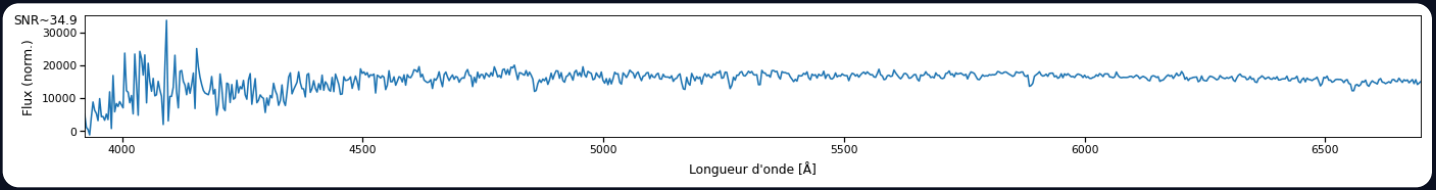
Rapport - Analyse Spectrométrique HD31151 - 16-10-2025 - G8III_20251016T224055.dat

RV (CCF) : -30.4 km/s (brute=+206.8, lin=-32.9, quad=-27.8, mode=linear, qual=OK)



Session

	=== Session ===
Fichier .DAT	HD31151 - 16-10-2025 - G8III_20251016T224055.dat
Fichier .FITS	HD31151 - 16-10-2025 - G8III_20251016T224055.fit

Objet etudié	HD31151
Date de prise de vue	2025-10-16T22:35:44.840

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	G8 III
- Lettre	G
- Sous-classe	8
- Luminosité	III

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	34.9
Teff	5800 K
v sin i	0.0 km/s
Hα	ligne très faible (EW ≈ 0.00 Å)
RV (CCF) utilisée	-30.4 km/s (brute=+206.8, lin=-32.9, quad=-27.8, mode=linear, qual=OK)
z (CCF) utilisé	-0.000101 (brute=+0.000690, lin=-0.000110, quad=-0.000093)
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 G

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	0.000	0.001
N	II	N	II	3995.00	0.001	0.001
He	I	He	I	4027.00	0.000	0.001
NH2	NH2	4056.00	0.000	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	0.001
He	II	+	H	delta	He	II
H	delta	H	delta	4102.00	0.000	0.001
Hδ	4101	H	I	4101.74	0.000	0.001
Si	IV	4116	Si	IV	4116.10	0.000
He	I	4121	He	I	4120.99	0.001
He	II	He	II	4200.00	0.001	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
CN	4215	band	CN	4215.00	0.001	0.001
Ca	I	4226	Ca	I	4226.73	0.000
Ca	I	Ca	I	4227.00	0.000	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	0.001	0.001
He	II	+	H	gamma	He	II
H	gamma	H	gamma	4341.00	0.000	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	0.000	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	0.000	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	0.000
Fe	II/Cr	II	Fe	II/Cr	II	4585.00
Swan	-	C2	Swan	-	C2	4600.00
N	V	N	V	4603.00	0.001	0.001
N	V	N	V	4619.00	0.000	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	0.001	0.001
Fe	I	Fe	I	4667.00	0.000	0.001
He	II	He	II	4686.00	0.001	0.001
C2	Swan	C2	Swan	4737.00	0.000	0.001
SiC2	SiC2	4767.00	0.001	0.001		
TiO	TiO	4775.00	0.001	0.001		
SiC2	SiC2	4807.00	0.001	0.001		
SiC2	SiC2	4832.00	0.000	0.001		

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
CH4	CH4	4860.00	0.001	0.001		
Hβ	4861	H	I	4861.33	0.001	0.001
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		
Fe	I/II	Fe	I/II	4919.00	0.000	0.001
He	I	He	I	4921.00	0.001	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	0.000	0.001
Fe	I/II	Fe	I/II	5012.00	0.000	0.001
Fe	II	Fe	II	5018.00	0.001	0.001
Si	II	Si	II	5100.00	0.001	0.001
Mg	I	b	5167	Mg	I	5167.32
C2	Swan	C2	Swan	5165.00	0.000	0.001
Fe	II	Fe	II	5169.00	0.000	0.001
Mg	I	b	5172	Mg	I	5172.68
Mg	Mg	5173.00	0.001	0.001		
Mg	I	b	5183	Mg	I	5183.60
Mg	Mg	5184.00	0.001	0.001		
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	0.000	0.001
ZrO	ZrO	5404.00	0.001	0.001		
He	II	He	II	5411.00	0.001	0.001
CH4	CH4	5430.00	0.000	0.001		
TiO	bands	5448–5670	TiO	5448.00	0.001	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
TiO	TiO	5480.00	0.000	0.001		
Si	II	Si	II	5500.00	0.000	0.001
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	0.001	0.001		
O	VII	O	VII	5670.00	0.001	0.001
N	II	N	II	5679.00	0.000	0.001
Na	I	5682.633	Na	I	5682.63	0.000
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	0.001	0.001		
DIB	DIB	5780.00	0.000	0.001		
DIB	DIB	5797.00	0.001	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		
NaI	NaI	5890.00	0.001	0.001		
Na	I	D	(5889–5896)	Na	I	5891.58
Na	I	D1	5895.92	Na	I	5895.92
NaI	NaI	5896.00	0.001	0.001		
TiO	TiO	5930.00	0.000	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	0.001	0.001
Swan	-	C2	Swan	-	C2	6122.00
Ba	II	6141.713	Ba	II	6141.71	0.000
Si	II	Si	II	6150.00	0.000	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	0.000	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
Na	I	6160.747	Na	I	6160.75	0.001
CH4	CH4	6190.00	0.001	0.001		
CN	CN	6206.00	0.000	0.001		
ZrO	ZrO	6229.00	0.001	0.001		
TiO	TiO	6250.00	0.000	0.001		
CN	CN	6259.00	0.001	0.001		
ZrO	ZrO	6261.00	0.000	0.001		
O2	a	band	~6277	O2	6277.00	0.000
O2	a	band	6276–6287	O2	6276.00	0.000
O2	a	band	(repère)	O2	6280.00	0.001
O2	a	band	(repère)	O2	6283.00	0.001
O	I	O	I	6300.00	0.001	0.001
ZrO	ZrO	6350.00	0.000	0.001		
CN	CN	6358.00	0.001	0.001		
CN	CN	6355.00	0.000	0.001		
O	I	O	I	6364.00	0.001	0.001
ZrO	ZrO	6378.00	0.000	0.001		
CaH	6385	band	CaH	6385.00	0.000	0.001
Ca	I	6439.075	Ca	I	6439.07	0.001
ZrO	ZrO	6475.00	0.000	0.001		
ZrO	ZrO	6494.00	0.001	0.001		
Ba	II	6496.897	Ba	II	6496.90	0.001
CN	CN	6502.00	0.000	0.001		
Hα	6563	H	I	6562.80	0.002	0.001
H	alpha	H	alpha	6563.00	0.002	0.001
TiO	bands	6651–6852	TiO	6651.00	0.000	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 G	22 raies/ranges
Correspondances mesurées	19 / 22
	Taux de correspondance ≈ 86%
	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
K	3934.00	—	3934.00	0.000 K

nom_attendu	λ_ref [Å]	λ_to [Å]	λ_mes [Å]	Δλ [Å] id_raie
H	3968.00	—	3968.47	0.470 Ca II H 3968
Ca I	4227.00	—	4227.00	0.000 Ca I
G band	4300.00	4313.00	4300.00	0.000 CH G band 43
Mg	5167.00	—	5167.32	0.320 Mg I b 5167
Mg	5173.00	—	5173.00	0.000 Mg
Mg	5184.00	—	5184.00	0.000 Mg
Sr II	4077.00	—	4077.00	0.000 Sr II
Ba II	4554.00	—	4554.00	0.000 Ba II
CN 4215 band	4215.00	4225.00	4215.00	0.000 CN 4215 band
Hβ 4861	4861.33	—	4861.33	0.000 Hβ 4861
Mg I b 5172	5172.68	—	5172.68	0.000 Mg I b 5172
Mg I b 5183	5183.60	—	5183.60	0.000 Mg I b 5183
Ca I 4226	4226.73	—	4226.73	0.000 Ca I 4226
Na I D (5889–5896)	5891.58	5897.56	5891.58	0.000 Na I D (5889
Na I D2 5889.95	5889.95	—	5890.00	0.050 NaI
Na I D1 5895.92	5895.92	—	5895.92	0.000 Na I D1 5895
Hγ (Balmer)	4340.47	—	4340.47	0.000 Hγ (Balmer)
Hα (Balmer)	6562.80	—	6562.80	0.000 Hα 6563

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	—
Mg I b 5167	5167.32	—

Raies supplémentaires (non attendues) parmi les pics principaux

id_raie	Élément	λ0 [Å]
H epsilon	H epsilon	3970.00
N II	N II	3995.00
He I	He I	4027.00
NH2	NH2	4056.00
N IV	N IV	4058.00
Si IV 4089	Si IV	4088.86
He II + H de He II + H de	4100.00	
H delta	H delta	4102.00
Hδ 4101	H I	4101.74
Si IV 4116	Si IV	4116.10
He I 4121	He I	4120.99

id_raie	Élément	λ0 [Å]
He II	He II	4200.00
C II	C II	4267.00
He II + H ga He II + H ga	4340.00	
H gamma	H gamma	4341.00
CN	CN	4380.00
He I 4388	He I	4387.93
He I	He I	4471.00
He I 4471	He I	4471.50
Mg II 4481	Mg II	4481.23
Fe II	III	M Fe II
He II	He II	4511.00
Ti II	Ti II	4534.00
He II 4541	He II	4541.59
Ti II/Fe II	Ti II/Fe II	4550.00
Si III 4552	Si III	4552.62
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
H beta	H beta	4861.00
SiC2	SiC2	4867.00
Fe II	III	S Fe II
SiC2	SiC2	4909.00

id_raie	Élément	λ0 [Å]
Fe I/II	Fe I/II	4919.00
He I	He I	4921.00
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
Fe II	Fe II	5018.00
Si II	Si II	5100.00
C2 Swan	C2 Swan	5165.00
Fe II	Fe II	5169.00
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

id_raie	Élément	λ0 [Å]
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
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
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
CN	CN	6259.00
ZrO	ZrO	6261.00
O2 a band ~6 O2	6277.00	
O2 a band 62 O2	6276.00	
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	6358.00

id_raie	Élément	λ0 [Å]
CN	CN	6355.00
O I	O I	6364.00
ZrO	ZrO	6378.00
CaH 6385 ban CaH	6385.00	
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
H alpha	H alpha	6563.00
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=51001 **min=1653** **max=85965** **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
H	alpha	H	alpha	6563.000	6562.956	0.020	-0.044	-2.02	0.001	3.969	0.002	OUI
Hα	6563	H	I	6562.800	6562.800	0.020	-0.000	-0.00	0.001	3.891	0.002	OUI
Hα	(Balmer)	Hα	(Balmer)	6562.800	6562.800	0.020	-0.000	-0.00	0.001	3.891	0.002	OUI
Hβ	4861	H	I	4861.330	4861.740	0.014	0.410	25.28	0.001	1.946	0.001	OUI
Hβ	(Balmer)	Hβ	(Balmer)	4861.330	4861.740	0.014	0.410	25.28	0.001	1.946	0.001	OUI
Hγ	(Balmer)	Hγ	(Balmer)	4340.470	4340.470	0.014	-0.000	-0.00	0.001	1.868	0.001	OUI
Hγ	4340	H	I	4340.470	4340.470	0.014	-0.000	-0.00	0.001	1.868	0.001	OUI
Mg	I	b	5167	Mg	I	5167.320	5168.800	0.011	1.480	85.87	0.001	1.167
Mg	Mg	5184.000	5185.470	0.011	1.470	84.98	0.001	1.167	0.001	OUI		
N	V	N	V	4603.000	4603.909	0.011	0.909	59.22	0.001	1.167	0.001	OUI
ZrO	ZrO	6229.000	6231.437	0.011	2.437	117.28	0.001	1.167	0.001	OUI		
O	I	O	I	6300.000	6302.477	0.011	2.477	117.85	0.001	1.167	0.001	OUI
C	III/IV	C	III/IV	4650.000	4650.957	0.011	0.957	61.73	0.001	1.167	0.001	OUI
Na	I	D	(5889–5896)	Na	I	5891.580	5893.686	0.011	2.106	107.18	0.001	1.167
O2	a	band	(repère)	O2	6283.000	6285.496	0.011	2.496	119.08	0.001	1.167	0.001
Na	I	D1	5895.92	Na	I	5895.920	5898.048	0.011	2.128	108.22	0.001	1.167

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
He	II	He	II	4200.000	4200.571	0.011	0.571	40.79	0.001	1.167	0.001	OUI
NaI	NaI	5890.000	5892.128	0.011	2.128	108.33	0.001	1.167	0.001	OUI		
TiO	bands	5448–5670	TiO	5448.000	5449.688	0.011	1.688	92.87	0.001	1.167	0.001	OUI
O	V	O	V	5572.000	5573.851	0.011	1.851	99.62	0.001	1.167	0.001	OUI
ZrO	ZrO	5718.000	5719.982	0.011	1.982	103.89	0.001	1.167	0.001	OUI		
Ba	II	6496.897	Ba	II	6496.897	6499.550	0.011	2.653	122.40	0.001	1.167	0.001
Mg	II	4481	Mg	II	4481.230	4482.082	0.011	0.852	57.01	0.001	1.167	0.001
SiC2	SiC2	4767.000	4768.111	0.011	1.111	69.86	0.001	1.167	0.001	OUI		
Fe	II	Fe	II	5535.000	5536.774	0.011	1.774	96.07	0.001	1.167	0.001	OUI
N	II	N	II	3995.000	3995.397	0.011	0.397	29.82	0.001	1.167	0.001	OUI
Si	IV	4089	Si	IV	4088.860	4089.338	0.011	0.478	35.06	0.001	1.167	0.001
SiC2	SiC2	4807.000	4808.149	0.011	1.149	71.63	0.001	1.167	0.001	OUI		
Fe	II	Fe	II	5276.000	5277.541	0.011	1.541	87.55	0.001	1.167	0.001	OUI
Mg	Mg	5173.000	5174.564	0.010	1.564	90.65	0.001	1.090	0.001	OUI		
O	VIII	O	VIII	6068.000	6070.351	0.010	2.351	116.15	0.001	1.090	0.001	OUI
Fe	II,III,	Si	II	Fe	II,III,	Si	II	4900.000	4901.310	0.010	1.310	80.17
Swan	-	C2	Swan	-	C2	4900.000	4901.310	0.010	1.310	80.17	0.001	1.090
TiO	TiO	4990.000	4991.356	0.010	1.356	81.49	0.001	1.090	0.001	OUI		
Ba	II	Ba	II	4554.000	4554.991	0.010	0.991	65.27	0.001	1.090	0.001	OUI
Ca	I	6439.075	Ca	I	6439.075	6441.752	0.010	2.677	124.63	0.001	1.090	0.001
CH	G	band	4300	CH	4300.000	4300.744	0.010	0.744	51.86	0.001	1.090	0.001
G	band	G	band	4300.000	4300.744	0.010	0.744	51.86	0.001	1.090	0.001	OUI
Na	I	6160.747	Na	I	6160.747	6163.201	0.010	2.454	119.43	0.001	1.090	0.001
CN	4215	band	CN	4215.000	4215.683	0.010	0.683	48.58	0.001	1.090	0.001	OUI
CN	CN	6259.000	6261.504	0.010	2.504	119.94	0.001	1.090	0.001	OUI		
ZrO	ZrO	6494.000	6496.745	0.010	2.745	126.74	0.001	1.090	0.001	OUI		
Fe	II,III,	Mg	II	Fe	II,III,	Mg	II	4300.000	4300.744	0.010	0.744	51.86
O	VII	O	VII	5670.000	5671.999	0.010	1.999	105.67	0.001	1.090	0.001	OUI
CH4	CH4	5760.000	5762.045	0.010	2.045	106.41	0.001	1.090	0.001	OUI		
NaI	NaI	5896.000	5898.204	0.010	2.204	112.07	0.001	1.090	0.001	OUI		
DIB	DIB	5797.000	5799.122	0.010	2.122	109.76	0.001	1.090	0.001	OUI		
Na	I	D2	5889.95	Na	I	5889.950	5892.128	0.010	2.178	110.88	0.001	1.090
TiO	TiO	5640.000	5641.931	0.010	1.931	102.66	0.001	1.090	0.001	OUI		
He	II	He	II	5411.000	5412.766	0.010	1.766	97.82	0.001	1.090	0.001	OUI
Fe	II	Fe	II	5018.000	5019.398	0.010	1.398	83.55	0.001	1.090	0.001	OUI
Si	II	Si	II	5100.000	5101.499	0.010	1.499	88.13	0.001	1.090	0.001	OUI
C	III	4647–51	C	III	4647.420	4648.465	0.010	1.045	67.40	0.001	1.090	0.001
He	I	He	I	4921.000	4922.342	0.010	1.342	81.75	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
Fe	II/Cr	II	Fe	II/Cr	II	4585.000	4585.993	0.010	0.993	64.96	0.001	1.090
TiO	TiO	4775.000	4776.212	0.010	1.212	76.08	0.001	1.090	0.001	OUI		
CH4	CH4	4860.000	4861.273	0.010	1.273	78.50	0.001	1.090	0.001	OUI		
He	II	He	II	6560.000	6562.800	0.010	2.800	127.96	0.001	1.090	0.001	OUI
O	I	O	I	6364.000	6366.662	0.010	2.662	125.38	0.001	1.090	0.001	OUI
H	beta	H	beta	4861.000	4862.207	0.010	1.207	74.46	0.001	1.090	0.001	OUI
He	II	+	H	beta	He	II	+	H	beta	4861.000	4862.207	0.010
SiC2	SiC2	4867.000	4868.283	0.010	1.283	79.04	0.001	1.090	0.001	OUI		
SiC2	SiC2	4957.000	4958.329	0.010	1.329	80.39	0.001	1.090	0.001	OUI		
Fe	II	Fe	II	4924.000	4925.302	0.010	1.302	79.26	0.001	1.090	0.001	OUI
He	II	+	H	gamma	He	II	+	H	gamma	4340.000	4340.782	0.010
ZrO	ZrO	5404.000	5405.755	0.010	1.755	97.37	0.001	1.090	0.001	OUI		
ZrO	ZrO	5545.000	5546.900	0.010	1.900	102.72	0.001	1.090	0.001	OUI		
Fe	II	Fe	II	5235.000	5236.568	0.010	1.568	89.81	0.001	1.090	0.001	OUI
Fe	I/Ca	I	Fe	I/Ca	I	5270.000	5271.621	0.010	1.621	92.20	0.001	1.090
Mg	I	b	5172	Mg	I	5172.680	5174.253	0.010	1.573	91.15	0.001	1.090
Mg	I	b	5183	Mg	I	5183.600	5185.158	0.010	1.558	90.10	0.001	1.090
He	I	4121	He	I	4120.990	4121.586	0.010	0.596	43.39	0.001	1.090	0.001
Ca	I	Ca	I	4227.000	4227.679	0.010	0.679	48.14	0.001	1.090	0.001	OUI
CH4	CH4	6190.000	6192.490	0.010	2.490	120.57	0.001	1.090	0.001	OUI		
CH4	CH4	5960.000	5962.233	0.010	2.233	112.34	0.001	1.090	0.001	OUI		
CN	CN	6358.000	6360.586	0.010	2.586	121.93	0.001	1.090	0.001	OUI		
O2	a	band	(repère)	O2	6280.000	6282.536	0.010	2.536	121.04	0.001	1.090	0.001
He	II	+	H	delta	He	II	+	H	delta	4100.000	4100.555	0.010
NaI	NaI	5889.000	5891.194	0.010	2.194	111.67	0.001	1.090	0.001	OUI		
He	II	He	II	4686.000	4687.101	0.010	1.101	70.41	0.001	1.090	0.001	OUI
[O	III]	[O	III]	4959.000	4960.354	0.010	1.354	81.88	0.001	1.090	0.001	OUI
N	III	4640	(em)	N	III	4640.640	4645.148	0.009	4.508	291.23	0.001	0.934
TiO	bands	4950–5190	TiO	4950.000	4954.701	0.005	4.701	284.70	0.001	0.545	0.000	OUI
N	II	N	II	5755.000	5760.441	0.003	5.441	283.46	0.001	0.311	0.000	OUI
ZrO	ZrO	6154.000	6159.884	0.001	5.884	286.66	0.001	0.078	0.000	OUI		
TiO	bands	6159–6395	TiO	6159.000	6161.488	0.001	2.488	121.08	0.001	0.078	0.000	OUI
He	I	He	I	6687.000	6690.080	0.001	3.080	138.07	0.001	0.078	0.000	OUI
He	I	4471	He	I	4471.500	4475.494	0.001	3.994	267.77	0.001	0.078	0.000
Fe	II	Fe	II	5169.000	5173.117	0.001	4.117	238.78	0.001	0.078	0.000	OUI
CN	CN	4380.000	4384.201	0.001	4.201	287.57	0.001	0.078	0.000	OUI		
N	III	4634	(em)	N	III	4634.140	4635.846	0.001	1.706	110.36	0.001	0.078

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
He	II	4686	He	II	4685.680	4687.101	0.001	1.421	90.89	0.001	0.078	0.000
N	III	N	III	4634.000	4635.846	0.001	1.846	119.42	0.001	0.078	0.000	OUI
K	K	3934.000	3934.951	0.001	0.951	72.49	0.001	0.078	0.000	OUI		
CN	CN	6656.000	6662.304	0.001	6.304	283.94	0.001	0.078	0.000	OUI		
Ca	II	K	3933	Ca	II	3933.660	3934.951	0.001	1.291	98.41	0.001	0.078
O2	a	band	~6277	O2	6277.000	6279.887	0.001	2.887	137.89	0.001	0.078	0.000
O2	a	band	6276–6287	O2	6276.000	6281.088	0.001	5.088	243.06	0.001	0.078	0.000
TiO	TiO	6250.000	6256.006	0.001	6.006	288.10	0.001	0.078	0.000	OUI		
CN	CN	6355.000	6361.008	0.001	6.008	283.42	0.001	0.078	0.000	OUI		
C	IV	C	IV	5801.000	5803.796	0.001	2.796	144.50	0.001	0.078	0.000	OUI
TiO	TiO	5930.000	5935.393	0.001	5.393	272.62	0.001	0.078	0.000	OUI		
Si	II	Si	II	6150.000	6153.231	0.001	3.231	157.49	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	6059.000	6064.697	0.001	5.697	281.90	0.001	0.078
Swan	-	C2	Swan	-	C2	6005.000	6010.639	0.001	5.639	281.50	0.001	0.078
Ca	II	-	K	line	Ca	II	-	K	line	3934.000	3934.951	0.001
CaH	6385	band	CaH	6385.000	6391.075	0.001	6.075	285.25	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	4600.000	4601.105	0.001	1.105	72.01	0.001	0.078
N	III	N	III	4641.000	4645.460	0.001	4.460	288.08	0.001	0.078	0.000	OUI
Si	III	4575	Si	III	4574.760	4579.094	0.001	4.334	283.98	0.001	0.078	0.000
Fe	I/II	Fe	I/II	4919.000	4920.784	0.001	1.784	108.73	0.001	0.078	0.000	OUI
SiC2	SiC2	4832.000	4833.698	0.001	1.698	105.35	0.001	0.078	0.000	OUI		
C2	Swan	C2	Swan	4737.000	4738.667	0.001	1.667	105.48	0.001	0.078	0.000	OUI
CN	CN	6502.000	6505.002	0.001	3.002	138.43	0.001	0.078	0.000	OUI		
SiC2	SiC2	4909.000	4911.125	0.001	2.125	129.78	0.001	0.078	0.000	OUI		
H	gamma	H	gamma	4341.000	4342.495	0.001	1.495	103.26	0.001	0.078	0.000	OUI
He	I	He	I	5876.000	5881.645	0.001	5.645	288.02	0.001	0.078	0.000	OUI
Hδ	4101	H	I	4101.740	4106.586	0.001	4.846	354.15	0.001	0.078	0.000	OUI
NH2	NH2	4056.000	4060.005	0.001	4.005	295.99	0.001	0.078	0.000	OUI		
Sr	II	Sr	II	4077.000	4077.654	0.001	0.654	48.09	0.001	0.078	0.000	OUI
CN	CN	6206.000	6211.918	0.001	5.918	285.88	0.001	0.078	0.000	OUI		
O2	a	band	(repère)	O2	6277.000	6279.887	0.001	2.887	137.89	0.001	0.078	0.000
TiO	TiO	5190.000	5192.324	0.001	2.324	134.26	0.001	0.078	0.000	OUI		
Fe	II,III,	Mg	II	Fe	II,III,	Mg	II	4500.000	4501.556	0.001	1.556	103.65
Ti	II/Fe	II	Ti	II/Fe	II	4550.000	4551.564	0.001	1.564	103.06	0.001	0.078
Fe	I/II	Fe	I/II	5012.000	5013.478	0.001	1.478	88.43	0.001	0.078	0.000	OUI
Na	I	5688.205	Na	I	5688.205	5691.005	0.001	2.800	147.56	0.001	0.078	0.000
N	III	N	III	5314.000	5318.001	0.001	4.001	225.70	0.001	0.078	0.000	OUI
C2	Swan	C2	Swan	5636.000	5641.419	0.001	5.419	288.23	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	II	4541	He	II	4541.590	4542.840	0.001	1.250	82.51	0.001	0.078	0.000
He	II	He	II	4541.000	4542.840	0.001	1.840	121.47	0.001	0.078	0.000	OUI
Ca	II	H	3968	Ca	II	3968.470	3969.069	0.001	0.599	45.25	0.001	0.078
H	epsilon	H	epsilon	3970.000	3973.386	0.001	3.386	255.69	0.001	0.078	0.000	OUI
H	H	3968.000	3969.069	0.001	1.069	80.77	0.001	0.078	0.000	OUI		
He	I	He	I	4027.000	4030.093	0.001	3.093	230.27	0.001	0.078	0.000	OUI
N	IV	N	IV	4058.000	4060.939	0.001	2.939	217.15	0.001	0.078	0.000	OUI
N	V	N	V	4933.000	4937.564	0.001	4.564	277.37	0.001	0.078	0.000	OUI
Fe	I	Fe	I	4667.000	4668.250	0.001	1.250	80.30	0.001	0.078	0.000	OUI
N	V	N	V	4619.000	4623.493	0.001	4.493	291.64	0.001	0.078	0.000	OUI
ZrO	ZrO	6378.000	6382.974	0.001	4.974	233.81	0.001	0.078	0.000	OUI		
ZrO	ZrO	6475.000	6478.518	0.001	3.518	162.89	0.001	0.078	0.000	OUI		
Si	III	4568	Si	III	4567.840	4572.239	0.001	4.399	288.70	0.001	0.078	0.000
C	III	C	III	5696.000	5701.397	0.001	5.397	284.08	0.001	0.078	0.000	OUI
Ti	II	Ti	II	4534.000	4535.206	0.001	1.206	79.76	0.001	0.078	0.000	OUI
He	II	He	II	4511.000	4515.376	0.001	4.376	290.81	0.001	0.078	0.000	OUI
He	I	He	I	4471.000	4475.338	0.001	4.338	290.88	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	5000.000	5004.709	0.001	4.709	282.35	0.001	0.078
He	I	4388	He	I	4387.930	4391.368	0.001	3.438	234.88	0.001	0.078	0.000
CH4	CH4	5430.000	5432.551	0.001	2.551	140.83	0.001	0.078	0.000	OUI		
Si	II	Si	II	5500.000	5505.259	0.001	5.259	286.66	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	5500.000	5505.259	0.001	5.259	286.66	0.001	0.078
Fe	II	Fe	II	5198.000	5202.405	0.001	4.405	254.07	0.001	0.078	0.000	OUI
Fe	II	Fe	II	5317.000	5319.448	0.001	2.448	138.03	0.001	0.078	0.000	OUI
N	II	N	II	5679.000	5684.416	0.001	5.416	285.93	0.001	0.078	0.000	OUI
Na	I	5682.633	Na	I	5682.633	5686.909	0.001	4.276	225.59	0.001	0.078	0.000
Ba	II	6141.713	Ba	II	6141.713	6147.421	0.001	5.708	278.64	0.001	0.078	0.000
Na	I	6154.226	Na	I	6154.226	6160.040	0.001	5.814	283.23	0.001	0.078	0.000
Swan	-	C2	Swan	-	C2	6122.000	6126.857	0.001	4.857	237.85	0.001	0.078
He	I	He	I	5875.000	5880.555	0.001	5.555	283.45	0.001	0.078	0.000	OUI
Ca	I	4226	Ca	I	4226.730	4227.523	0.001	0.793	56.24	0.001	0.078	0.000
H	delta	H	delta	4102.000	4105.962	0.001	3.962	289.59	0.001	0.078	0.000	OUI
Si	IV	4116	Si	IV	4116.100	4120.139	0.001	4.039	294.19	0.001	0.078	0.000
O	I	O	I	5577.000	5582.375	0.001	5.375	288.91	0.001	0.078	0.000	OUI
DIB	DIB	5780.000	5784.589	0.001	4.589	238.01	0.001	0.078	0.000	OUI		
C	II	C	II	4267.000	4271.099	0.001	4.099	287.97	0.001	0.078	0.000	OUI
ZrO	ZrO	6350.000	6356.023	0.001	6.023	284.34	0.001	0.078	0.000	OUI		
TiO	bands	6651–6852	TiO	6651.000	6656.228	0.001	5.228	235.66	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
CH4	CH4	6680.000	6683.225	0.001	3.225	144.73	0.001	0.078	0.000	OUI		
ZrO	ZrO	6261.000	6266.911	0.001	5.911	283.06	0.001	0.078	0.000	OUI		
He	II	He	II	6683.000	6689.411	0.001	6.411	287.60	0.001	0.078	0.000	OUI
Si	III	4552	Si	III	4552.620	4554.524	0.001	1.904	125.38	0.001	0.078	0.000
C2	Swan	C2	Swan	5165.000	5170.001	0.001	5.001	290.28	0.001	0.078	0.000	OUI
TiO	TiO	5480.000	5482.871	0.001	2.871	157.05	0.001	0.078	0.000	OUI		
Mg	Mg	5167.000	5168.800	0.001	1.800	104.44	0.001	0.078	0.000	OUI		
SiC2	SiC2	4977.000	4981.808	0.001	4.808	289.62	0.001	0.078	0.000	OUI		
[O	III]	[O	III]	5007.000	5011.875	0.001	4.875	291.91	0.001	0.078	0.000	OUI
ZrO	ZrO	5629.000	5634.408	0.001	5.408	288.03	0.001	0.078	0.000	OUI		

Total OK	177