Sur la détection des champs magnétique stellaires

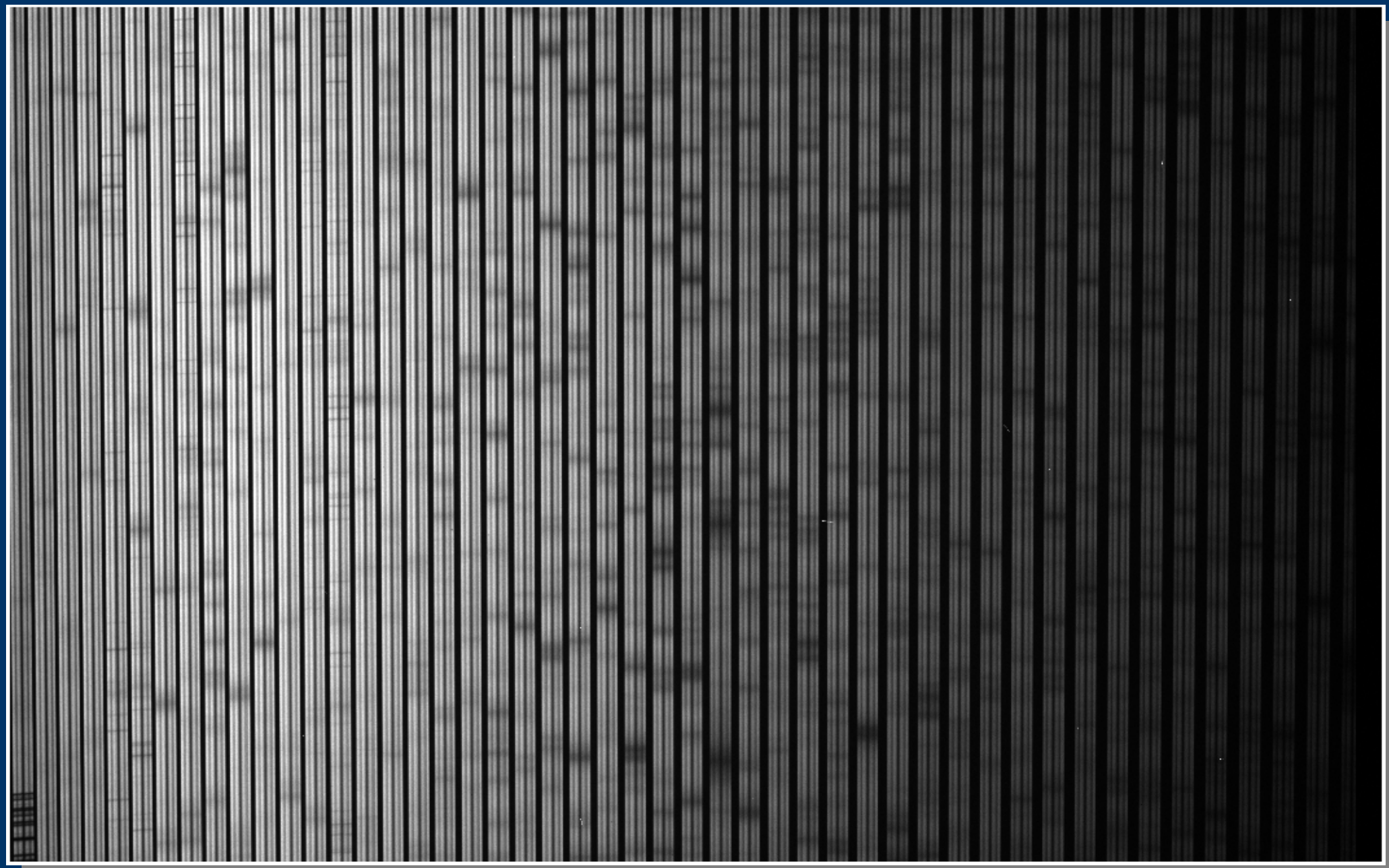
Meir Semel **Julio Ramirez Vélez**

LESIA, Observatoire Paris Meudon

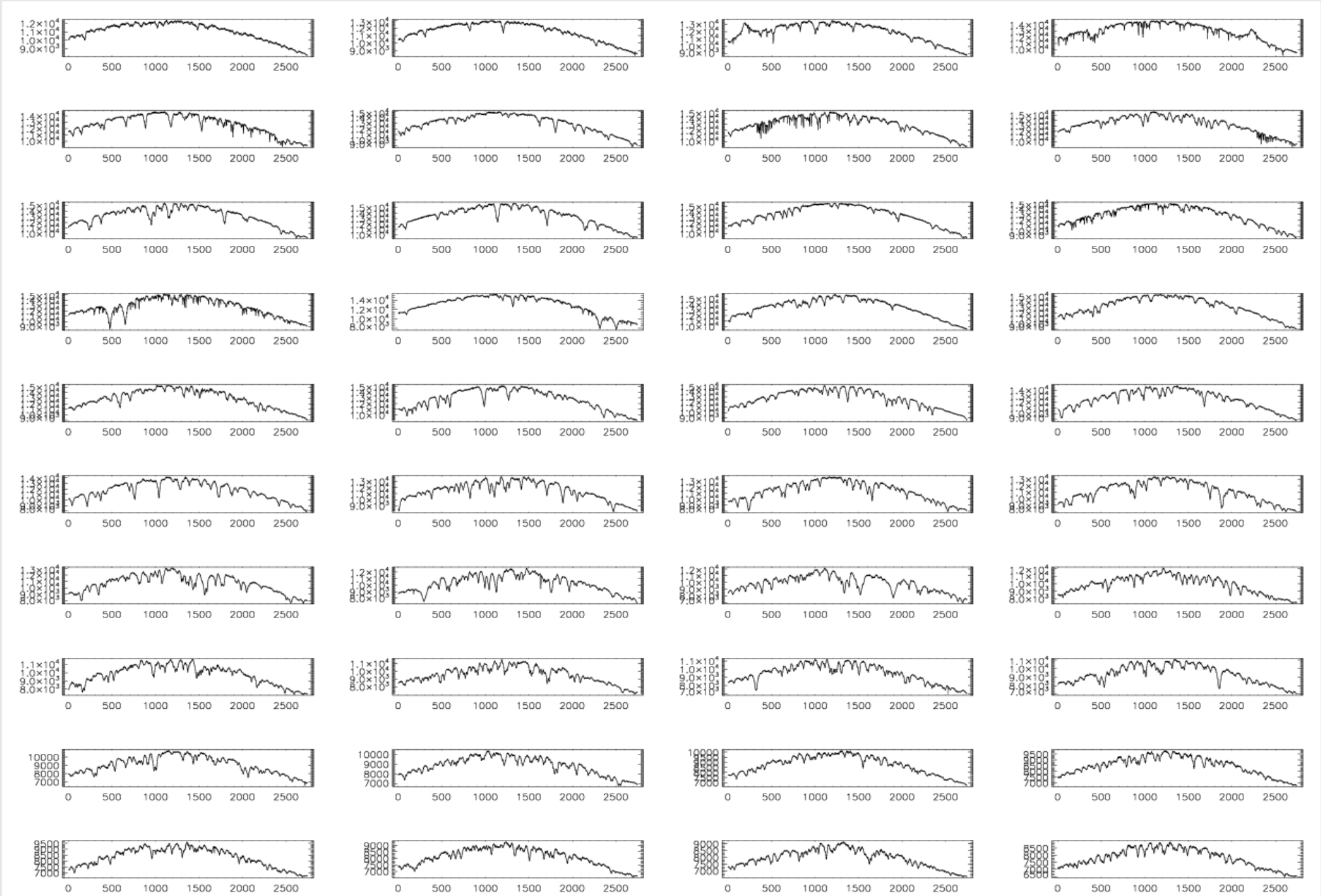
Atelier à Nice France, Mai 2005

Première Partie

Image du «ccd», 2 faisceaux avec 46 ordres de dispersion pour chaque faisceaux.



On obtient les profils respectifs (observés).



Encore sans connaître la longueur d'onde

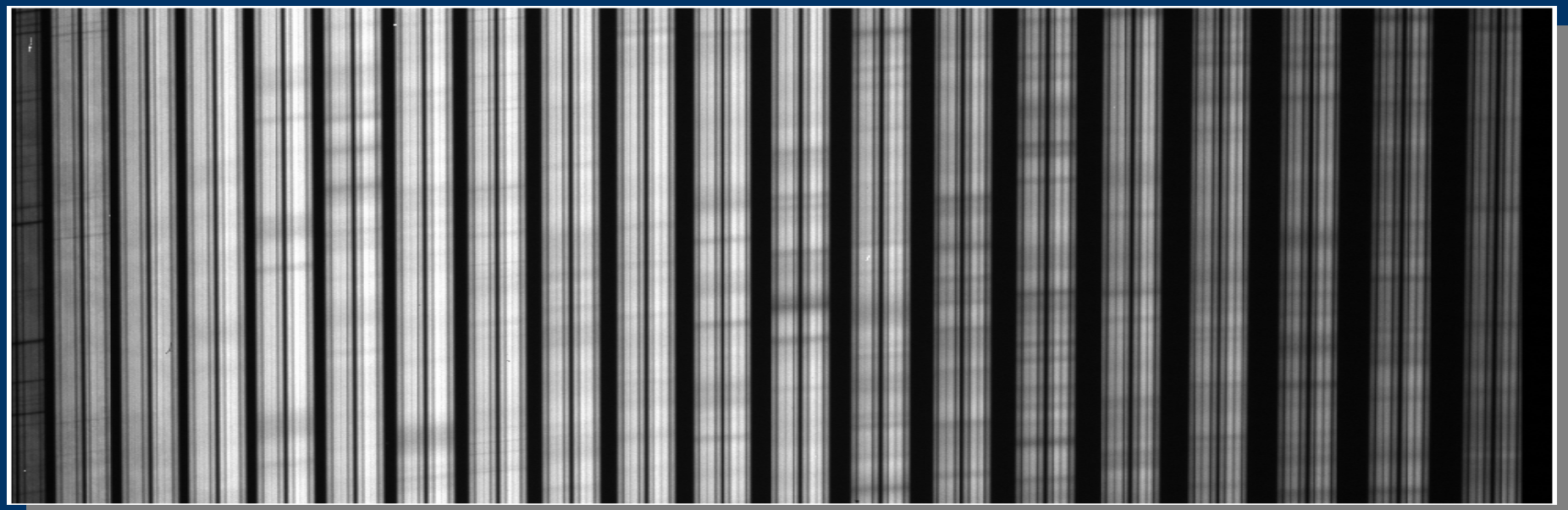


Image d'un des faisceaux, soit l'ordinaire ou l'extraordinaire

Pour un des ordres

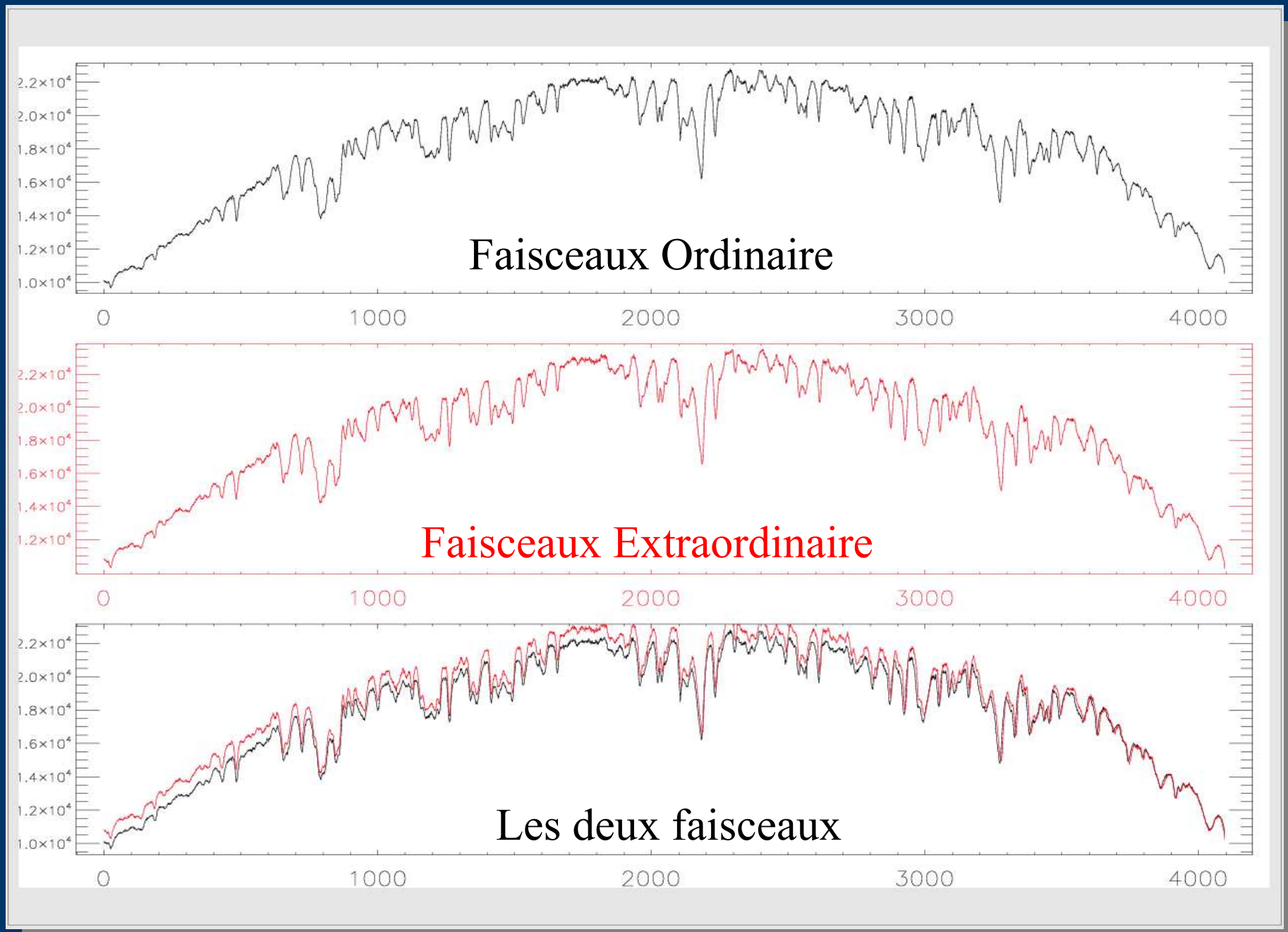
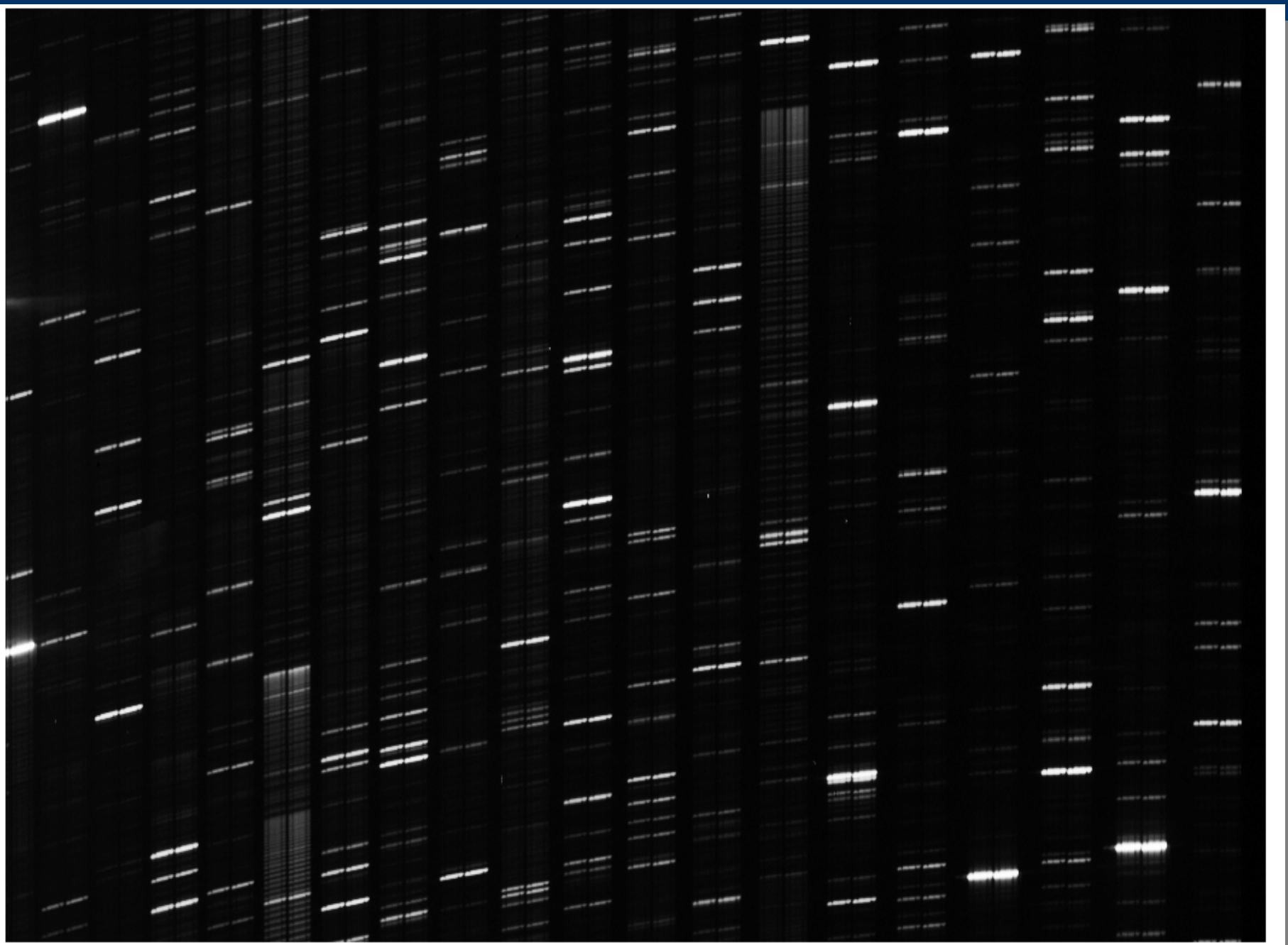
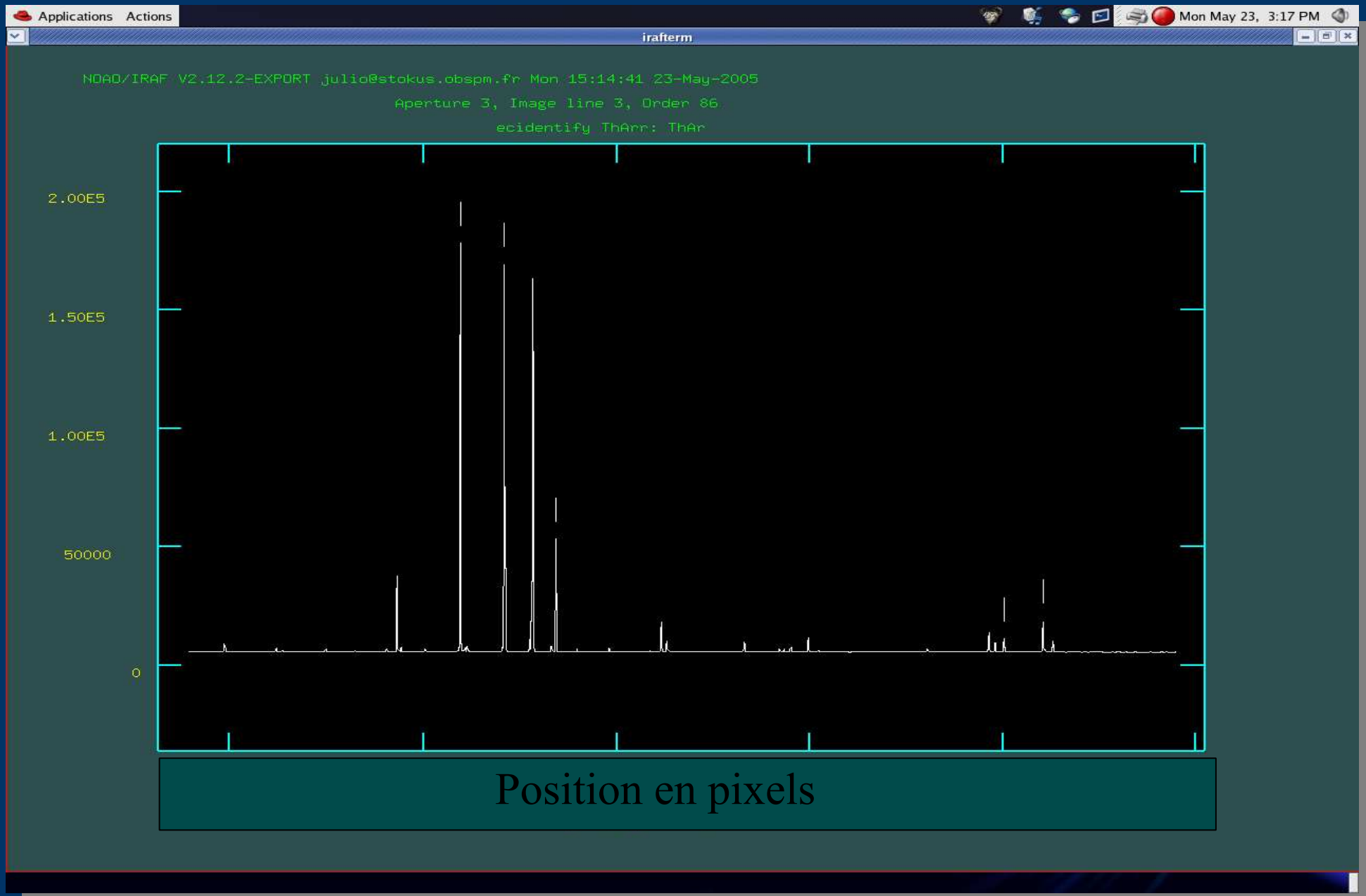


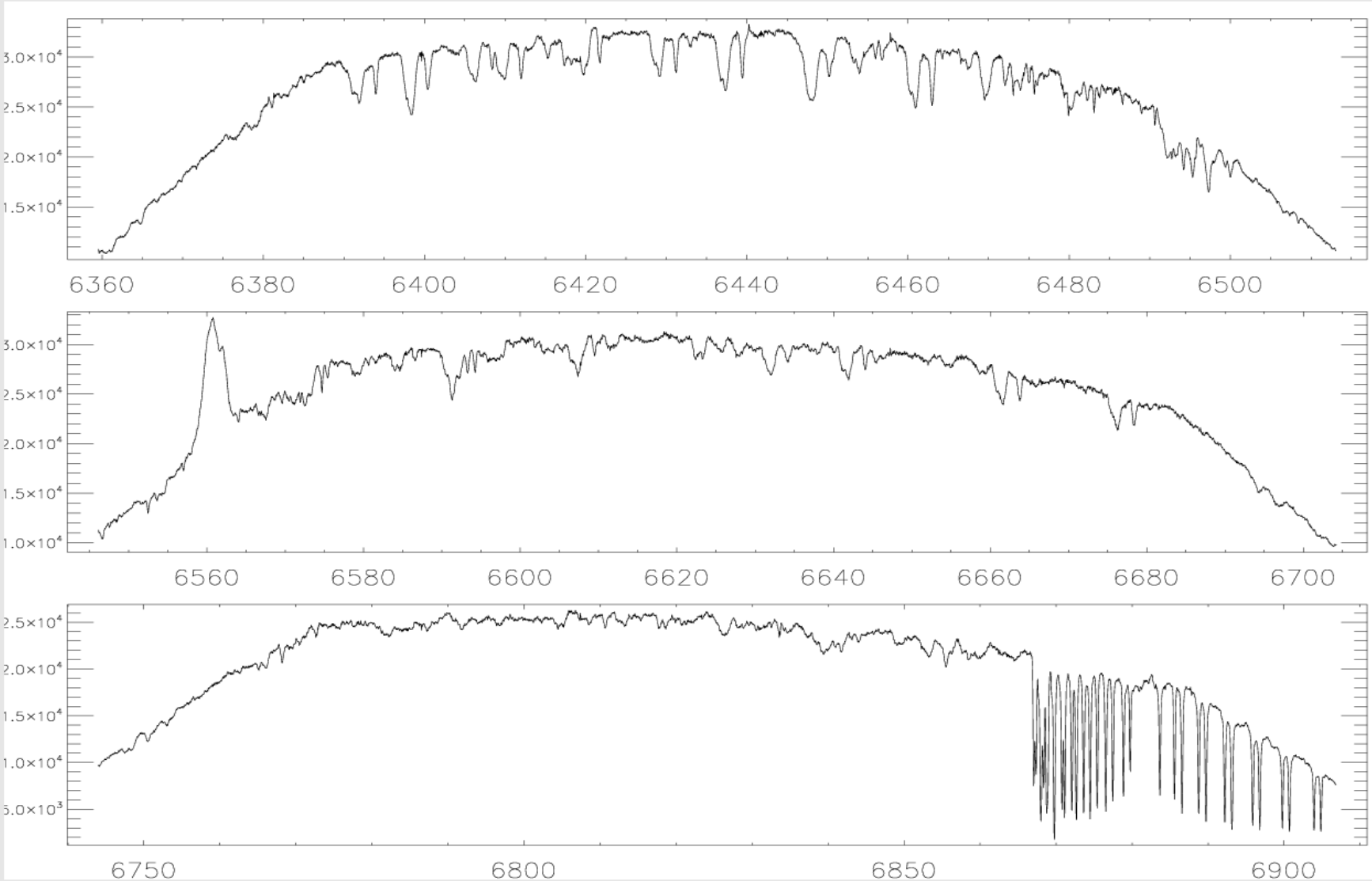
Image de la lampe utilisée, ThAr.



Calibration du lampe ThAr

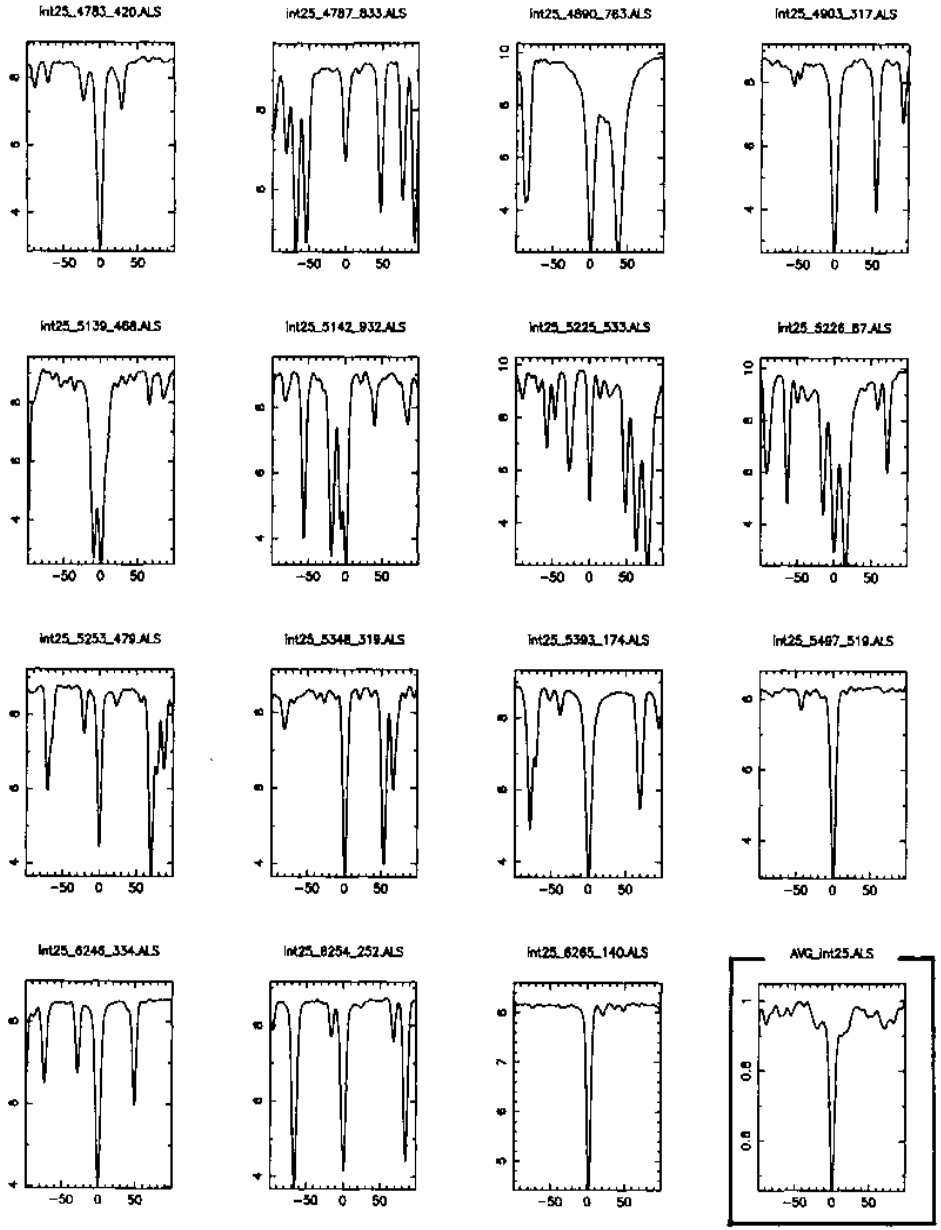


Assignation de la longueur d'onde à chaque ordre.



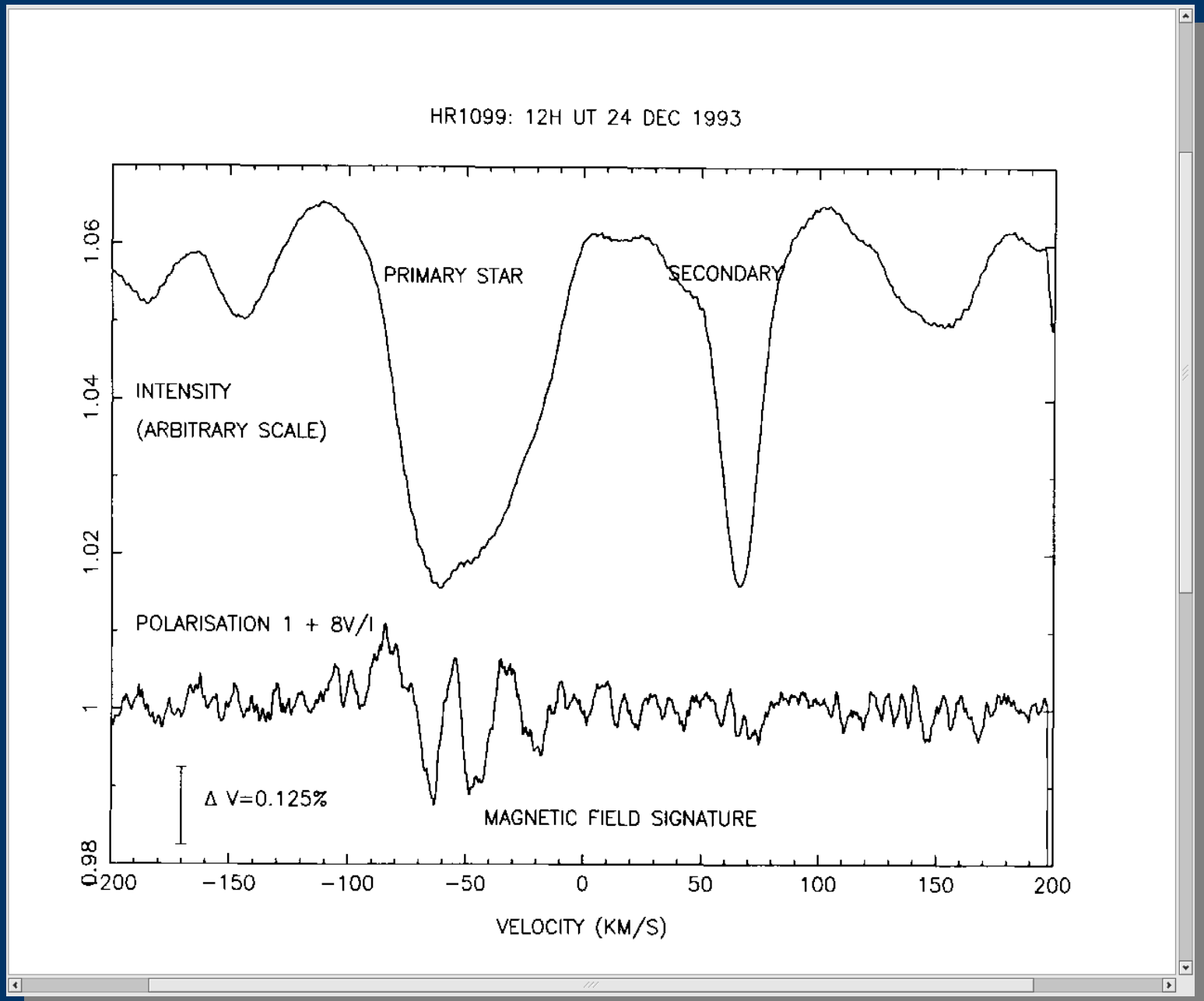
Rang de travail obtenu, ~ [4500, 7000] A°.

Principe d'addition des lignes



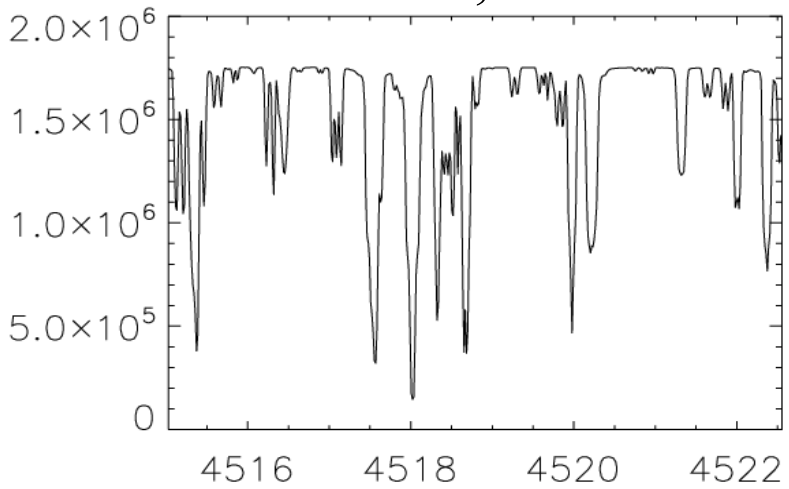
Superposition cohérent des raies et incohérent du bruit.

Résultat de l'addition appliquée aux spectres observés

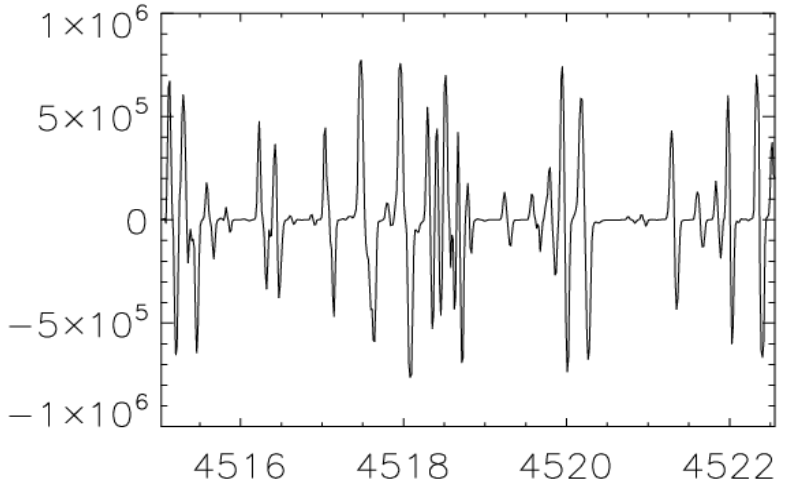


Profils synthétiques de Stokes calculés à 4750 °K

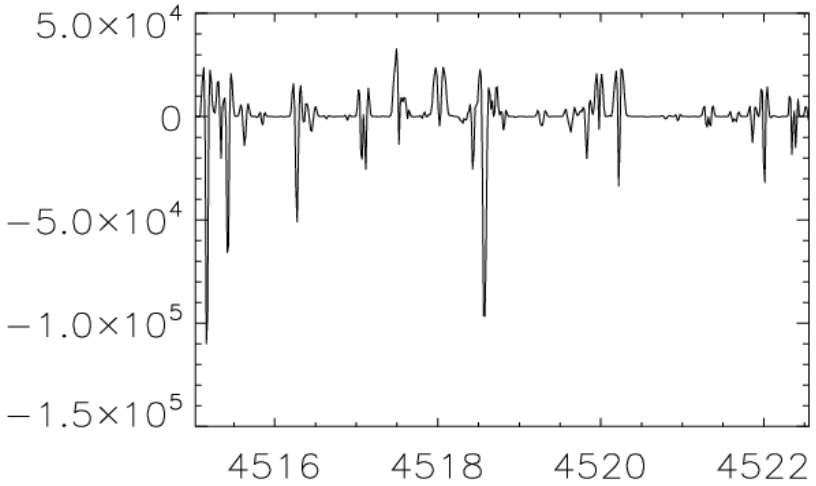
Intensité, **I**



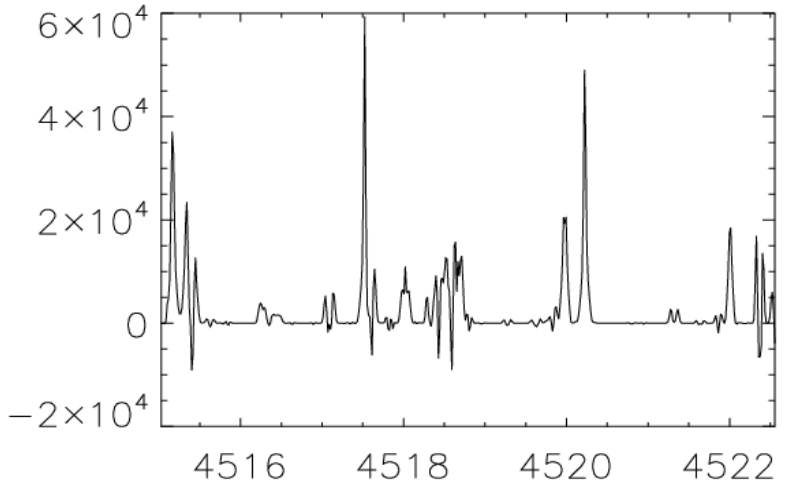
Pol. Circulaire, **V**



Pol. Linaire, **Q**



Pol. Linaire, **U**



Programme de calcul, COSSAM

- **Profils de la base de données**

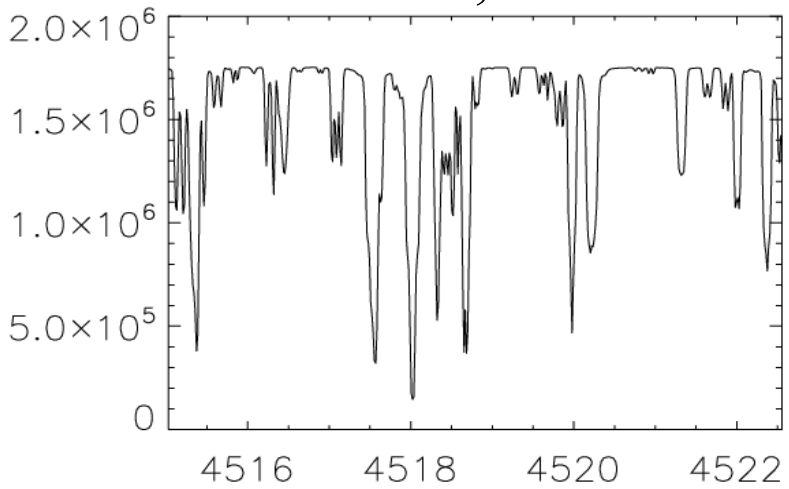
$$f_n(x) = \sum_{0}^{254} a_{n,i} \; P_i(x)$$

- **Changement du variable x (Amstrons) à:**

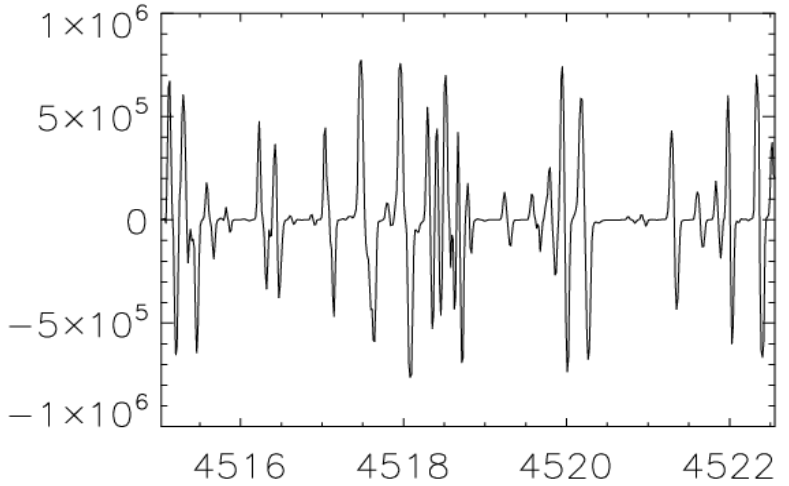
x (km /s)

Profils synthétiques de Stokes calculés à 4750 °K

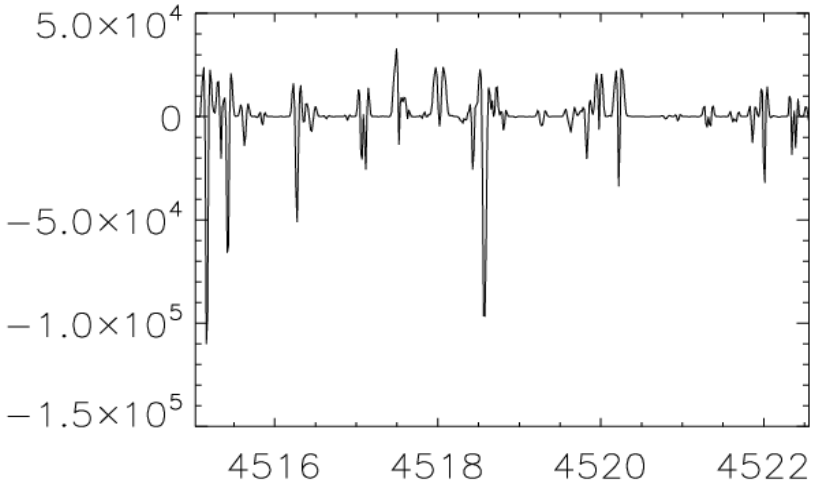
Intensité, **I**



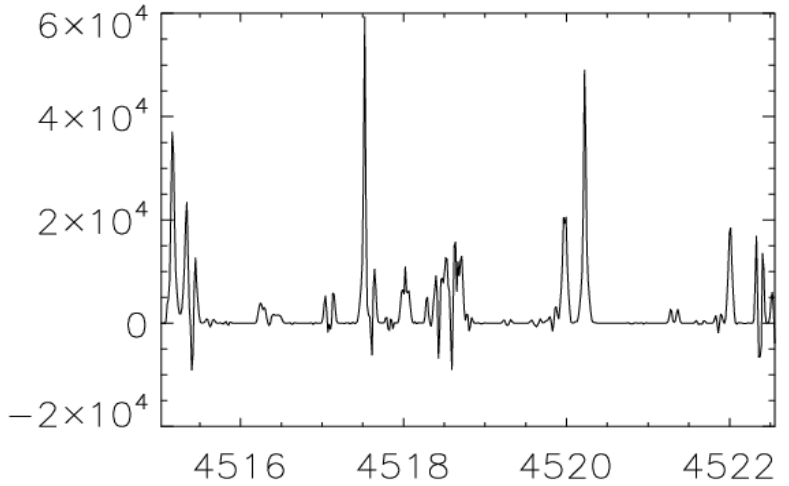
Pol. Circulaire, **V**



Pol. Linaire, **Q**

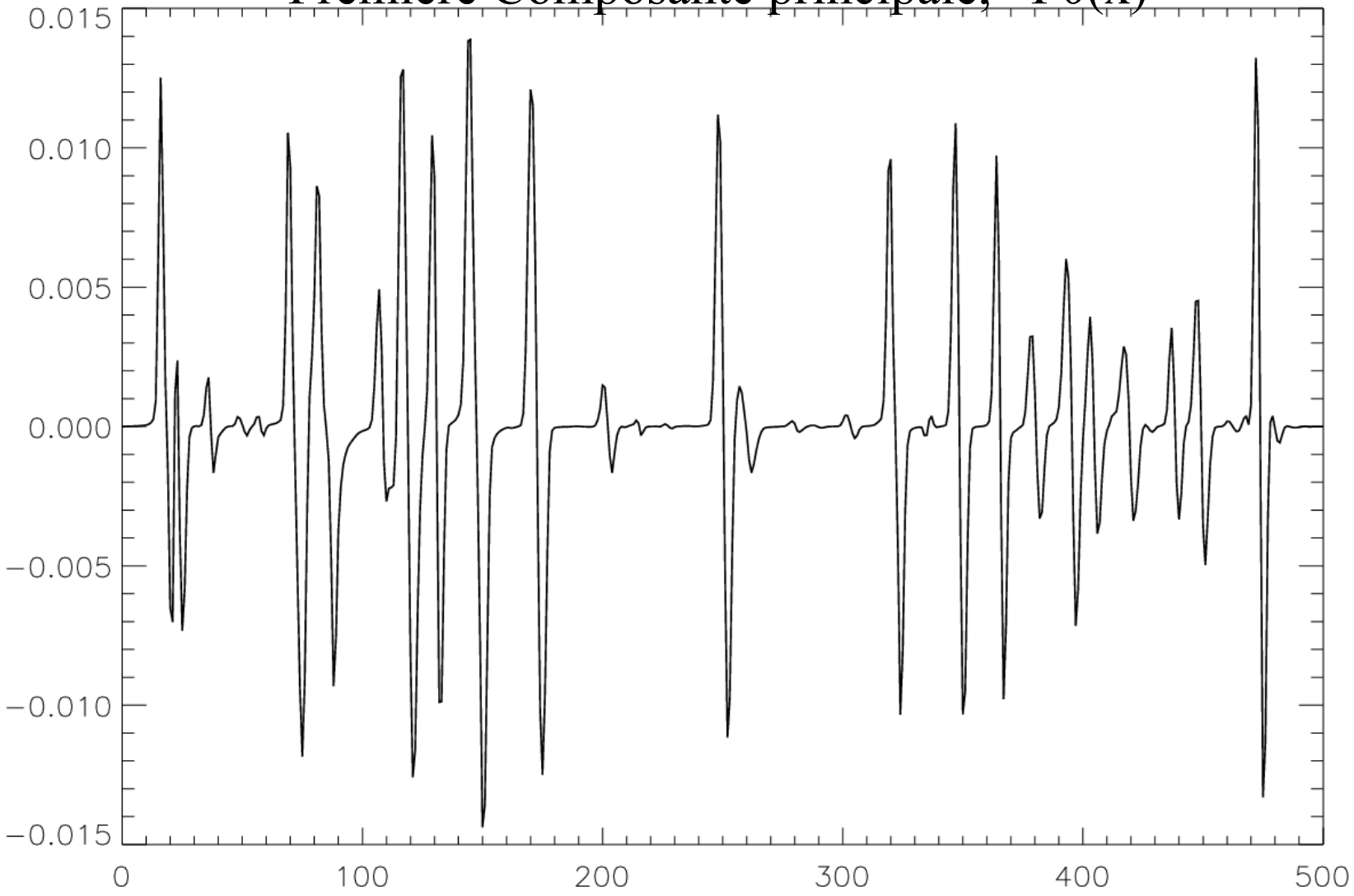


Pol. Linaire, **U**



PCA

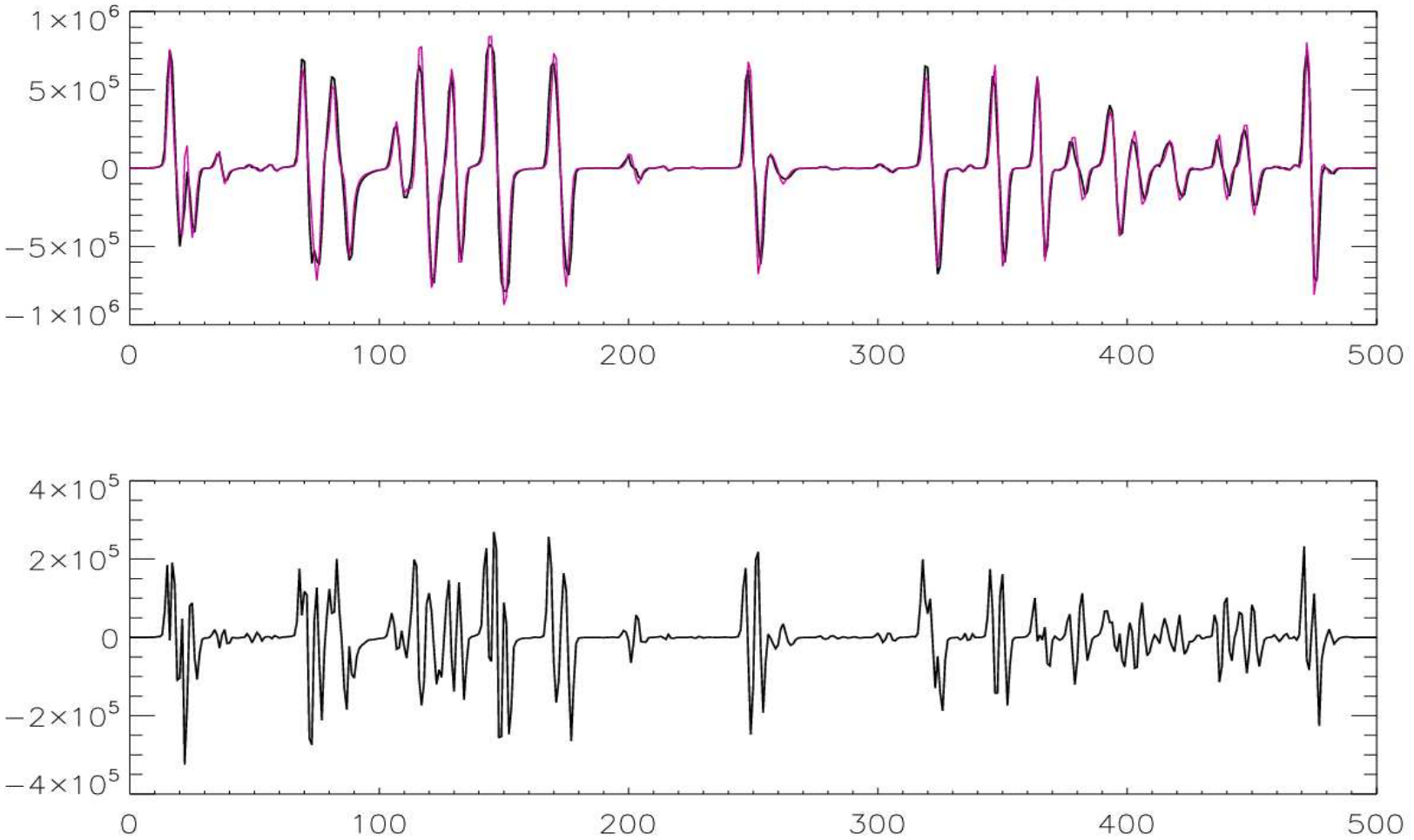
Première Composante principale, P0(x)



x = km / s

Comparaison entre le profil calculé et la première composante

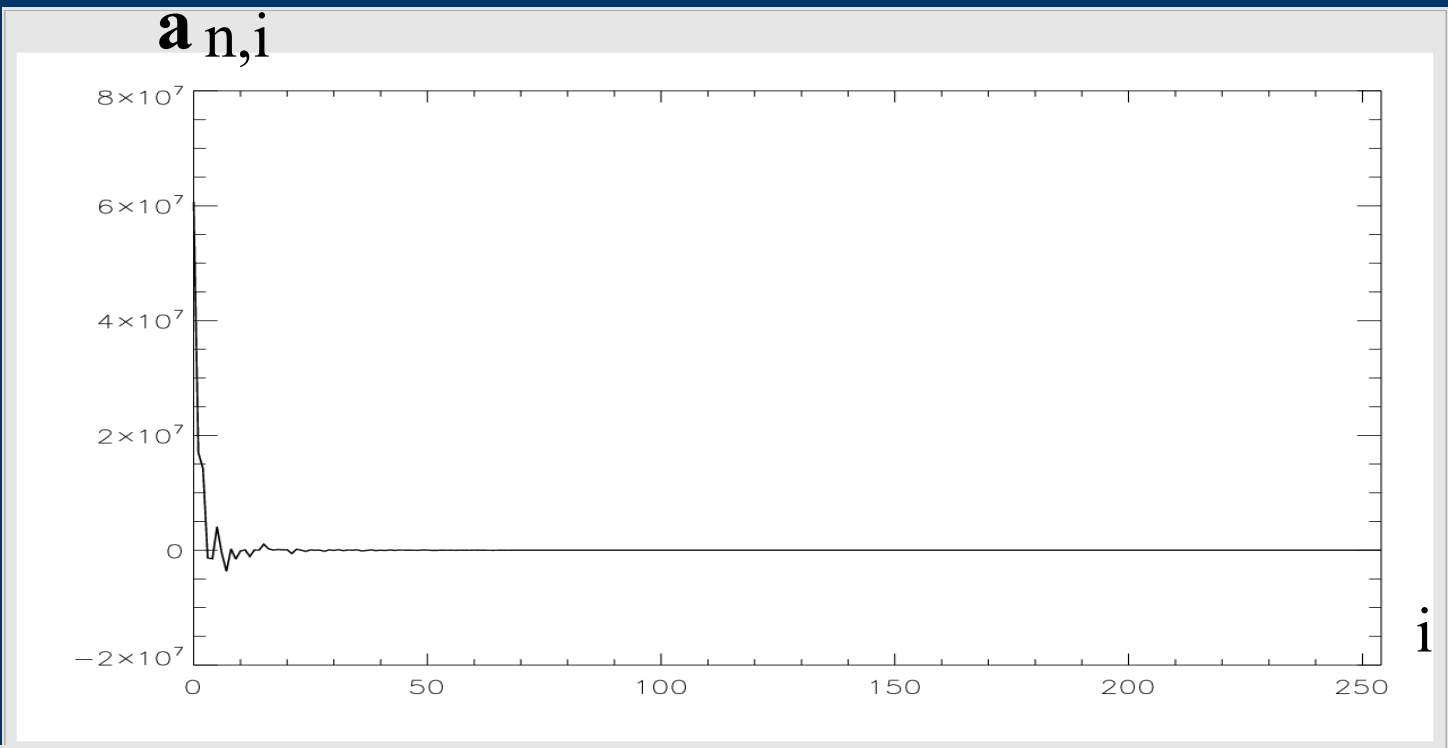
f_0 vs $(a_{n,0} * P_0)$



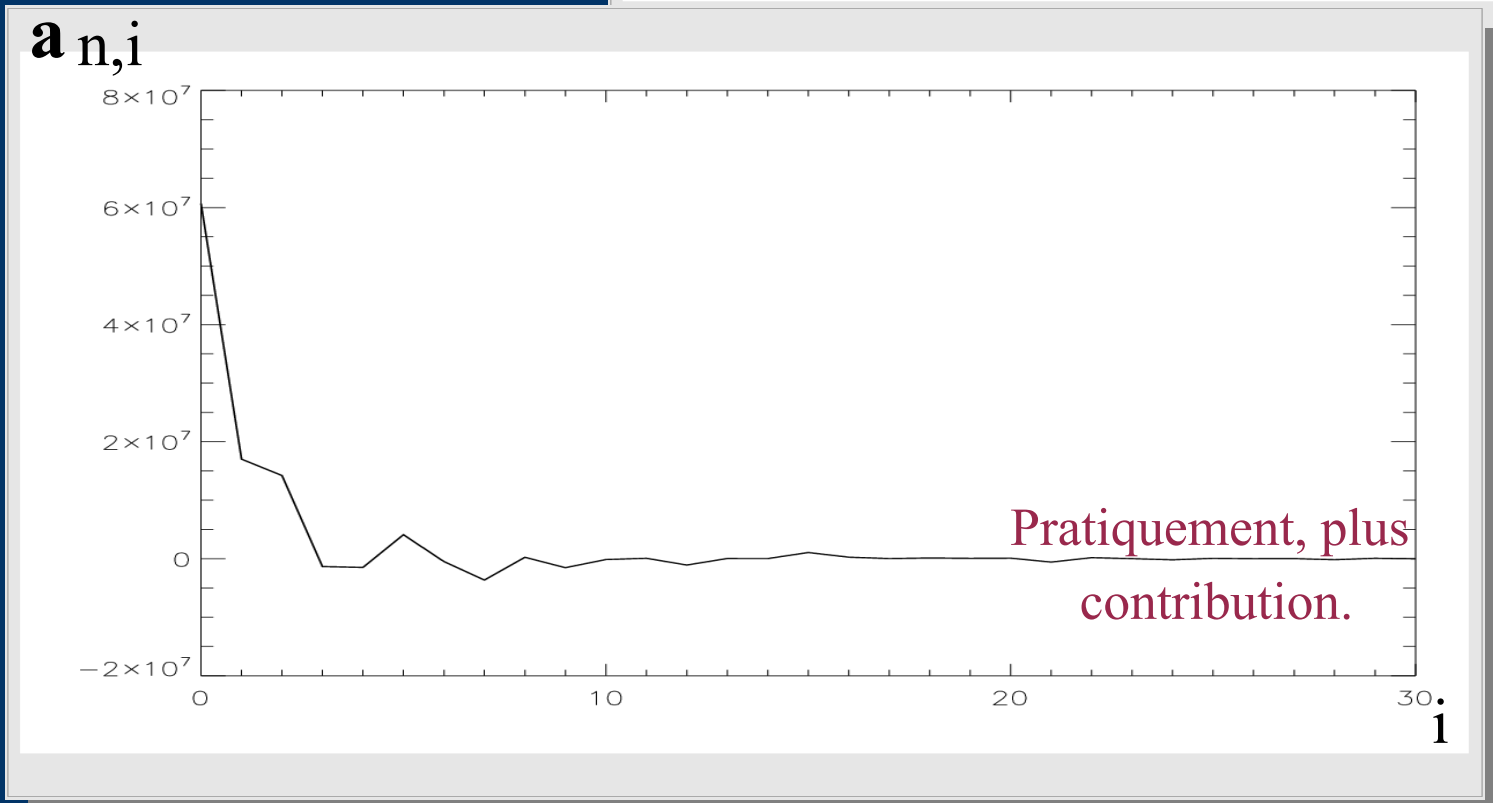
Différence entre les deux

Les 255 coefficients a $_{n,i}$ d'une des composante P $_{n,i}$

i

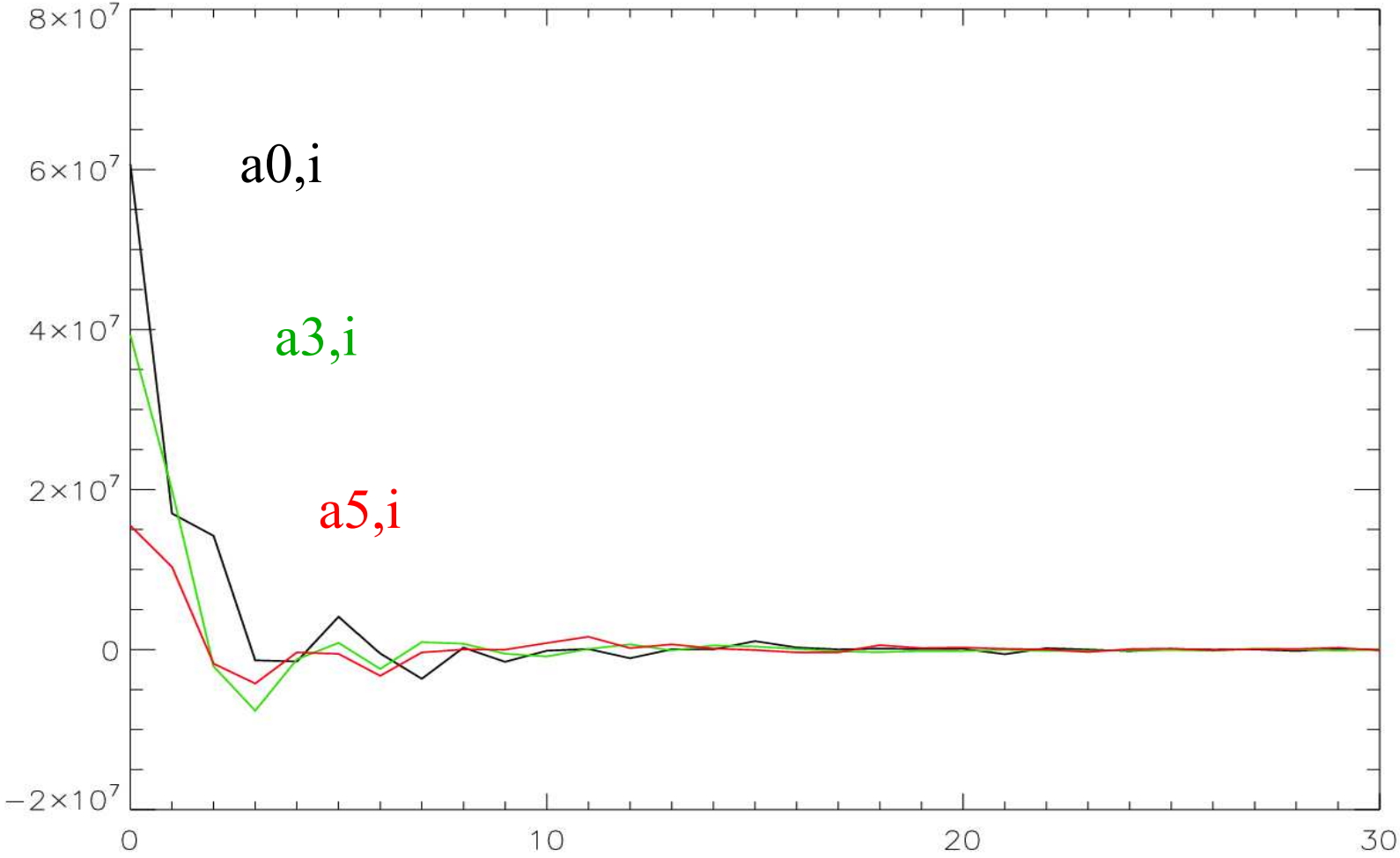


Compression des composantes

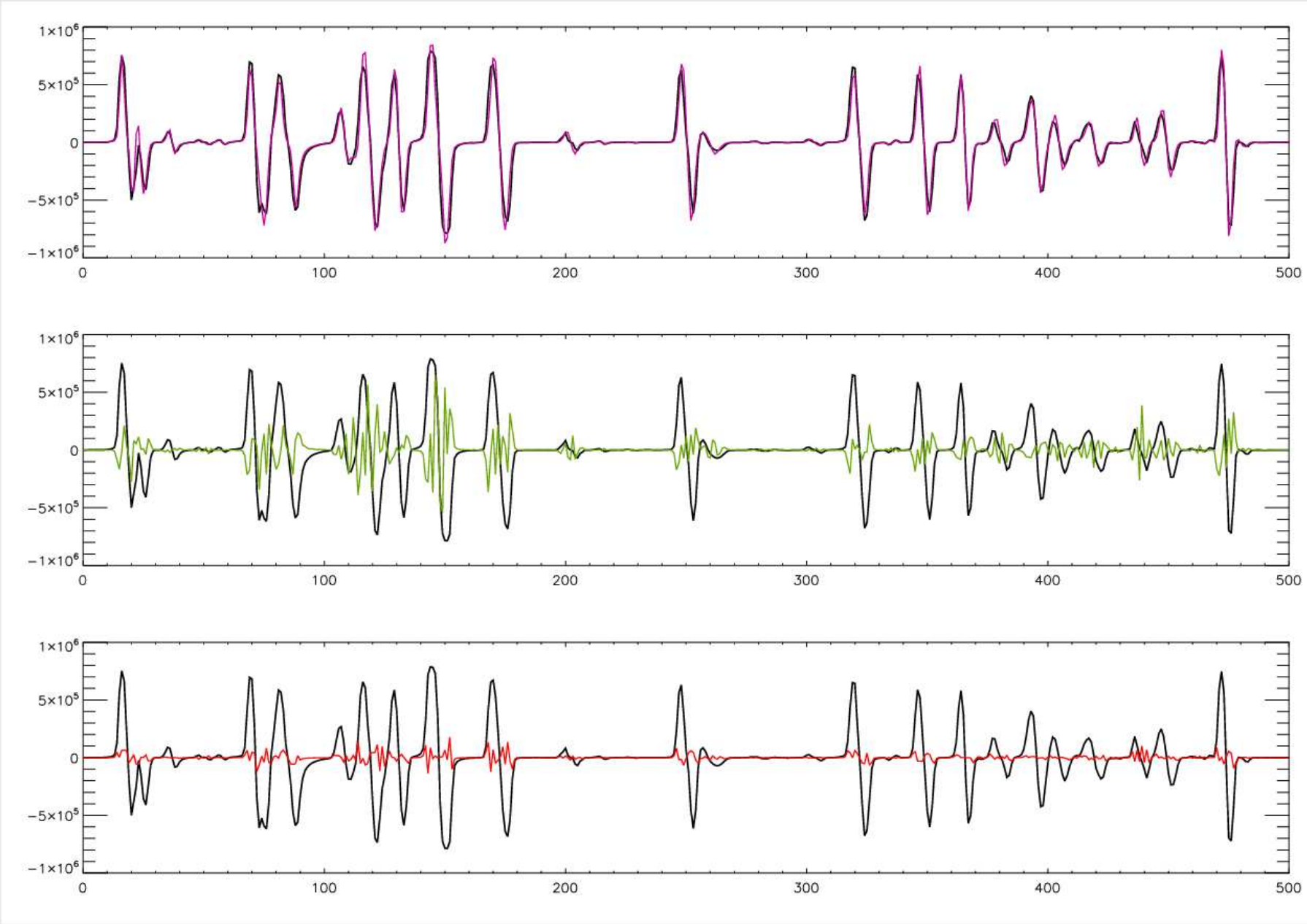


Calcule jusqu'à 70éme coefficient pour chaque composante.

Comparaison des coefficients de trois composantes: P0, P3 et P5 calculées jusqu'au 30éme coefficient

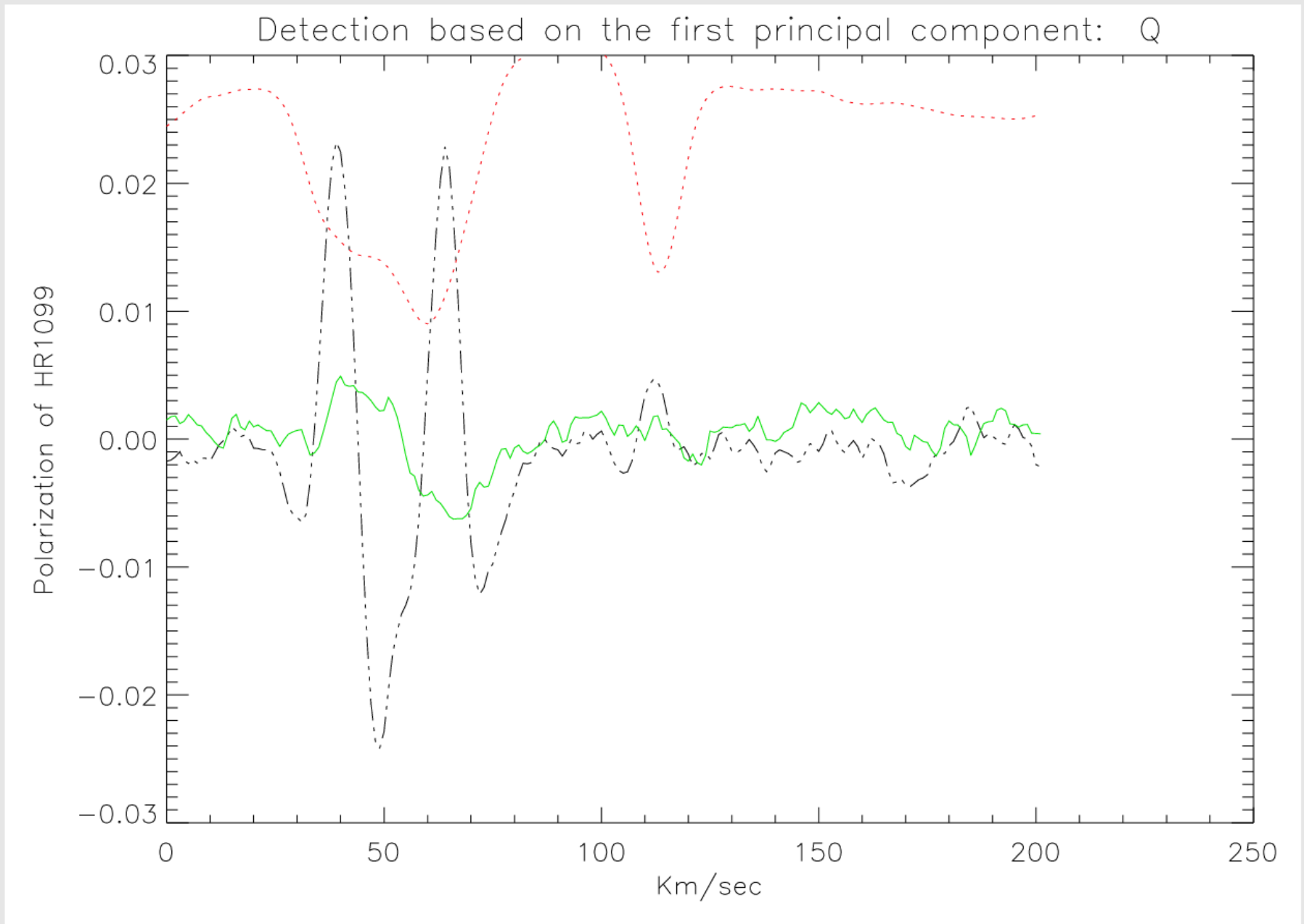


Comparaison d'un profil total f_n avec les composantes: P0, P3 et P5.

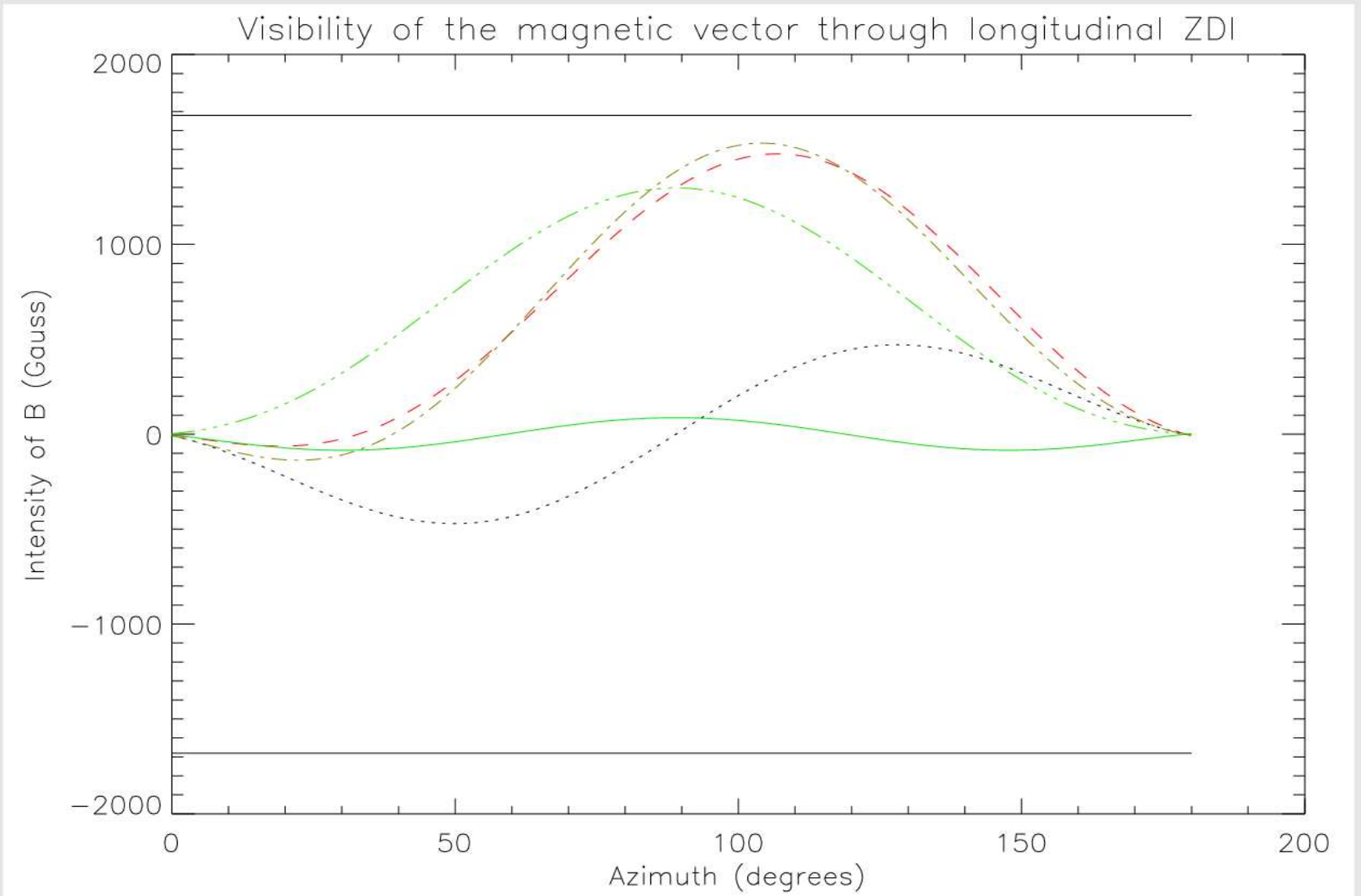


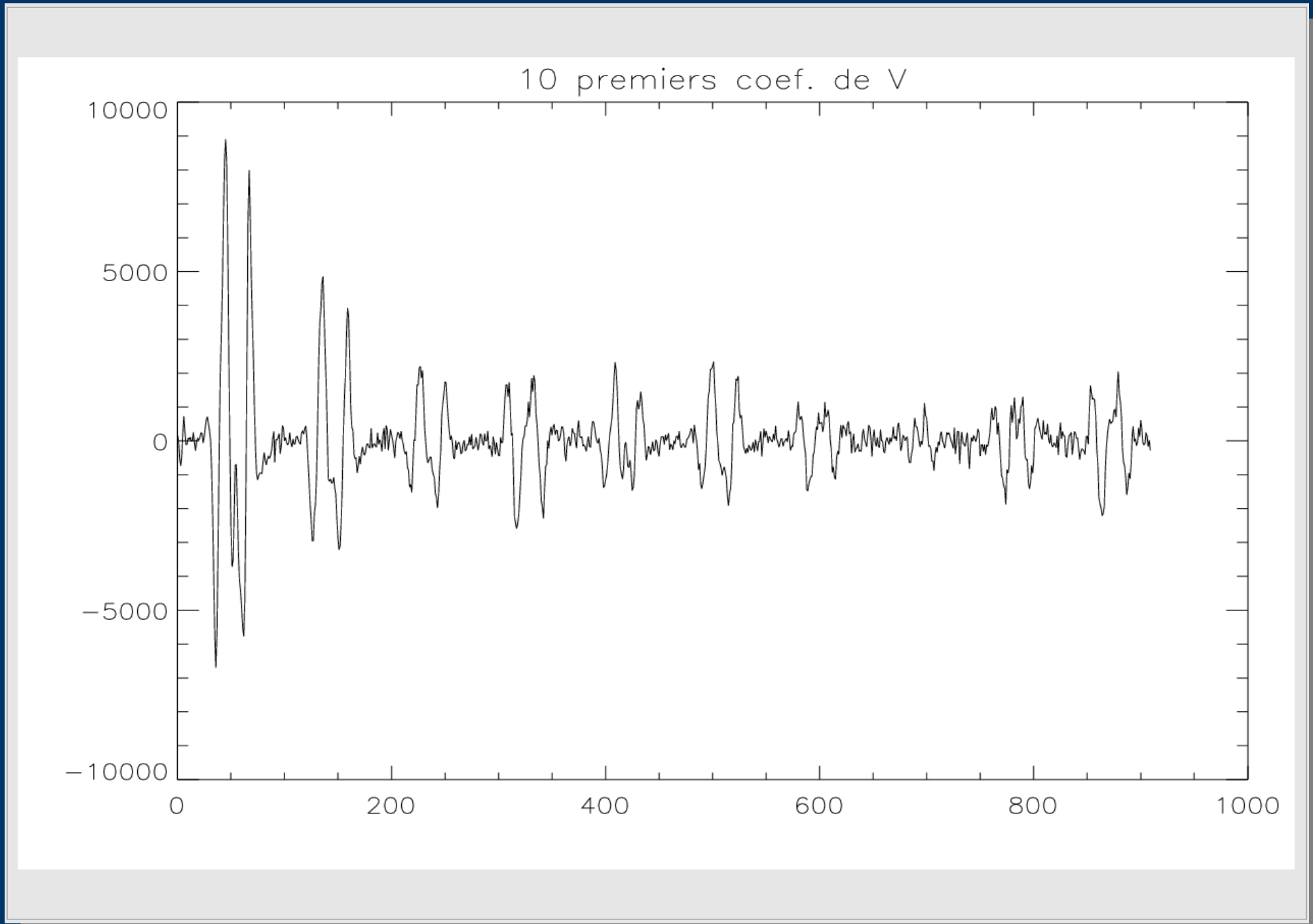
Chaque composante calculée à 70 coefficients.

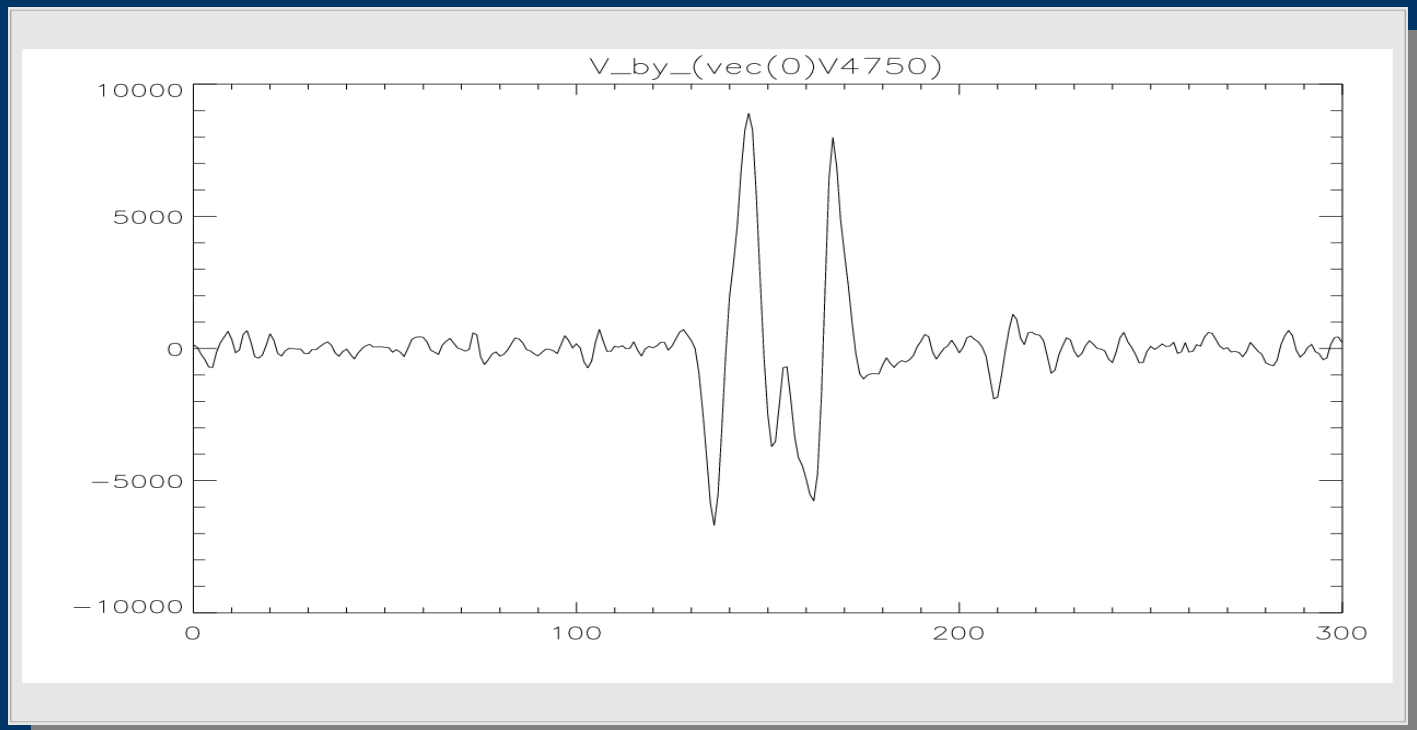
Deuxième Partie

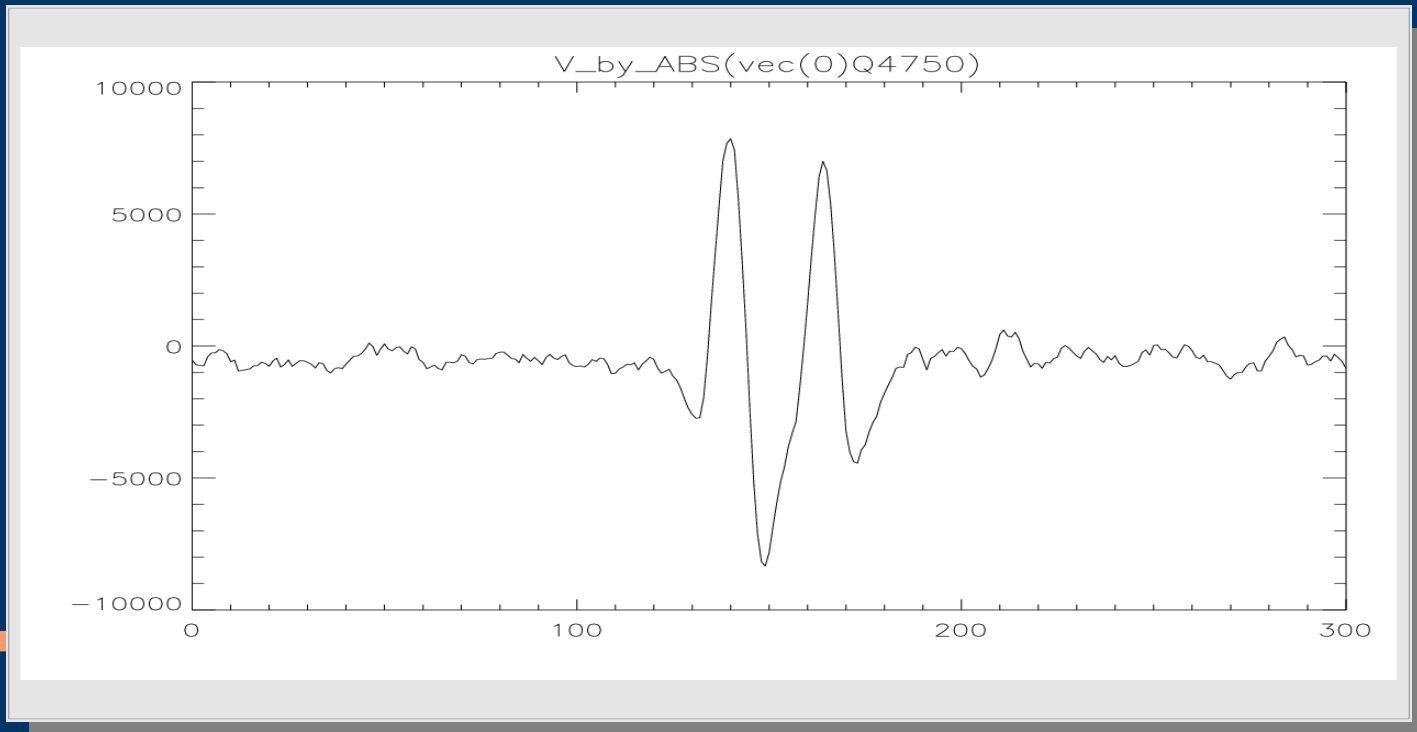

Detection based on the first principal component: Q
Polarization of HR1099
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.03
0
50
100
150
200
250
Km/sec

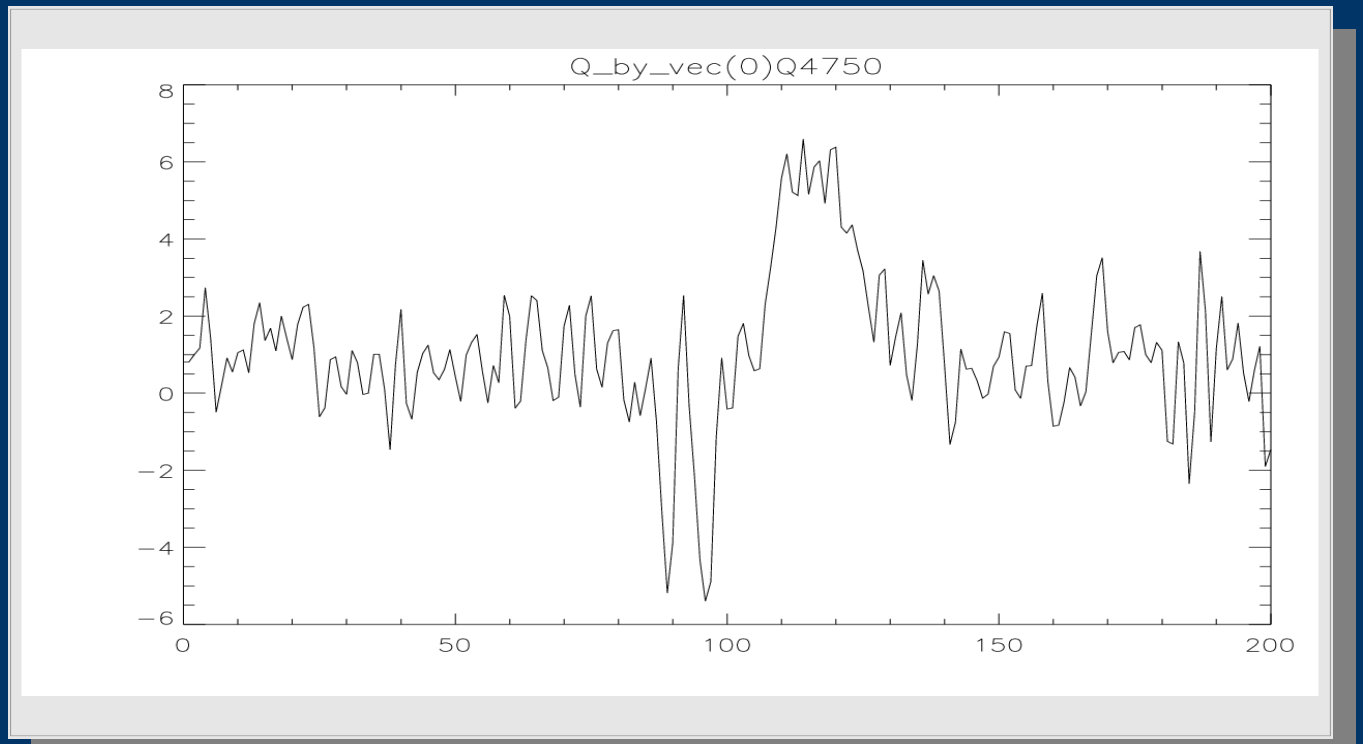

Detection based on the first principal component: V
Polarization of HR1099
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.03
0
50
100
150
200
250
Km/sec

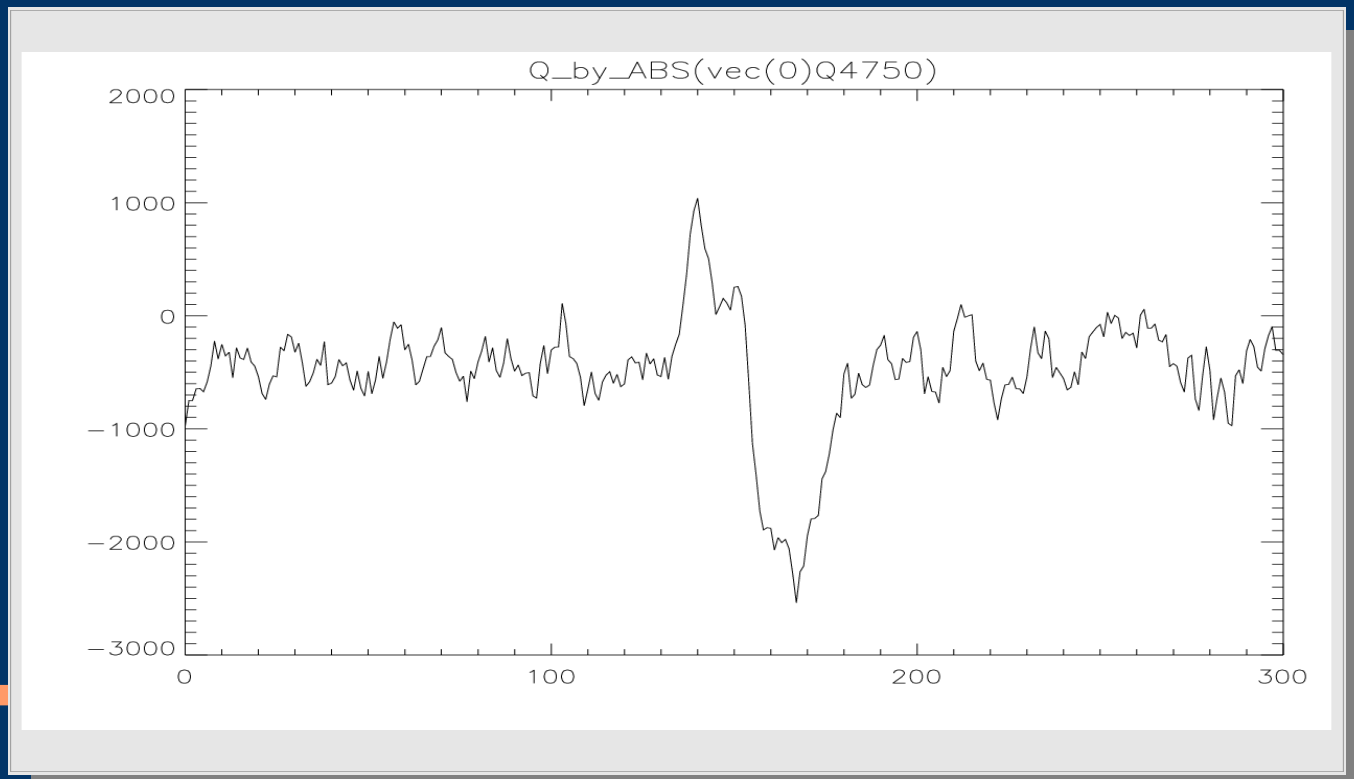

Visibility of the magnetic vector through longitudinal ZDI
2000
1000
0
−1000
−2000
Intensity of B (Gauss)
0
50
100
150
200
Azimuth (degrees)

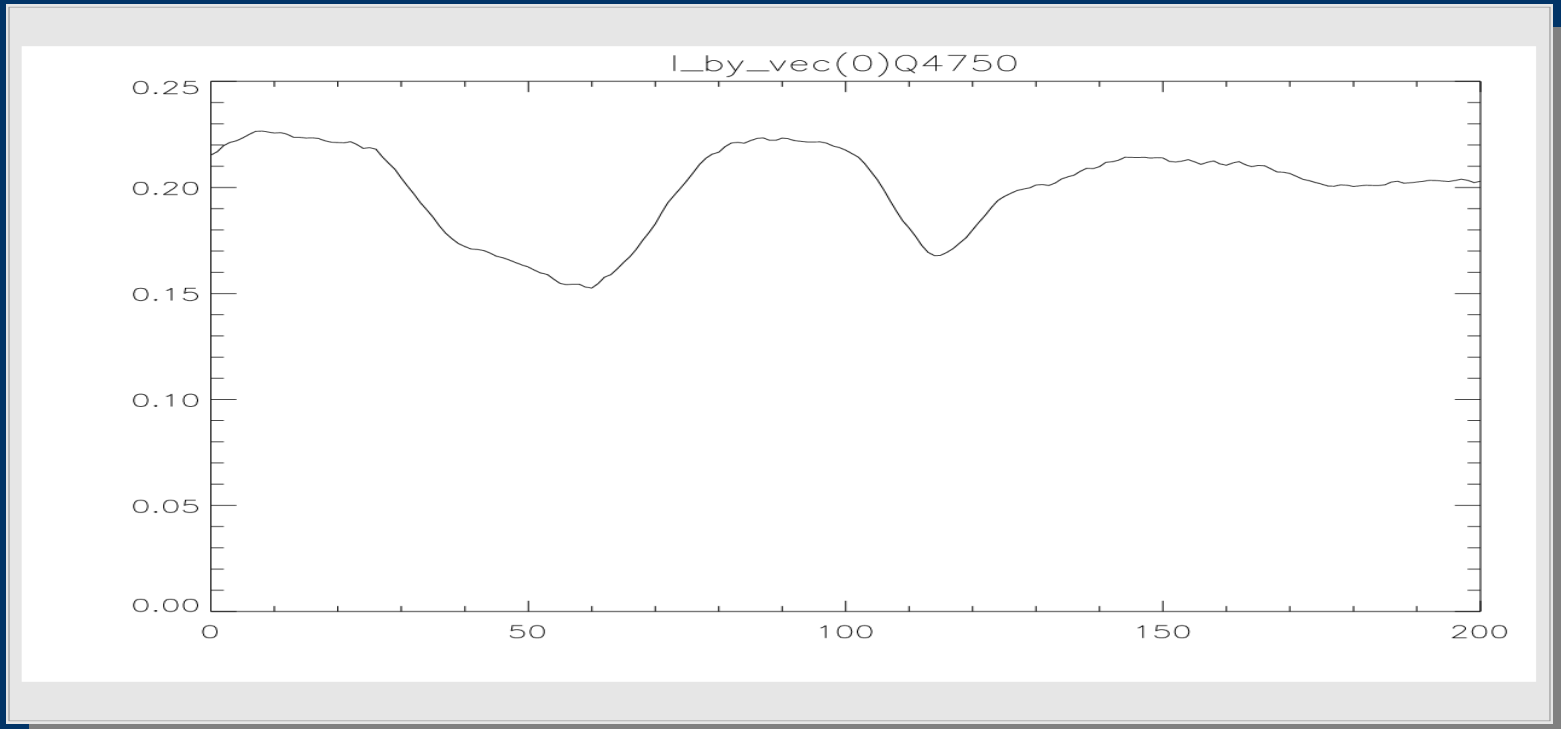

10 premiers coef. de V
10000
5000
0
−5000
−10000
0
200
400
600
800
1000

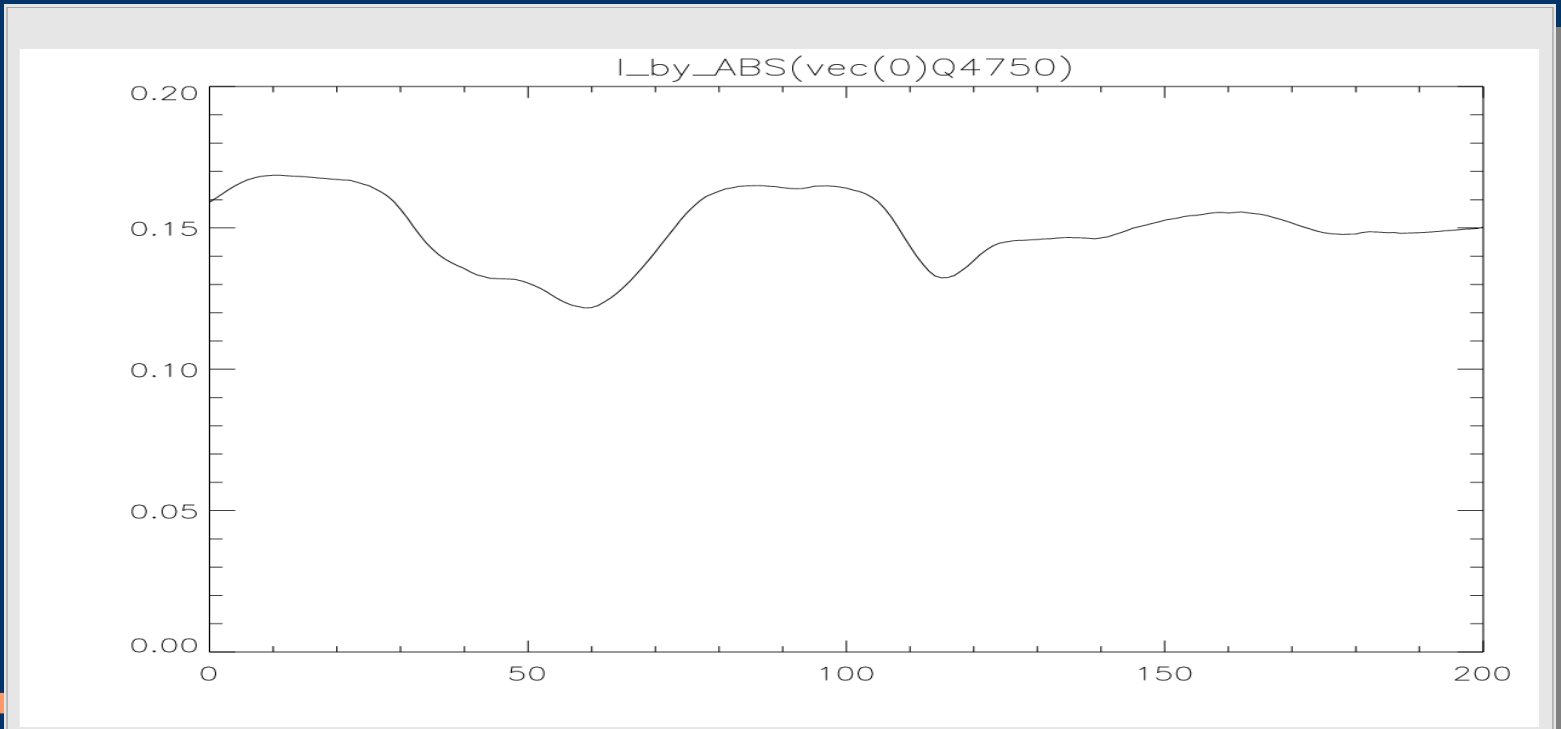

V_by_(vec(0)V4750)
10000
5000
0
−5000
−10000
0
100
200
300

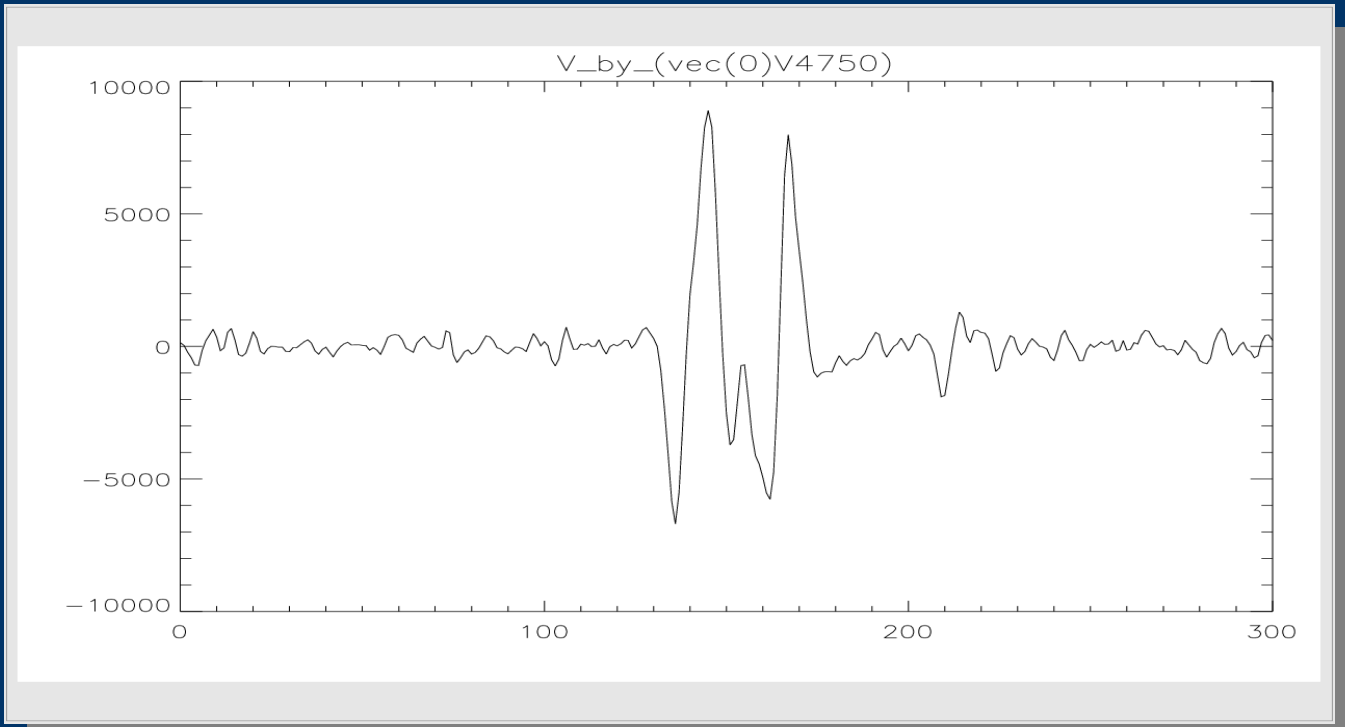

V_by_ABS(vec(0)Q4750)
10000
5000
0
−5000
−10000
0
100
200
300

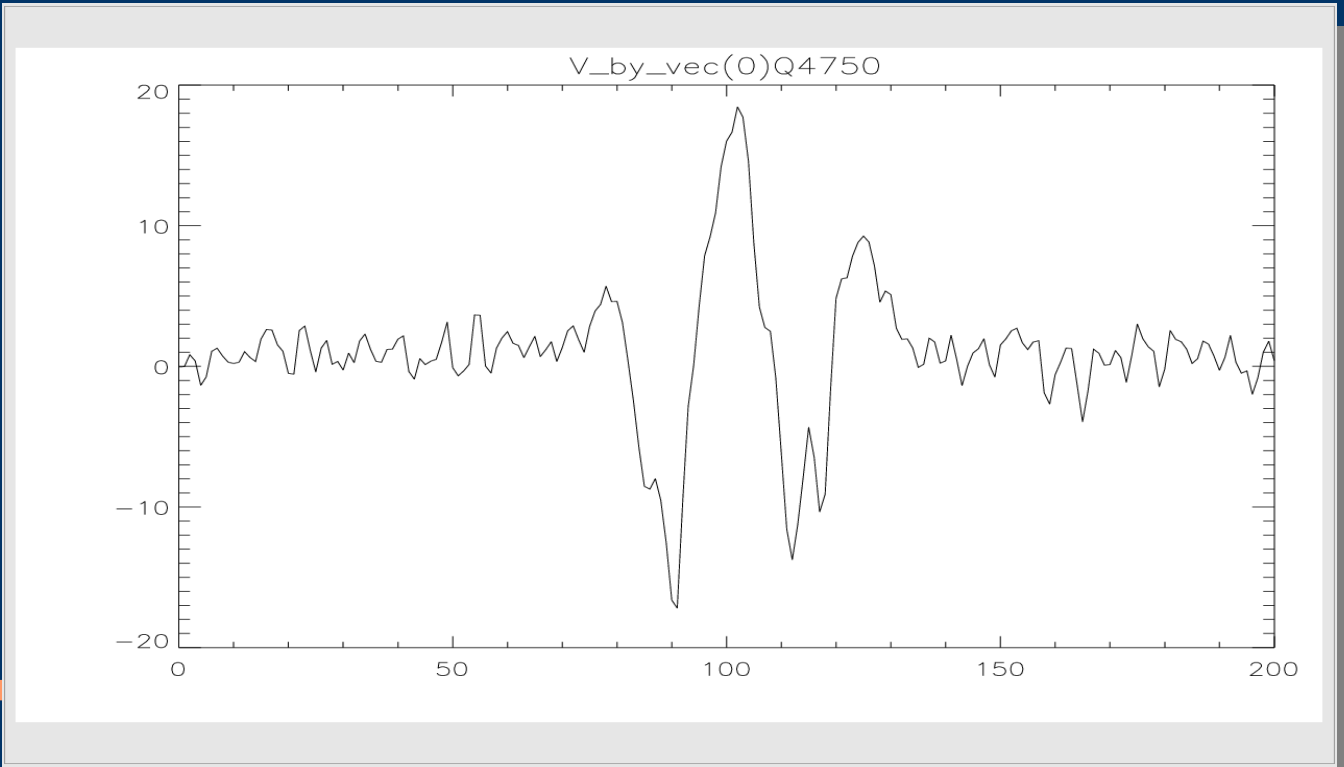

Q_by_vec(0)Q4750
8
6
4
2
0
−2
−4
−6
0
50
100
150
200


Q_by_ABS(vec(0)Q4750)
2000
1000
0
−1000
−2000
−3000
0
100
200
300

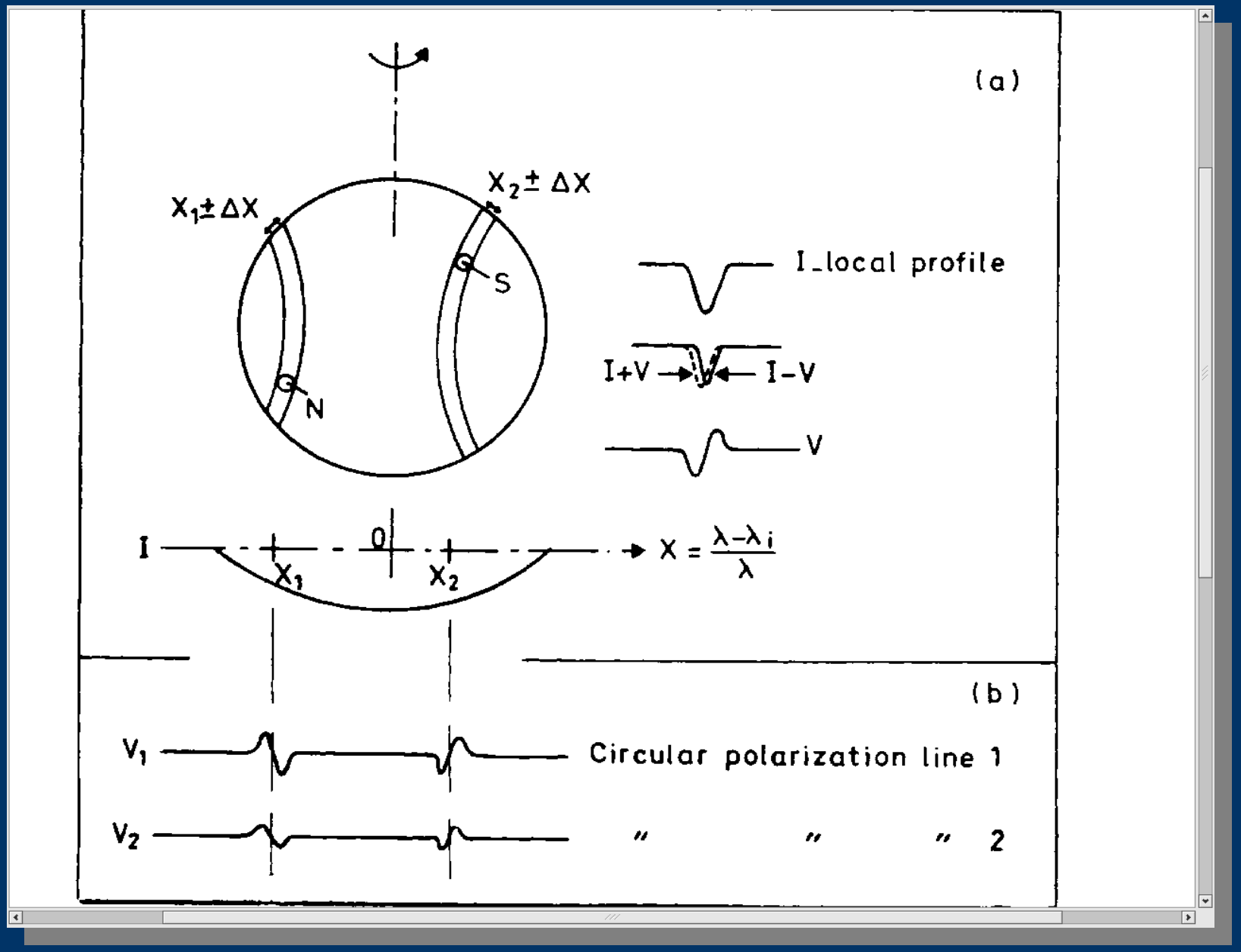

I_by_vec(0)Q4750
0.25
0.20
0.15
0.10
0.05
0.00
0
50
100
150
200


I_by_ABS(vec(0)Q4750)
0.20
0.15
0.10
0.05
0.00
0
50
100
150
200


V_by_(vec(0)V4750)
10000
5000
0
−5000
−10000
0
100
200
300


V_by_vec(0)Q4750
20
10
0
−10
−20
0
50
100
150
200

Principe du spectropolarimetrie stellaire.



CONCLUSIONS

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