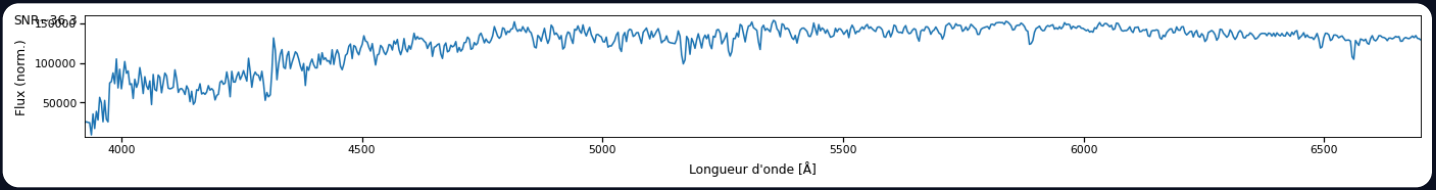
Rapport - Analyse Spectrométrique HD41597 - 16-10-2025 - K0III_20251016T234208.dat

RV (CCF) : -10.1 km/s (brute=+96.6, lin=-8.8, quad=-11.4, mode=linear, qual=OK)



Session

	=== Session ===
Fichier .DAT	HD41597 - 16-10-2025 - K0III_20251016T234208.dat
Fichier .FITS	HD41597 - 16-10-2025 - K0III_20251016T234208.fit

Objet etudié	HD41597
Date de prise de vue	2025-10-16T23:28:37.213

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	K0 III
- Lettre	K
- Sous-classe	0
- Luminosité	III

Paramètres d'analyse

Résolution de lecture (Å)	0.504
Tolérance clustering (Å)	0.050
Sensibilité raies fortes	0.200
Seeing utilisé (arcsec)	5.00

Données spectrales (.DAT)

Points	17840
Lambda min (A)	3924.142

Lambda max (A)	6700.439

Indicateurs

SNR	36.3
Teff	4500 K
v sin i	0.2 km/s
Hα	ligne très faible (EW ≈ 0.00 Å)
RV (CCF) utilisée	-10.1 km/s (brute=+96.6, lin=-8.8, quad=-11.4, mode=linear, qual=OK)
z (CCF) utilisé	-0.000034 (brute=+0.000322, lin=-0.000029, quad=-0.000038)
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=284)
R_eff	878
Δλ_eff(λ_ref	5312 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 K

Couverture utilisée pour la concordance : [3933.66 6698.48] Å

— Pics principaux sélectionnés (max 25)

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
K	K	3934.00	0.000	0.001		
Ca	II	K	3933	Ca	II	3933.66
H	epsilon	H	epsilon	3970.00	0.000	0.001
H	H	3968.00	0.000	0.001		
Ca	II	H	3968	Ca	II	3968.47
N	II	N	II	3995.00	0.000	0.001
He	I	He	I	4027.00	0.001	0.001
N	IV	N	IV	4058.00	0.001	0.001
NH2	NH2	4056.00	0.000	0.001		
Sr	II	Sr	II	4077.00	0.000	0.001
Si	IV	4089	Si	IV	4088.86	0.001
Hδ	4101	H	I	4101.74	0.000	0.001
He	II	+	H	delta	He	II
H	delta	H	delta	4102.00	0.001	0.001
Si	IV	4116	Si	IV	4116.10	0.000

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
He	I	4121	He	I	4120.99	0.000
He	II	He	II	4200.00	0.001	0.001
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
G	band	G	band	4300.00	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	0.001
He	I	He	I	4471.00	0.001	0.001
He	I	4471	He	I	4471.50	0.001
Mg	II	4481	Mg	II	4481.23	0.000
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	He	II	4541.00	0.000	0.001
He	II	4541	He	II	4541.59	0.000
Si	III	4552	Si	III	4552.62	0.000
Ti	II/Fe	II	Ti	II/Fe	II	4550.00
Ba	II	Ba	II	4554.00	0.001	0.001
Si	III	4568	Si	III	4567.84	0.001
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	N	III	4634.00	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	0.001	0.001
C	III	4647–51	C	III	4647.42	0.000
C	III/IV	C	III/IV	4650.00	0.001	0.001
Fe	I	Fe	I	4667.00	0.000	0.001
He	II	4686	He	II	4685.68	0.000
He	II	He	II	4686.00	0.000	0.001
C2	Swan	C2	Swan	4737.00	0.000	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
SiC2	SiC2	4767.00	0.001	0.001		
TiO	TiO	4775.00	0.001	0.001		
SiC2	SiC2	4807.00	0.000	0.001		
SiC2	SiC2	4832.00	0.001	0.001		
H	beta	H	beta	4861.00	0.000	0.001
CH4	CH4	4860.00	0.000	0.001		
SiC2	SiC2	4867.00	0.000	0.001		
Swan	-	C2	Swan	-	C2	4900.00
SiC2	SiC2	4909.00	0.000	0.001		
He	I	He	I	4921.00	0.001	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	0.000	0.001		
[O	III]	[O	III]	4959.00	0.001	0.001
SiC2	SiC2	4977.00	0.000	0.001		
TiO	TiO	4990.00	0.000	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	0.001	0.001
Si	II	Si	II	5100.00	0.001	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	5167	Mg	I	5167.32
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	0.001	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	0.000	0.001		

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
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
TiO	TiO	5480.00	0.001	0.001		
Swan	-	C2	Swan	-	C2	5500.00
Fe	II	Fe	II	5535.00	0.000	0.001
ZrO	ZrO	5545.00	0.000	0.001		
O	V	O	V	5572.00	0.001	0.001
O	I	O	I	5577.00	0.001	0.001
ZrO	ZrO	5629.00	0.001	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	0.001	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	0.001
C	III	C	III	5696.00	0.000	0.001
ZrO	ZrO	5718.00	0.001	0.001		
N	II	N	II	5755.00	0.001	0.001
CH4	CH4	5760.00	0.000	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
Na	I	D2	5889.95	Na	I	5889.95
NaI	NaI	5889.00	0.000	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	0.001
Si	II	Si	II	6150.00	0.001	0.001

id_raie	Élément	λ0	[Å]	EW	[Å]	Profondeur
ZrO	ZrO	6154.00	0.000	0.001		
Na	I	6154.226	Na	I	6154.23	0.000
Na	I	6160.747	Na	I	6160.75	0.000
TiO	bands	6159–6395	TiO	6159.00	0.000	0.001
CH4	CH4	6190.00	0.001	0.001		
CN	CN	6206.00	0.000	0.001		
ZrO	ZrO	6229.00	0.000	0.001		
TiO	TiO	6250.00	0.000	0.001		
CN	CN	6259.00	0.001	0.001		
ZrO	ZrO	6261.00	0.001	0.001		
O2	a	band	(repère)	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	0.000	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	0.001	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	0.001
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	0.001	0.001		
H	alpha	H	alpha	6563.00	0.000	0.001
He	II	He	II	6560.00	0.000	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	0.001	0.001		
He	II	He	II	6683.00	0.000	0.001
He	I	He	I	6687.00	0.001	0.001
Pm	I	Pm	I	6698.48	0.000	0.001

Attendus pour Type K	24 raies/ranges
Correspondances mesurées	24 / 24
	Taux de correspondance ≈ 100%
	Tolérance de correspondance ±0.76 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
H	3968.00	—	3968.00	0.000 H
Ca I	4227.00	—	4227.00	0.000 Ca I
G band	4300.00	4313.00	4300.00	0.000 G band
Sr II	4077.00	—	4077.00	0.000 Sr II
Ba II	4554.00	—	4554.00	0.000 Ba II
TiO	4775.00	—	4775.00	0.000 TiO
TiO	4990.00	—	4990.00	0.000 TiO
TiO	5190.00	—	5190.00	0.000 TiO
TiO	5480.00	—	5480.00	0.000 TiO
TiO	5640.00	—	5640.00	0.000 TiO
TiO	5930.00	—	5930.00	0.000 TiO
TiO	6250.00	—	6250.00	0.000 TiO
Ca I 4226	4226.73	—	4226.73	0.000 Ca I 4226
Mg I b 5167	5167.32	—	5167.32	0.000 Mg I b 5167
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
Na I D (5889–5896)	5891.58	5897.56	5891.58	0.000 Na I D (5889
Na I D2 5889.95	5889.95	—	5889.95	0.000 Na I D2 5889
Na I D1 5895.92	5895.92	—	5895.92	0.000 Na I D1 5895
CaH 6385 band	6385.00	—	6385.00	0.000 CaH 6385 ban
Hγ (Balmer)	4340.47	—	4340.00	-0.470 He II + H ga
Hβ (Balmer)	4861.33	—	4861.00	-0.330 H beta
Hα (Balmer)	6562.80	—	6563.00	0.200 H alpha

Raies supplémentaires (non attendues) parmi les pics principaux

id_raie	Élément	λ0 [Å]
Ca II K 3933 Ca II	3933.66	
H epsilon	H epsilon	3970.00
Ca II H 3968 Ca II	3968.47	
N II	N II	3995.00
He I	He I	4027.00
N IV	N IV	4058.00
NH2	NH2	4056.00
Si IV 4089	Si IV	4088.86
Hδ 4101	H I	4101.74

id_raie	Élément	λ0 [Å]
He II + H de He II + H de	4100.00	
H delta	H delta	4102.00
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	
C II	C II	4267.00
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	He II	4541.00
He II 4541	He II	4541.59
Si III 4552	Si III	4552.62
Ti II/Fe II	Ti II/Fe II	4550.00
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	N III	4634.00
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 4686	He II	4685.68
He II	He II	4686.00
C2 Swan	C2 Swan	4737.00
SiC2	SiC2	4767.00
SiC2	SiC2	4807.00

id_raie	Élément	λ0 [Å]
SiC2	SiC2	4832.00
CH4	CH4	4860.00
SiC2	SiC2	4867.00
Swan - C2	Swan - C2	4900.00
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
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
Mg	Mg	5173.00
Mg	Mg	5184.00
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	
Swan - C2	Swan - C2	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

id_raie	Élément	λ0 [Å]
C2 Swan	C2 Swan	5636.00
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
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
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	
Na I 6160.74 Na I	6160.75	
TiO bands 61 TiO	6159.00	
CH4	CH4	6190.00
CN	CN	6206.00
ZrO	ZrO	6229.00
CN	CN	6259.00
ZrO	ZrO	6261.00
O2 a band (r 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

id_raie	Élément	λ0 [Å]
CN	CN	6355.00
CN	CN	6358.00
O I	O I	6364.00
ZrO	ZrO	6378.00
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
He II	He II	6560.00
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
Pm I	Pm I	6698.48

Verdict	cohérent avec la classe de référence.

R (lambda/FWHM) — mediane=54594	min=3502	max=86141	n=178

Raies validées (OK=OUI) — Tableau complet

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
Na	I	5688.205	Na	I	5688.205	5688.913	0.011	0.708	37.31	0.001	1.167	0.001
He	II	He	II	4200.000	4199.676	0.011	-0.324	-23.11	0.001	1.167	0.001	OUI
O2	a	band	(repère)	O2	6283.000	6284.172	0.011	1.172	55.90	0.001	1.167	0.001
Ti	II	Ti	II	4534.000	4533.906	0.011	-0.094	-6.24	0.001	1.167	0.001	OUI
Mg	Mg	5173.000	5173.396	0.011	0.396	22.95	0.001	1.167	0.001	OUI		
Fe	II	Fe	II	4924.000	4924.203	0.011	0.203	12.39	0.001	1.167	0.001	OUI
Swan	-	C2	Swan	-	C2	4600.000	4599.942	0.011	-0.058	-3.80	0.001	1.167
Fe	II	Fe	II	5018.000	5018.274	0.011	0.274	16.35	0.001	1.167	0.001	OUI
Na	I	D	(5889–5896)	Na	I	5891.580	5892.472	0.011	0.892	45.40	0.001	1.167
Fe	I/Ca	I	Fe	I/Ca	I	5270.000	5270.425	0.011	0.425	24.19	0.001	1.167
Fe	II	Fe	II	5169.000	5169.347	0.011	0.347	20.10	0.001	1.167	0.001	OUI
Si	II	Si	II	5100.000	5100.351	0.011	0.351	20.66	0.001	1.167	0.001	OUI
Si	IV	4089	Si	IV	4088.860	4088.474	0.011	-0.386	-28.30	0.001	1.167	0.001
H	gamma	H	gamma	4341.000	4340.781	0.011	-0.219	-15.09	0.001	1.167	0.001	OUI
SiC2	SiC2	4832.000	4832.158	0.011	0.158	9.80	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
[O	III]	[O	III]	4959.000	4959.246	0.011	0.246	14.88	0.001	1.167	0.001	OUI
Na	I	D1	5895.92	Na	I	5895.920	5896.833	0.011	0.913	46.42	0.001	1.167
Ba	II	6141.713	Ba	II	6141.713	6142.755	0.011	1.042	50.86	0.001	1.167	0.001
Mg	I	b	5172	Mg	I	5172.680	5173.084	0.011	0.404	23.44	0.001	1.167
He	II	He	II	5411.000	5411.531	0.011	0.531	29.40	0.001	1.167	0.001	OUI
TiO	bands	5448–5670	TiO	5448.000	5448.598	0.011	0.598	32.90	0.001	1.167	0.001	OUI
CN	CN	6502.000	6503.305	0.011	1.305	60.18	0.001	1.167	0.001	OUI		
Fe	II/Cr	II	Fe	II/Cr	II	4585.000	4584.990	0.011	-0.010	-0.64	0.001	1.167
[O	III]	[O	III]	5007.000	5007.371	0.010	0.371	22.24	0.001	1.089	0.001	OUI
O	VIII	O	VIII	6068.000	6069.087	0.010	1.087	53.72	0.001	1.089	0.001	OUI
He	I	4471	He	I	4471.500	4471.452	0.010	-0.048	-3.23	0.001	1.089	0.001
Ba	II	Ba	II	4554.000	4553.997	0.010	-0.003	-0.21	0.001	1.089	0.001	OUI
ZrO	ZrO	6475.000	6479.743	0.010	4.743	219.58	0.001	1.089	0.001	OUI		
ZrO	ZrO	5718.000	5718.816	0.010	0.816	42.79	0.001	1.089	0.001	OUI		
TiO	TiO	5480.000	5480.682	0.010	0.682	37.28	0.001	1.089	0.001	OUI		
O	VII	O	VII	5670.000	5670.847	0.010	0.847	44.76	0.001	1.089	0.001	OUI
NaI	NaI	5896.000	5896.989	0.010	0.989	50.27	0.001	1.089	0.001	OUI		
He	I	He	I	4921.000	4921.244	0.010	0.244	14.88	0.001	1.089	0.001	OUI
N	II	N	II	5755.000	5755.883	0.010	0.883	46.02	0.001	1.089	0.001	OUI
CaH	6385	band	CaH	6385.000	6389.722	0.010	4.722	221.70	0.001	1.089	0.001	OUI
CH4	CH4	5960.000	5961.000	0.010	1.000	50.30	0.001	1.089	0.001	OUI		
DIB	DIB	5797.000	5797.935	0.010	0.935	48.34	0.001	1.089	0.001	OUI		
O	I	O	I	5577.000	5577.711	0.010	0.711	38.21	0.001	1.089	0.001	OUI
Ba	II	6496.897	Ba	II	6496.897	6498.321	0.010	1.424	65.73	0.001	1.089	0.001
CN	CN	6259.000	6260.187	0.010	1.187	56.85	0.001	1.089	0.001	OUI		
Si	III	4568	Si	III	4567.840	4567.858	0.010	0.018	1.19	0.001	1.089	0.001
He	I	4388	He	I	4387.930	4387.817	0.010	-0.113	-7.75	0.001	1.089	0.001
CN	4215	band	CN	4215.000	4214.784	0.010	-0.216	-15.40	0.001	1.089	0.001	OUI
ZrO	ZrO	6261.000	6262.212	0.010	1.212	58.01	0.001	1.089	0.001	OUI		
C	III/IV	C	III/IV	4650.000	4650.092	0.010	0.092	5.91	0.001	1.089	0.001	OUI
ZrO	ZrO	5629.000	5629.730	0.010	0.730	38.87	0.001	1.089	0.001	OUI		
O	V	O	V	5572.000	5572.727	0.010	0.727	39.11	0.001	1.089	0.001	OUI
Ca	I	Ca	I	4227.000	4226.776	0.010	-0.224	-15.89	0.001	1.089	0.001	OUI
N	III	N	III	4641.000	4641.058	0.010	0.058	3.78	0.001	1.089	0.001	OUI
Si	II	Si	II	6150.000	6151.165	0.010	1.165	56.80	0.001	1.089	0.001	OUI
Fe	II	Fe	II	5235.000	5235.538	0.010	0.538	30.83	0.001	1.089	0.001	OUI
N	III	4640	(em)	N	III	4640.640	4640.747	0.010	0.107	6.91	0.001	1.089
He	I	He	I	6687.000	6688.486	0.010	1.486	66.64	0.001	1.089	0.001	OUI

Elements	Élément	λ0	[Å]	λ_obs_rest	[Å]	σ_λ	[Å]	Δλ	[Å]	RV_indiv	[km/s]	Profondeur
He	I	He	I	4471.000	4470.985	0.010	-0.015	-1.03	0.001	1.089	0.001	OUI
Si	III	4552	Si	III	4552.620	4552.595	0.010	-0.025	-1.64	0.001	1.089	0.001
N	V	N	V	4603.000	4603.057	0.010	0.057	3.69	0.001	1.089	0.001	OUI
H	delta	H	delta	4102.000	4105.094	0.010	3.094	226.10	0.001	1.089	0.001	OUI
O	I	O	I	6364.000	6365.315	0.010	1.315	61.94	0.001	1.089	0.001	OUI
O2	a	band	(repère)	O2	6280.000	6281.212	0.010	1.212	57.88	0.001	1.089	0.001
Fe	II	Fe	II	5198.000	5198.471	0.010	0.471	27.16	0.001	1.089	0.001	OUI
Fe	II	Fe	II	5276.000	5276.499	0.010	0.499	28.38	0.001	1.089	0.001	OUI
Mg	Mg	5184.000	5184.454	0.010	0.454	26.25	0.001	1.089	0.001	OUI		
SiC2	SiC2	4767.000	4767.212	0.010	0.212	13.34	0.001	1.089	0.001	OUI		
He	I	He	I	4027.000	4026.643	0.010	-0.357	-26.56	0.001	1.089	0.001	OUI
N	IV	N	IV	4058.000	4057.636	0.010	-0.364	-26.85	0.001	1.089	0.001	OUI
Fe	II,III,	Mg	II	Fe	II,III,	Mg	II	4500.000	4499.953	0.010	-0.047	-3.12
CH4	CH4	6680.000	6681.478	0.010	1.478	66.33	0.001	1.089	0.001	OUI		
TiO	TiO	4775.000	4775.155	0.010	0.155	9.74	0.001	1.089	0.001	OUI		
Swan	-	C2	Swan	-	C2	6122.000	6123.131	0.010	1.131	55.38	0.001	1.089
CH4	CH4	6190.000	6191.192	0.010	1.192	57.71	0.001	1.089	0.001	OUI		
Ca	I	6439.075	Ca	I	6439.075	6440.384	0.010	1.309	60.95	0.001	1.089	0.001
SiC2	SiC2	4867.000	4870.582	0.006	3.582	220.64	0.001	0.623	0.000	OUI		
ZrO	ZrO	6378.000	6382.402	0.004	4.402	206.90	0.001	0.467	0.000	OUI		
ZrO	ZrO	5545.000	5546.250	0.003	1.250	67.60	0.001	0.311	0.000	OUI		
Fe	I/II	Fe	I/II	5012.000	5015.737	0.002	3.737	223.50	0.001	0.233	0.000	OUI
ZrO	ZrO	6494.000	6495.830	0.001	1.830	84.46	0.001	0.078	0.000	OUI		
He	II	He	II	6560.000	6564.001	0.001	4.001	182.84	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	5430.000	5434.069	0.001	4.069	224.63	0.001	0.078	0.000	OUI		
N	V	N	V	4933.000	4936.774	0.001	3.774	229.34	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	6059.000	6063.435	0.001	4.435	219.46	0.001	0.078
Na	I	6160.747	Na	I	6160.747	6162.379	0.001	1.632	79.41	0.001	0.078	0.000
TiO	bands	6159–6395	TiO	6159.000	6163.580	0.001	4.580	222.92	0.001	0.078	0.000	OUI
He	I	4121	He	I	4120.990	4121.025	0.001	0.035	2.53	0.001	0.078	0.000
CN	CN	4380.000	4383.255	0.001	3.255	222.78	0.001	0.078	0.000	OUI		
TiO	bands	6651–6852	TiO	6651.000	6653.444	0.001	2.444	110.15	0.001	0.078	0.000	OUI
CN	CN	6656.000	6660.874	0.001	4.874	219.55	0.001	0.078	0.000	OUI		
Fe	II	Fe	II	5535.000	5536.283	0.001	1.283	69.47	0.001	0.078	0.000	OUI
Hα	(Balmer)	Hα	(Balmer)	6562.800	6562.800	0.000	0.000	0.00	0.001	0.078	0.000	OUI
Hα	6563	H	I	6562.800	6562.800	0.000	0.000	0.00	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
C2	Swan	C2	Swan	5636.000	5640.120	0.001	4.120	219.13	0.001	0.078	0.000	OUI
SiC2	SiC2	4977.000	4980.694	0.001	3.694	222.50	0.001	0.078	0.000	OUI		
O2	a	band	6276–6287	O2	6276.000	6280.389	0.001	4.389	209.64	0.001	0.078	0.000
O2	a	band	(repère)	O2	6277.000	6279.188	0.001	2.188	104.49	0.001	0.078	0.000
O2	a	band	~6277	O2	6277.000	6279.188	0.001	2.188	104.49	0.001	0.078	0.000
Ca	I	4226	Ca	I	4226.730	4226.620	0.001	-0.110	-7.79	0.001	0.078	0.000
G	band	G	band	4300.000	4302.735	0.001	2.735	190.65	0.001	0.078	0.000	OUI
NH2	NH2	4056.000	4058.526	0.001	2.526	186.69	0.001	0.078	0.000	OUI		
CH	G	band	4300	CH	4300.000	4302.735	0.001	2.735	190.65	0.001	0.078	0.000
Hγ	4340	H	I	4340.470	4340.470	0.001	0.000	0.00	0.001	0.078	0.000	OUI
Ti	II/Fe	II	Ti	II/Fe	II	4550.000	4552.706	0.001	2.706	178.28	0.001	0.078
N	III	4634	(em)	N	III	4634.140	4637.587	0.001	3.447	222.99	0.001	0.078
He	II	4686	He	II	4685.680	4689.139	0.001	3.459	221.29	0.001	0.078	0.000
TiO	TiO	5640.000	5641.255	0.001	1.255	66.71	0.001	0.078	0.000	OUI		
N	II	N	II	5679.000	5683.261	0.001	4.261	224.94	0.001	0.078	0.000	OUI
N	III	N	III	5314.000	5318.038	0.001	4.038	227.82	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	5500.000	5504.154	0.001	4.154	226.42	0.001	0.078
He	I	He	I	5875.000	5879.344	0.001	4.344	221.69	0.001	0.078	0.000	OUI
C	III	C	III	5696.000	5700.237	0.001	4.237	223.02	0.001	0.078	0.000	OUI
Si	II	Si	II	5500.000	5504.154	0.001	4.154	226.42	0.001	0.078	0.000	OUI
Hγ	(Balmer)	Hγ	(Balmer)	4340.470	4340.470	0.001	0.000	0.00	0.001	0.078	0.000	OUI
Fe	II,III,	Mg	II	Fe	II,III,	Mg	II	4300.000	4302.735	0.001	2.735	190.65
He	II	+	H	gamma	He	II	+	H	gamma	4340.000	4340.470	0.001
C	III	4647–51	C	III	4647.420	4648.067	0.001	0.647	41.74	0.001	0.078	0.000
N	V	N	V	4619.000	4619.566	0.001	0.566	36.71	0.001	0.078	0.000	OUI
Hδ	4101	H	I	4101.740	4101.401	0.001	-0.339	-24.78	0.001	0.078	0.000	OUI
He	II	+	H	delta	He	II	+	H	delta	4100.000	4102.602	0.001
Na	I	D2	5889.95	Na	I	5889.950	5891.226	0.001	1.276	64.96	0.001	0.078
SiC2	SiC2	4909.000	4912.477	0.001	3.477	212.37	0.001	0.078	0.000	OUI		
TiO	bands	4950–5190	TiO	4950.000	4953.750	0.001	3.750	227.11	0.001	0.078	0.000	OUI
TiO	TiO	5190.000	5193.909	0.001	3.909	225.81	0.001	0.078	0.000	OUI		
Si	III	4575	Si	III	4574.760	4578.248	0.001	3.488	228.57	0.001	0.078	0.000
ZrO	ZrO	6154.000	6158.596	0.001	4.596	223.88	0.001	0.078	0.000	OUI		
NaI	NaI	5890.000	5891.226	0.001	1.226	62.41	0.001	0.078	0.000	OUI		
NaI	NaI	5889.000	5892.427	0.001	3.427	174.46	0.001	0.078	0.000	OUI		
DIB	DIB	5780.000	5784.340	0.001	4.340	225.09	0.001	0.078	0.000	OUI		
ZrO	ZrO	5404.000	5408.059	0.001	4.059	225.18	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	He	II	4686.000	4689.450	0.001	3.450	220.73	0.001	0.078	0.000	OUI
C2	Swan	C2	Swan	4737.000	4737.465	0.001	0.465	29.42	0.001	0.078	0.000	OUI
ZrO	ZrO	6350.000	6354.679	0.001	4.679	220.91	0.001	0.078	0.000	OUI		
Pm	I	Pm	I	6698.481	6703.393	0.001	4.912	219.83	0.001	0.078	0.000	OUI
He	II	He	II	4541.000	4544.451	0.001	3.451	227.85	0.001	0.078	0.000	OUI
He	II	He	II	6683.000	6687.195	0.001	4.195	188.20	0.001	0.078	0.000	OUI
Si	IV	4116	Si	IV	4116.100	4119.267	0.001	3.167	230.63	0.001	0.078	0.000
N	III	N	III	4634.000	4637.431	0.001	3.431	221.98	0.001	0.078	0.000	OUI
He	II	4541	He	II	4541.590	4545.074	0.001	3.484	230.00	0.001	0.078	0.000
C2	Swan	C2	Swan	5165.000	5168.834	0.001	3.834	222.55	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	5000.000	5003.744	0.001	3.744	224.50	0.001	0.078
Mg	I	b	5167	Mg	I	5167.320	5170.392	0.001	3.072	178.21	0.001	0.078
Mg	Mg	5167.000	5170.392	0.001	3.392	196.79	0.001	0.078	0.000	OUI		
Na	I	6154.226	Na	I	6154.226	6158.752	0.001	4.526	220.45	0.001	0.078	0.000
Fe	I/II	Fe	I/II	4919.000	4921.978	0.001	2.978	181.49	0.001	0.078	0.000	OUI
Swan	-	C2	Swan	-	C2	4900.000	4903.600	0.001	3.600	220.25	0.001	0.078
SiC2	SiC2	4807.000	4809.530	0.001	2.530	157.77	0.001	0.078	0.000	OUI		
Fe	II,III,	Si	II	Fe	II,III,	Si	II	4900.000	4903.600	0.001	3.600	220.25
CH4	CH4	5760.000	5763.314	0.001	3.314	172.49	0.001	0.078	0.000	OUI		
H	H	3968.000	3970.997	0.001	2.997	226.43	0.001	0.078	0.000	OUI		
H	epsilon	H	epsilon	3970.000	3970.263	0.001	0.263	19.89	0.001	0.078	0.000	OUI
Ca	II	H	3968	Ca	II	3968.470	3971.464	0.001	2.994	226.19	0.001	0.078
K	K	3934.000	3934.442	0.001	0.442	33.68	0.001	0.078	0.000	OUI		
Ca	II	-	K	line	Ca	II	-	K	line	3934.000	3934.442	0.001
C	IV	C	IV	5801.000	5805.365	0.001	4.365	225.60	0.001	0.078	0.000	OUI
Na	I	5682.633	Na	I	5682.633	5686.687	0.001	4.054	213.90	0.001	0.078	0.000
TiO	TiO	4990.000	4992.842	0.001	2.842	170.75	0.001	0.078	0.000	OUI		
Fe	II	Fe	II	5317.000	5320.997	0.001	3.997	225.39	0.001	0.078	0.000	OUI
Hβ	4861	H	I	4861.330	4861.905	0.001	0.575	35.48	0.001	0.078	0.000	OUI
TiO	TiO	5930.000	5931.097	0.001	1.097	55.46	0.001	0.078	0.000	OUI		
Hβ	(Balmer)	Hβ	(Balmer)	4861.330	4861.905	0.001	0.575	35.48	0.001	0.078	0.000	OUI
SiC2	SiC2	4957.000	4957.844	0.001	0.844	51.07	0.001	0.078	0.000	OUI		
CH4	CH4	4860.000	4863.106	0.001	3.106	191.61	0.001	0.078	0.000	OUI		
TiO	TiO	6250.000	6254.691	0.001	4.691	224.99	0.001	0.078	0.000	OUI		
ZrO	ZrO	6229.000	6230.751	0.001	1.751	84.27	0.001	0.078	0.000	OUI		
CN	CN	6206.000	6210.615	0.001	4.615	222.92	0.001	0.078	0.000	OUI		
Swan	-	C2	Swan	-	C2	6005.000	6006.633	0.001	1.633	81.55	0.001	0.078
CN	CN	6358.000	6361.688	0.001	3.688	173.88	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	He	II	4511.000	4514.392	0.001	3.392	225.45	0.001	0.078	0.000	OUI
C	II	C	II	4267.000	4270.184	0.001	3.184	223.68	0.001	0.078	0.000	OUI
Sr	II	Sr	II	4077.000	4079.551	0.001	2.551	187.62	0.001	0.078	0.000	OUI
H	beta	H	beta	4861.000	4861.905	0.001	0.905	55.83	0.001	0.078	0.000	OUI
He	II	+	H	beta	He	II	+	H	beta	4861.000	4861.905	0.001
Mg	II	4481	Mg	II	4481.230	4481.731	0.001	0.501	33.52	0.001	0.078	0.000
Ca	II	K	3933	Ca	II	3933.660	3935.643	0.001	1.983	151.11	0.001	0.078
O	I	O	I	6300.000	6301.459	0.001	1.459	69.44	0.001	0.078	0.000	OUI
N	II	N	II	3995.000	3995.338	0.001	0.338	25.39	0.001	0.078	0.000	OUI
Mg	I	b	5183	Mg	I	5183.600	5184.142	0.001	0.542	31.37	0.001	0.078
He	I	He	I	5876.000	5880.435	0.001	4.435	226.25	0.001	0.078	0.000	OUI
Fe	I	Fe	I	4667.000	4668.002	0.001	1.002	64.39	0.001	0.078	0.000	OUI
CN	CN	6355.000	6359.663	0.001	4.663	219.97	0.001	0.078	0.000	OUI		

Total OK 178