4340.47	—	4340.47	0.000 Hγ (Balmer)
Hβ 4861	4861.33	—	4861.33	0.000 Hβ 4861
Mg II 4481	4481.23	—	4481.23	0.000 Mg II 4481

Attendus non retrouvés (dans la tolérance)

nom_attendu	λ_ref [Å]	λ_to [Å]
Ca II K 3933	3933.66	—
Ca II H 3968	3968.47	—
Hα 6563	6562.80	—

Raies supplémentaires (non attendues) parmi les pics principaux

id_raie	Élément	λ0 [Å]
N II	N II	3995.00
He I	He I	4027.00
NH2	NH2	4056.00
N IV	N IV	4058.00
Sr II	Sr II	4077.00
Si IV 4089	Si IV	4088.86
He II + H de He II + H de	4100.00	
Si IV 4116	Si IV	4116.10
He I 4121	He I	4120.99
He II	He II	4200.00
CN 4215 band CN	4215.00	
Ca I	Ca I	4227.00
C II	C II	4267.00
CH G band 43 CH	4300.00	
He II + H ga He II + H ga	4340.00	
CN	CN	4380.00
He I 4388	He I	4387.93
He I	He I	4471.00
He I 4471	He I	4471.50
Fe II	III	M Fe II
He II	He II	4511.00
Ti II	Ti II	4534.00

id_raie	Élément	λ0 [Å]
He II 4541	He II	4541.59
Ti II/Fe II	Ti II/Fe II	4550.00
Si III 4552	Si III	4552.62
Ba II	Ba II	4554.00
Si III 4568	Si III	4567.84
Si III 4575	Si III	4574.76
Fe II/Cr II	Fe II/Cr II	4585.00
Swan - C2	Swan - C2	4600.00
N V	N V	4603.00
N V	N V	4619.00
N III 4634 (N III	4634.14	
N III 4640 (N III	4640.64	
N III	N III	4641.00
C III 4647–5 C III	4647.42	
C III/IV	C III/IV	4650.00
Fe I	Fe I	4667.00
He II	He II	4686.00
C2 Swan	C2 Swan	4737.00
SiC2	SiC2	4767.00
TiO	TiO	4775.00
SiC2	SiC2	4807.00
SiC2	SiC2	4832.00
CH4	CH4	4860.00
SiC2	SiC2	4867.00
Fe II	III	S Fe II
SiC2	SiC2	4909.00
He I	He I	4921.00
Fe I/II	Fe I/II	4919.00
Fe II	Fe II	4924.00
N V	N V	4933.00
TiO bands 49 TiO	4950.00	
SiC2	SiC2	4957.00
[O III]	[O III]	4959.00
SiC2	SiC2	4977.00
TiO	TiO	4990.00
Swan - C2	Swan - C2	5000.00
[O III]	[O III]	5007.00
Fe I/II	Fe I/II	5012.00

id_raie	Élément	λ0 [Å]
Fe II	Fe II	5018.00
Si II	Si II	5100.00
Mg	Mg	5167.00
C2 Swan	C2 Swan	5165.00
Fe II	Fe II	5169.00
Mg I b 5172	Mg I	5172.68
Mg	Mg	5173.00
Mg	Mg	5184.00
Mg I b 5183	Mg I	5183.60
TiO	TiO	5190.00
Fe II	Fe II	5198.00
Fe II	Fe II	5235.00
Fe I/Ca I	Fe I/Ca I	5270.00
Fe II	Fe II	5276.00
N III	N III	5314.00
Fe II	Fe II	5317.00
ZrO	ZrO	5404.00
He II	He II	5411.00
CH4	CH4	5430.00
TiO bands 54 TiO	5448.00	
TiO	TiO	5480.00
Si II	Si II	5500.00
Fe II	Fe II	5535.00
ZrO	ZrO	5545.00
O V	O V	5572.00
O I	O I	5577.00
ZrO	ZrO	5629.00
C2 Swan	C2 Swan	5636.00
TiO	TiO	5640.00
O VII	O VII	5670.00
N II	N II	5679.00
Na I 5682.63 Na I	5682.63	
Na I 5688.20 Na I	5688.20	
C III	C III	5696.00
ZrO	ZrO	5718.00
N II	N II	5755.00
CH4	CH4	5760.00
DIB	DIB	5780.00

id_raie	Élément	λ0 [Å]
DIB	DIB	5797.00
C IV	C IV	5801.00
He I	He I	5875.00
He I	He I	5876.00
NaI	NaI	5889.00
Na I D2 5889 Na I	5889.95	
NaI	NaI	5890.00
Na I D (5889 Na I	5891.58	
NaI	NaI	5896.00
TiO	TiO	5930.00
CH4	CH4	5960.00
Swan - C2	Swan - C2	6005.00
Swan - C2	Swan - C2	6059.00
O VIII	O VIII	6068.00
Swan - C2	Swan - C2	6122.00
Ba II 6141.7 Ba II	6141.71	
Si II	Si II	6150.00
ZrO	ZrO	6154.00
Na I 6154.22 Na I	6154.23	
TiO bands 61 TiO	6159.00	
Na I 6160.74 Na I	6160.75	
CH4	CH4	6190.00
CN	CN	6206.00
ZrO	ZrO	6229.00
TiO	TiO	6250.00
ZrO	ZrO	6261.00
CN	CN	6259.00
O2 a band 62 O2	6276.00	
O2 a band ~6 O2	6277.00	
O2 a band (r O2	6280.00	
O2 a band (r O2	6283.00	
O I	O I	6300.00
ZrO	ZrO	6350.00
CN	CN	6355.00
CN	CN	6358.00
O I	O I	6364.00
ZrO	ZrO	6378.00
CaH 6385 ban CaH	6385.00	

id_raie	Élément	λ0 [Å]
Ca I 6439.07 Ca I	6439.07	
ZrO	ZrO	6475.00
ZrO	ZrO	6494.00
Ba II 6496.8 Ba II	6496.90	
CN	CN	6502.00
TiO bands 66 TiO	6651.00	
CN	CN	6656.00
CH4	CH4	6680.00
He II	He II	6683.00
He I	He I	6687.00

Verdict	cohérent avec la classe de référence.

R (lambda/FWHM) — mediane=53980	min=2498	max=85994	n=177

Raies validées (OK=OUI) — Tableau complet

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
Hβ	4861	H	I	4861.330	4861.438	0.008	0.108	6.67	0.001	1.946	0.001	OUI
Hβ	(Balmer)	Hβ	(Balmer)	4861.330	4861.438	0.008	0.108	6.67	0.001	1.946	0.001	OUI
TiO	TiO	4990.000	4991.018	0.006	1.018	61.17	0.001	1.167	0.001	OUI		
Na	I	6160.747	Na	I	6160.747	6162.535	0.006	1.788	86.98	0.001	1.167	0.001
NaI	NaI	5896.000	5897.612	0.006	1.612	81.95	0.001	1.167	0.001	OUI		
ZrO	ZrO	6475.000	6476.984	0.006	1.984	91.87	0.001	1.167	0.001	OUI		
Ti	II/Fe	II	Ti	II/Fe	II	4550.000	4550.726	0.006	0.726	47.85	0.001	1.167
H	gamma	H	gamma	4341.000	4341.560	0.006	0.560	38.69	0.001	1.167	0.001	OUI
CH4	CH4	5960.000	5961.623	0.006	1.623	81.64	0.001	1.167	0.001	OUI		
[O	III]	[O	III]	5007.000	5007.994	0.006	0.994	59.54	0.001	1.167	0.001	OUI
Fe	II	Fe	II	5235.000	5236.161	0.006	1.161	66.51	0.001	1.167	0.001	OUI
Fe	II	Fe	II	5169.000	5170.125	0.006	1.125	65.27	0.001	1.167	0.001	OUI
Fe	I/Ca	I	Fe	I/Ca	I	5270.000	5271.204	0.006	1.204	68.49	0.001	1.167
ZrO	ZrO	5404.000	5405.301	0.006	1.301	72.16	0.001	1.167	0.001	OUI		
Fe	II	Fe	II	5317.000	5318.239	0.006	1.239	69.87	0.001	1.167	0.001	OUI
O	V	O	V	5572.000	5573.350	0.006	1.350	72.63	0.001	1.167	0.001	OUI
NaI	NaI	5889.000	5890.603	0.006	1.603	81.61	0.001	1.167	0.001	OUI		
Na	I	5682.633	Na	I	5682.633	5684.085	0.006	1.452	76.60	0.001	1.167	0.001
Na	I	D2	5889.95	Na	I	5889.950	5891.538	0.006	1.588	80.81	0.001	1.167
O2	a	band	(repère)	O2	6280.000	6281.835	0.006	1.835	87.62	0.001	1.167	0.001
NH2	NH2	4056.000	4056.391	0.006	0.391	28.87	0.001	1.167	0.001	OUI		
H	beta	H	beta	4861.000	4861.905	0.006	0.905	55.83	0.001	1.167	0.001	OUI

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
He	II	+	H	beta	He	II	+	H	beta	4861.000	4861.905	0.006
SiC2	SiC2	4957.000	4958.000	0.006	1.000	60.49	0.001	1.167	0.001	OUI		
Fe	II/Cr	II	Fe	II/Cr	II	4585.000	4585.769	0.006	0.769	50.27	0.001	1.167
C	III	4647–51	C	III	4647.420	4648.223	0.006	0.803	51.78	0.001	1.167	0.001
SiC2	SiC2	4767.000	4767.835	0.006	0.835	52.52	0.001	1.167	0.001	OUI		
Si	III	4575	Si	III	4574.760	4575.490	0.006	0.730	47.82	0.001	1.167	0.001
Mg	II	4481	Mg	II	4481.230	4481.887	0.006	0.657	43.94	0.001	1.167	0.001
Ti	II	Ti	II	4534.000	4534.684	0.006	0.684	45.25	0.001	1.167	0.001	OUI
CN	CN	6358.000	6359.864	0.006	1.864	87.88	0.001	1.167	0.001	OUI		
Fe	II	Fe	II	4924.000	4924.982	0.006	0.982	59.80	0.001	1.167	0.001	OUI
ZrO	ZrO	6261.000	6262.835	0.006	1.835	87.84	0.001	1.167	0.001	OUI		
Fe	II,III,	Si	II	Fe	II,III,	Si	II	4900.000	4900.997	0.006	0.997	61.02
Swan	-	C2	Swan	-	C2	4900.000	4900.997	0.006	0.997	61.02	0.001	1.090
Mg	Mg	5173.000	5174.175	0.006	1.175	68.08	0.001	1.090	0.001	OUI		
Swan	-	C2	Swan	-	C2	4600.000	4600.876	0.006	0.876	57.10	0.001	1.090
CH	G	band	4300	CH	4300.000	4300.599	0.006	0.599	41.78	0.001	1.090	0.001
Ba	II	Ba	II	4554.000	4554.776	0.006	0.776	51.06	0.001	1.090	0.001	OUI
N	V	N	V	4619.000	4619.877	0.006	0.877	56.93	0.001	1.090	0.001	OUI
G	band	G	band	4300.000	4300.599	0.006	0.599	41.78	0.001	1.090	0.001	OUI
Na	I	D1	5895.92	Na	I	5895.920	5897.612	0.006	1.692	86.02	0.001	1.090
Fe	II,III,	Mg	II	Fe	II,III,	Mg	II	4300.000	4300.599	0.006	0.599	41.78
Si	II	Si	II	6150.000	6151.788	0.006	1.788	87.16	0.001	1.090	0.001	OUI
Mg	I	b	5172	Mg	I	5172.680	5173.863	0.006	1.183	68.58	0.001	1.090
Ca	I	Ca	I	4227.000	4227.555	0.006	0.555	39.34	0.001	1.090	0.001	OUI
N	III	4634	(em)	N	III	4634.140	4634.984	0.006	0.844	54.63	0.001	1.090
CaH	6385	band	CaH	6385.000	6386.964	0.006	1.964	92.19	0.001	1.090	0.001	OUI
Ba	II	6496.897	Ba	II	6496.897	6498.944	0.006	2.047	94.48	0.001	1.090	0.001
Si	II	Si	II	5100.000	5101.130	0.006	1.130	66.43	0.001	1.090	0.001	OUI
TiO	TiO	5930.000	5931.720	0.006	1.720	86.95	0.001	1.090	0.001	OUI		
ZrO	ZrO	5718.000	5719.595	0.006	1.595	83.62	0.001	1.090	0.001	OUI		
H	epsilon	H	epsilon	3970.000	3970.419	0.006	0.419	31.65	0.001	1.090	0.001	OUI
Fe	II	Fe	II	5535.000	5536.438	0.006	1.438	77.90	0.001	1.090	0.001	OUI
Fe	II	Fe	II	5276.000	5277.278	0.006	1.278	72.62	0.001	1.090	0.001	OUI
H	delta	H	delta	4102.000	4102.491	0.006	0.491	35.90	0.001	1.090	0.001	OUI
Na	I	D	(5889–5896)	Na	I	5891.580	5893.251	0.006	1.671	85.02	0.001	1.090
ZrO	ZrO	5545.000	5546.406	0.006	1.406	76.02	0.001	1.090	0.001	OUI		
He	II	+	H	gamma	He	II	+	H	gamma	4340.000	4340.626	0.006
He	I	He	I	4471.000	4471.763	0.006	0.763	51.18	0.001	1.090	0.001	OUI

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
SiC2	SiC2	4867.000	4867.979	0.006	0.979	60.33	0.001	1.090	0.001	OUI		
[O	III]	[O	III]	4959.000	4960.025	0.006	1.025	61.96	0.001	1.090	0.001	OUI
O2	a	band	~6277	O2	6277.000	6278.876	0.006	1.876	89.61	0.001	1.090	0.001
NaI	NaI	5890.000	5891.693	0.006	1.693	86.19	0.001	1.090	0.001	OUI		
TiO	bands	6651–6852	TiO	6651.000	6653.132	0.006	2.132	96.11	0.001	1.090	0.001	OUI
O2	a	band	(repère)	O2	6277.000	6278.876	0.006	1.876	89.61	0.001	1.090	0.001
TiO	bands	6159–6395	TiO	6159.000	6160.821	0.006	1.821	88.65	0.001	1.090	0.001	OUI
Swan	-	C2	Swan	-	C2	6005.000	6010.170	0.005	5.170	258.13	0.001	1.012
He	II	He	II	6683.000	6688.597	0.004	5.597	251.08	0.001	0.856	0.000	OUI
N	II	N	II	5679.000	5683.884	0.004	4.884	257.82	0.001	0.856	0.000	OUI
ZrO	ZrO	6378.000	6383.336	0.004	5.336	250.82	0.001	0.778	0.000	OUI		
O	I	O	I	5577.000	5581.871	0.003	4.871	261.83	0.001	0.623	0.000	OUI
O	I	O	I	6300.000	6305.308	0.002	5.308	252.58	0.001	0.467	0.000	OUI
TiO	TiO	6250.000	6252.711	0.002	2.711	130.04	0.001	0.389	0.000	OUI		
Swan	-	C2	Swan	-	C2	6059.000	6063.280	0.000	4.280	211.75	0.001	0.078
C2	Swan	C2	Swan	5636.000	5640.898	0.000	4.898	260.55	0.001	0.078	0.000	OUI
Si	II	Si	II	5500.000	5504.621	0.000	4.621	251.89	0.001	0.078	0.000	OUI
N	III	N	III	5314.000	5317.727	0.000	3.727	210.24	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	5500.000	5504.621	0.000	4.621	251.89	0.001	0.078
Swan	-	C2	Swan	-	C2	6122.000	6124.377	0.000	2.377	116.40	0.001	0.078
Fe	I	Fe	I	4667.000	4668.158	0.000	1.158	74.40	0.001	0.078	0.000	OUI
He	II	He	II	4686.000	4689.606	0.000	3.606	230.69	0.001	0.078	0.000	OUI
Fe	II	Fe	II	5018.000	5019.987	0.000	1.987	118.70	0.001	0.078	0.000	OUI
Fe	I/II	Fe	I/II	5012.000	5015.737	0.000	3.737	223.50	0.001	0.078	0.000	OUI
He	I	He	I	4921.000	4922.335	0.000	1.335	81.30	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	5000.000	5001.609	0.000	1.609	96.47	0.001	0.078
SiC2	SiC2	4909.000	4910.809	0.000	1.809	110.50	0.001	0.078	0.000	OUI		
CN	CN	4380.000	4384.034	0.000	4.034	276.08	0.001	0.078	0.000	OUI		
Ca	II	H	3968	Ca	II	3968.470	3969.173	0.000	0.703	53.12	0.001	0.078
CN	CN	6355.000	6359.819	0.000	4.819	227.32	0.001	0.078	0.000	OUI		
O	I	O	I	6364.000	6369.319	0.000	5.319	250.57	0.001	0.078	0.000	OUI
He	I	4471	He	I	4471.500	4475.300	0.000	3.800	254.79	0.001	0.078	0.000
He	I	4388	He	I	4387.930	4391.977	0.000	4.047	276.47	0.001	0.078	0.000
Fe	II,III,	Mg	II	Fe	II,III,	Mg	II	4500.000	4501.822	0.000	1.822	121.39
Si	IV	4116	Si	IV	4116.100	4119.889	0.000	3.789	276.00	0.001	0.078	0.000
O2	a	band	(repère)	O2	6283.000	6285.885	0.000	2.885	137.65	0.001	0.078	0.000
O2	a	band	6276–6287	O2	6276.000	6278.721	0.000	2.721	129.95	0.001	0.078	0.000

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
CN	CN	6206.000	6211.238	0.000	5.238	253.01	0.001	0.078	0.000	OUI		
CN	CN	6259.000	6263.257	0.000	4.257	203.88	0.001	0.078	0.000	OUI		
CH4	CH4	6680.000	6685.638	0.000	5.638	253.02	0.001	0.078	0.000	OUI		
Si	IV	4089	Si	IV	4088.860	4089.564	0.000	0.704	51.64	0.001	0.078	0.000
ZrO	ZrO	6154.000	6159.219	0.000	5.219	254.23	0.001	0.078	0.000	OUI		
Ba	II	6141.713	Ba	II	6141.713	6146.915	0.000	5.202	253.91	0.001	0.078	0.000
C	IV	C	IV	5801.000	5802.763	0.000	1.763	91.10	0.001	0.078	0.000	OUI
TiO	TiO	5640.000	5641.566	0.000	1.566	83.26	0.001	0.078	0.000	OUI		
C	III	C	III	5696.000	5701.016	0.000	5.016	264.00	0.001	0.078	0.000	OUI
DIB	DIB	5797.000	5799.648	0.000	2.648	136.94	0.001	0.078	0.000	OUI		
Ca	I	4226	Ca	I	4226.730	4227.555	0.000	0.825	58.49	0.001	0.078	0.000
C	III/IV	C	III/IV	4650.000	4654.252	0.000	4.252	274.11	0.001	0.078	0.000	OUI
N	III	N	III	4641.000	4645.218	0.000	4.218	272.49	0.001	0.078	0.000	OUI
He	II	4541	He	II	4541.590	4545.074	0.000	3.484	229.99	0.001	0.078	0.000
He	II	He	II	4511.000	4515.171	0.000	4.171	277.20	0.001	0.078	0.000	OUI
Fe	II	Fe	II	5198.000	5199.405	0.000	1.405	81.06	0.001	0.078	0.000	OUI
TiO	TiO	5190.000	5194.688	0.000	4.688	270.79	0.001	0.078	0.000	OUI		
He	II	He	II	4200.000	4200.922	0.000	0.922	65.83	0.001	0.078	0.000	OUI
CN	4215	band	CN	4215.000	4218.320	0.000	3.320	236.17	0.001	0.078	0.000	OUI
Ca	I	6439.075	Ca	I	6439.075	6443.921	0.000	4.846	225.63	0.001	0.078	0.000
CN	CN	6502.000	6505.018	0.000	3.018	139.18	0.001	0.078	0.000	OUI		
He	II	He	II	4541.000	4545.074	0.000	4.074	268.97	0.001	0.078	0.000	OUI
H	H	3968.000	3969.173	0.000	1.173	88.63	0.001	0.078	0.000	OUI		
He	II	4686	He	II	4685.680	4689.606	0.000	3.926	251.18	0.001	0.078	0.000
CH4	CH4	4860.000	4861.282	0.000	1.282	79.10	0.001	0.078	0.000	OUI		
N	II	N	II	3995.000	3997.785	0.000	2.785	209.00	0.001	0.078	0.000	OUI
He	I	He	I	4027.000	4030.803	0.000	3.803	283.12	0.001	0.078	0.000	OUI
N	IV	N	IV	4058.000	4058.571	0.000	0.571	42.18	0.001	0.078	0.000	OUI
K	K	3934.000	3937.356	0.000	3.356	255.74	0.001	0.078	0.000	OUI		
ZrO	ZrO	6350.000	6354.523	0.000	4.523	213.55	0.001	0.078	0.000	OUI		
Ca	II	K	3933	Ca	II	3933.660	3937.356	0.000	3.696	281.67	0.001	0.078
Si	III	4568	Si	III	4567.840	4572.018	0.000	4.178	274.21	0.001	0.078	0.000
N	V	N	V	4603.000	4606.594	0.000	3.594	234.05	0.001	0.078	0.000	OUI
Hγ	(Balmer)	Hγ	(Balmer)	4340.470	4340.470	0.000	0.000	0.00	0.001	0.078	0.000	OUI
Ca	II	-	K	line	Ca	II	-	K	line	3934.000	3937.356	0.000

Hα 6563	
H I	0.001
6562.800	0.078
6562.800	0.000
0.000	OUI
0.000	

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
Hα (Balmer) Hα (Balmer) 6562.800 6562.800 0.000 0.000	0.001 0.078 0.000 OUI											
He	II	He	II	6560.000	6562.800	0.000	2.800	127.96	0.001	0.078	0.000	OUI
ZrO	ZrO	6494.000	6496.608	0.000	2.608	120.41	0.001	0.078	0.000	OUI		
H	alpha	H	alpha	6563.000	6562.800	0.000	-0.200	-9.14	0.001	0.078	0.000	OUI
CH4	CH4	6190.000	6192.126	0.000	2.126	102.97	0.001	0.078	0.000	OUI		
ZrO	ZrO	6229.000	6233.665	0.000	4.665	224.52	0.001	0.078	0.000	OUI		
O	VII	O	VII	5670.000	5674.383	0.000	4.383	231.77	0.001	0.078	0.000	OUI
Mg	Mg	5167.000	5168.879	0.000	1.879	109.04	0.001	0.078	0.000	OUI		
Mg	I	b	5167	Mg	I	5167.320	5168.879	0.000	1.559	90.47	0.001	0.078
N	V	N	V	4933.000	4934.327	0.000	1.327	80.64	0.001	0.078	0.000	OUI
TiO	bands	4950–5190	TiO	4950.000	4954.529	0.000	4.529	274.27	0.001	0.078	0.000	OUI
Hγ	4340	H	I	4340.470	4340.470	0.000	0.000	0.00	0.001	0.078	0.000	OUI
Fe	I/II	Fe	I/II	4919.000	4923.380	0.000	4.380	266.92	0.001	0.078	0.000	OUI
N	III	4640	(em)	N	III	4640.640	4644.907	0.000	4.267	275.65	0.001	0.078
N	III	N	III	4634.000	4634.984	0.000	0.984	63.69	0.001	0.078	0.000	OUI
C2	Swan	C2	Swan	4737.000	4738.711	0.000	1.711	108.27	0.001	0.078	0.000	OUI
SiC2	SiC2	4807.000	4808.017	0.000	1.017	63.45	0.001	0.078	0.000	OUI		
SiC2	SiC2	4832.000	4836.318	0.000	4.318	267.90	0.001	0.078	0.000	OUI		
Si	III	4552	Si	III	4552.620	4554.464	0.000	1.844	121.43	0.001	0.078	0.000
Mg	Mg	5184.000	5186.011	0.000	2.011	116.32	0.001	0.078	0.000	OUI		
C	II	C	II	4267.000	4267.737	0.000	0.737	51.78	0.001	0.078	0.000	OUI
Mg	I	b	5183	Mg	I	5183.600	5187.212	0.000	3.612	208.91	0.001	0.078
He	II	He	II	5411.000	5413.088	0.000	2.088	115.69	0.001	0.078	0.000	OUI
TiO	TiO	5480.000	5481.772	0.000	1.772	96.92	0.001	0.078	0.000	OUI		
Na	I	5688.205	Na	I	5688.205	5690.159	0.000	1.954	102.98	0.001	0.078	0.000
He	II	+	H	delta	He	II	+	H	delta	4100.000	4103.069	0.000
DIB	DIB	5780.000	5784.340	0.000	4.340	225.09	0.001	0.078	0.000	OUI		
TiO	bands	5448–5670	TiO	5448.000	5452.758	0.000	4.758	261.82	0.001	0.078	0.000	OUI
CH4	CH4	5430.000	5433.757	0.000	3.757	207.42	0.001	0.078	0.000	OUI		
He	I	He	I	5876.000	5880.902	0.000	4.902	250.09	0.001	0.078	0.000	OUI
O	VIII	O	VIII	6068.000	6073.247	0.000	5.247	259.24	0.001	0.078	0.000	OUI
Na	I	6154.226	Na	I	6154.226	6159.530	0.000	5.304	258.38	0.001	0.078	0.000
CN	CN	6656.000	6661.186	0.000	5.186	233.58	0.001	0.078	0.000	OUI		

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
He	I	He	I	6687.000	6692.335	0.000	5.335	239.18	0.001	0.078	0.000	OUI
Sr	II	Sr	II	4077.000	4077.883	0.000	0.883	64.96	0.001	0.078	0.000	OUI
Hδ	4101	H	I	4101.740	4101.868	0.000	0.128	9.37	0.001	0.078	0.000	OUI
TiO	TiO	4775.000	4779.315	0.000	4.315	270.92	0.001	0.078	0.000	OUI		
C2	Swan	C2	Swan	5165.000	5169.613	0.000	4.613	267.75	0.001	0.078	0.000	OUI
SiC2	SiC2	4977.000	4981.473	0.000	4.473	269.41	0.001	0.078	0.000	OUI		
CH4	CH4	5760.000	5765.027	0.000	5.027	261.66	0.001	0.078	0.000	OUI		
He	I	4121	He	I	4120.990	4123.939	0.000	2.949	214.52	0.001	0.078	0.000
He	I	He	I	5875.000	5879.812	0.000	4.812	245.53	0.001	0.078	0.000	OUI
N	II	N	II	5755.000	5759.576	0.000	4.576	238.39	0.001	0.078	0.000	OUI
ZrO	ZrO	5629.000	5633.890	0.000	4.890	260.42	0.001	0.078	0.000	OUI		

Total OK	177