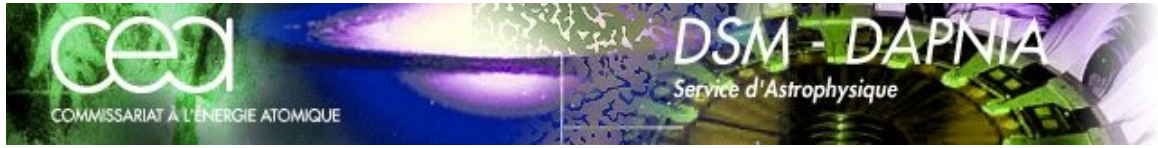


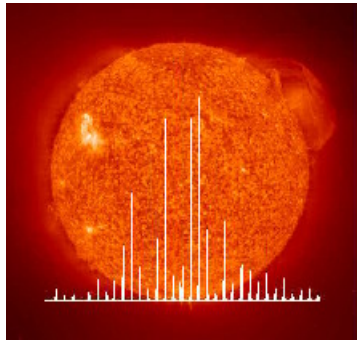
HD-45067

Hare & Hound # 3

by
R.A. García
Service d'Astrophysique CEA Saclay

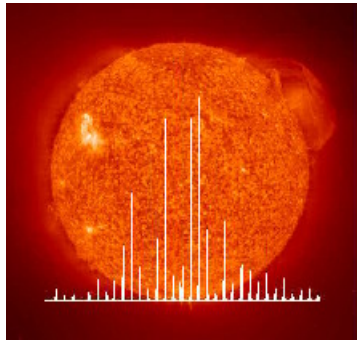
Saclay Team:

S. Turck-Chièze & J. Ballot

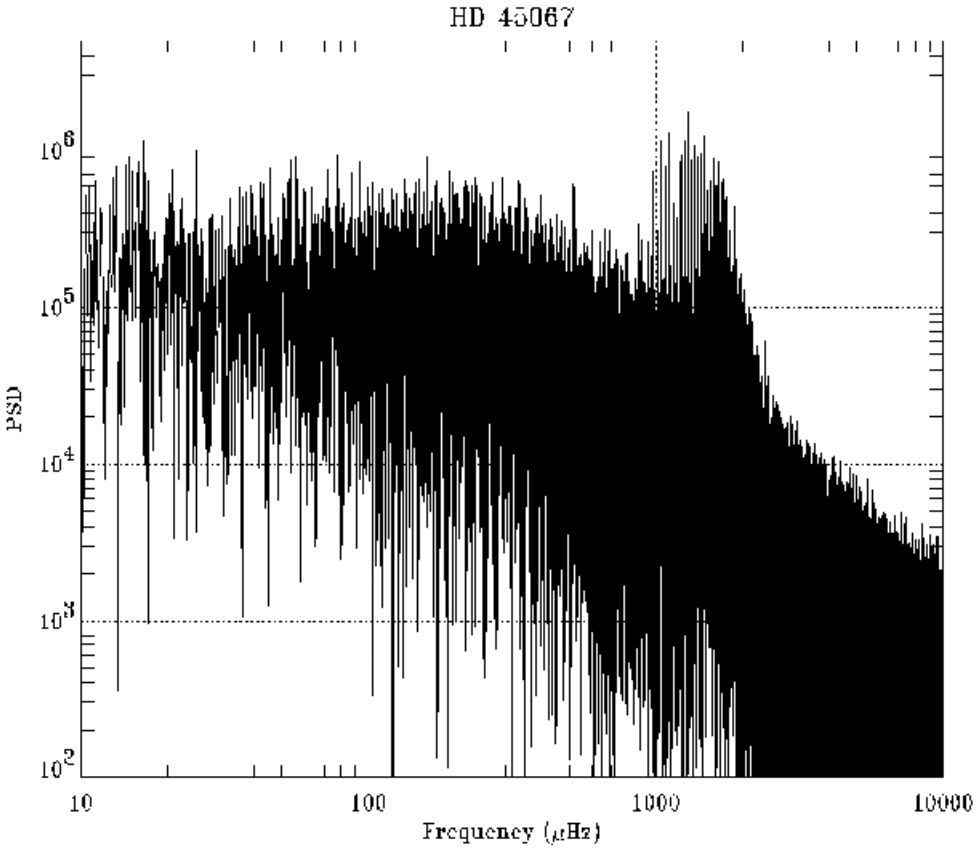


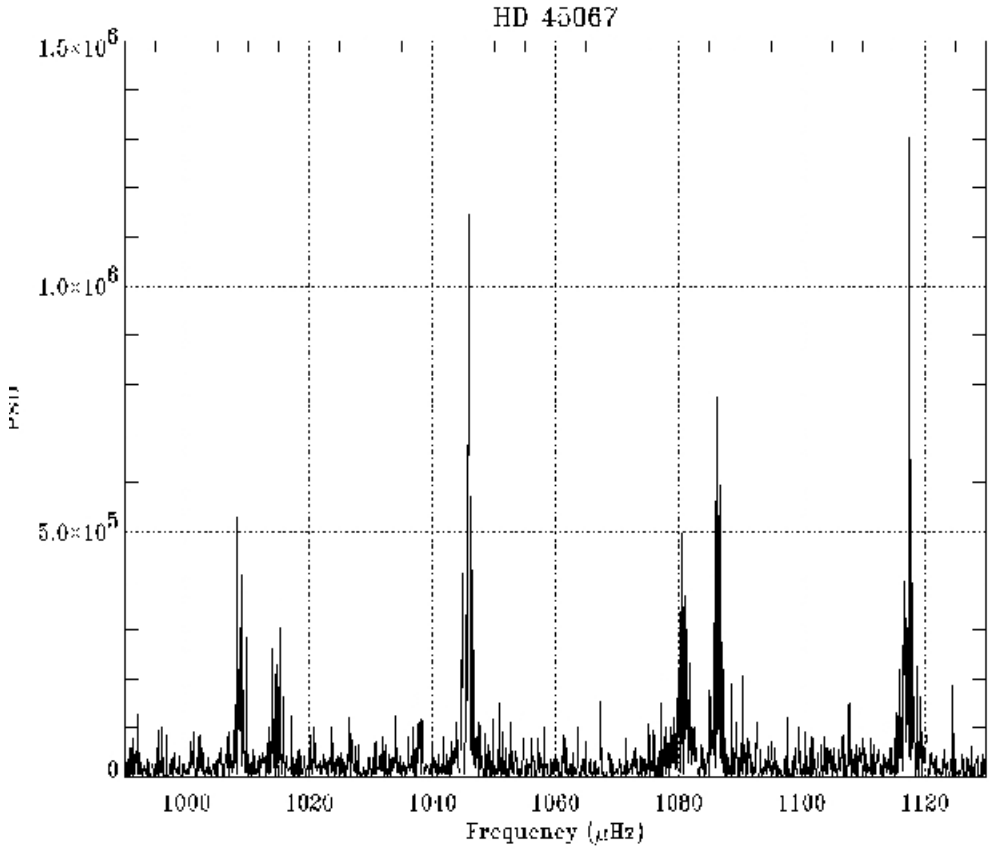
PSD :

- 4 different estimators have been computed:
  - Periodogram (FFT)
  - Multitaper (4 Sine tapers)
  - Zero Padded Periodogram (4 times)
  - Averaged cross spectrum

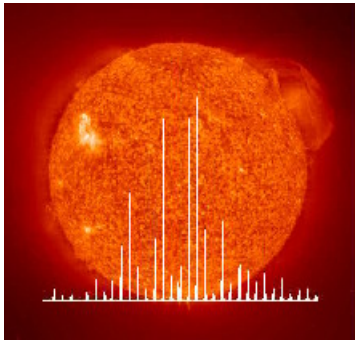


Periodogram :

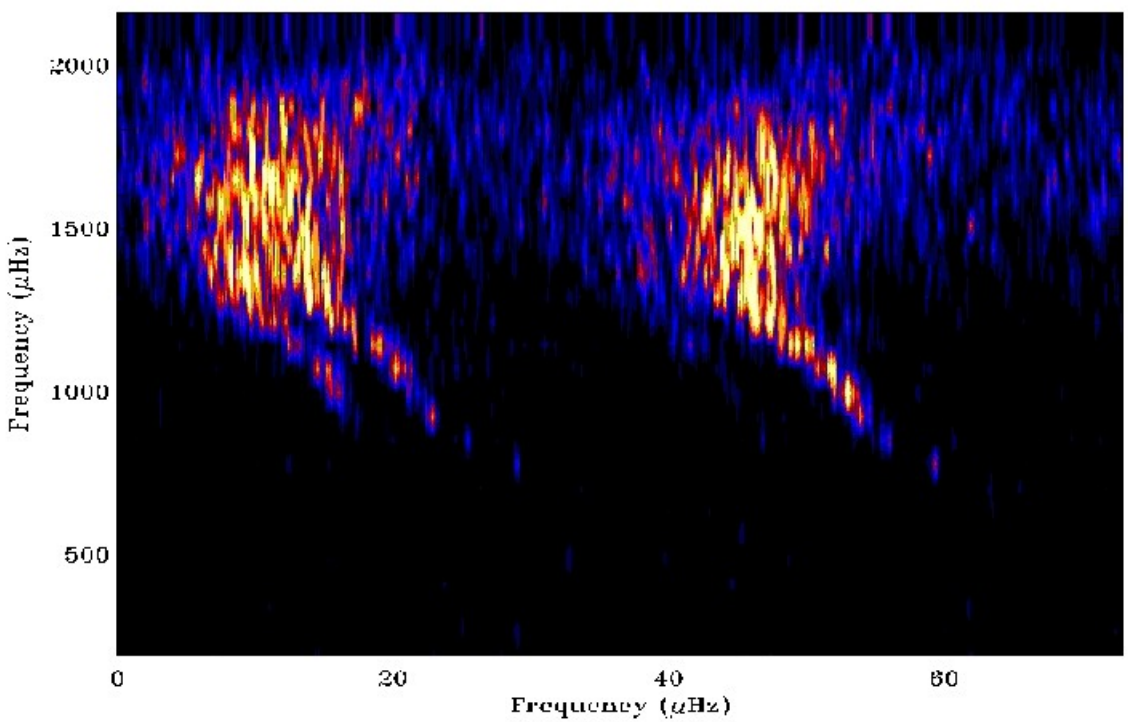


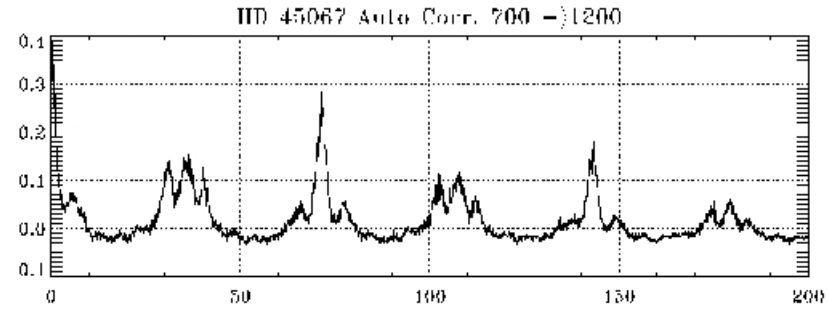


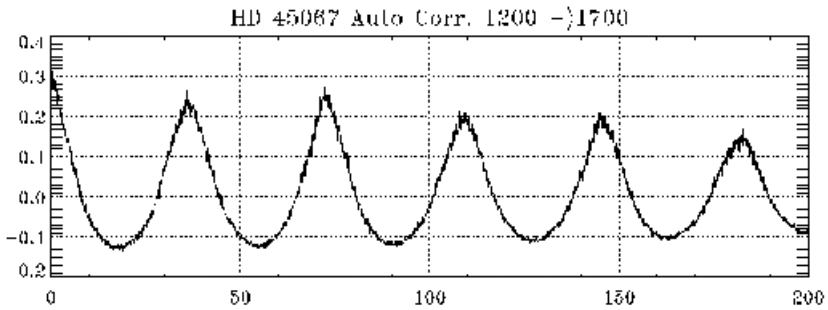
- Background fitted with a 2 elements Harvey model
- 2 groups of modes are clearly identified
- The individual multiplets are not directly recognized



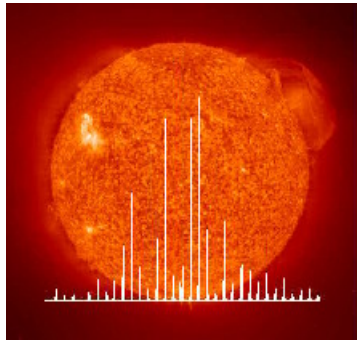
Identifying the modes :





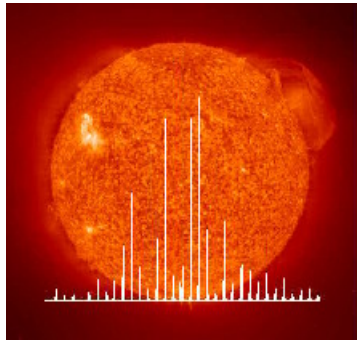


- Distance between the two left structures changing with frequency =>
  - Different modes not a “changing” splitting
- Amplitude ratio => doublet l=0-2 and l=1
- From the autocorrelation: Small and big differences
  - Constructing guessing frequencies for the fit



Fitting model

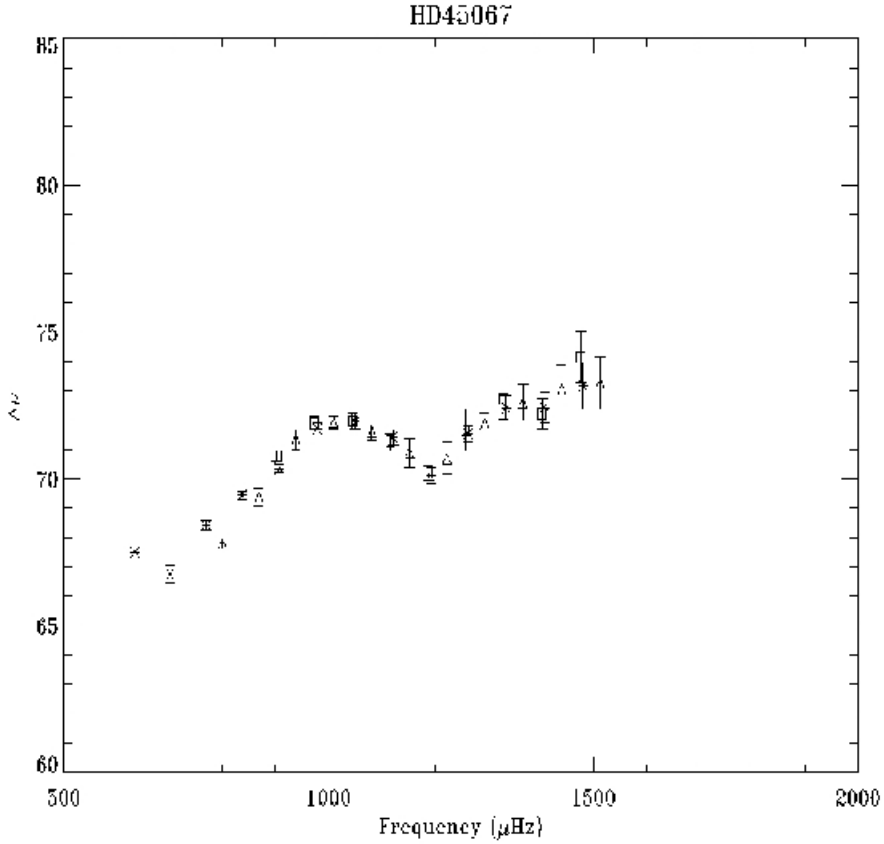
- Symmetric and asymmetric profiles used
  - No systematic differences observed on the resultant frequencies
- Fitted parameters: Frequency, amplitude, Line-width
  - First step:
    - fitting only one lorentzian profile per mode
      - The asymmetry takes into account the asymmetry of the whole mode
      - Better determination of the central frequencies
  - Second step:
    - Using the new guessing table
      - free splitting and different fixed amplitude ratios of the components of the multiplets
      - Fixed splitting to the most common value found (~800 nHz)
- This process has been repeated for the 4 Fourier estimators



DSM - DAPNIA SAp

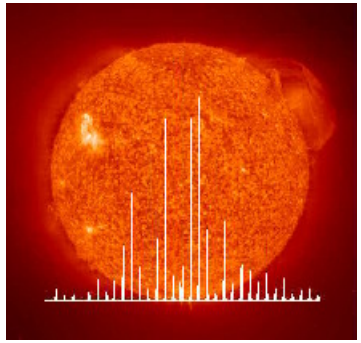
Results :

l=0	l=1	l=2	l=3
* 530.5170 0.13			
* 600.1405 0.1227			
* 667.6530 0.2413			
734.4192 0.1332	765.3281 0.1320		
802.8481 0.0893	833.1413 0.1070	866.4656 0.1602	
872.3123 0.1149	902.5326 0.2750	937.2448 0.0804	
942.6650 0.1042	973.8620 0.1706	1009.1386 0.2244	
1014.3876 0.1930	1045.7911 0.1186	1081.0989 0.2060	
1086.3512 0.1376	1117.3852 0.2129	1152.3626 0.1874	1181.6210
1157.7844 0.2039	1188.2857 0.4551	1222.6506 0.2759	1252.1820
1227.9085 0.1812	1258.9915 0.2774	1294.3077 0.6501	1324.2065
1299.4447 0.2135	1330.8657 0.2434	1367.0392 0.2661	0 0
1371.8733 0.3462	1403.4696 0.5409	1439.2745 0.4578	1468.8972
1444.3102 0.3877	1476.5164 0.6188	1513.4282 0.7430	
1517.4924 0.6915	1549.8008 0.6593		
0 0	1622.9331 0.6533		
0 0	1696.2605 0.6527		
0 0	1769.5830 0.6735		

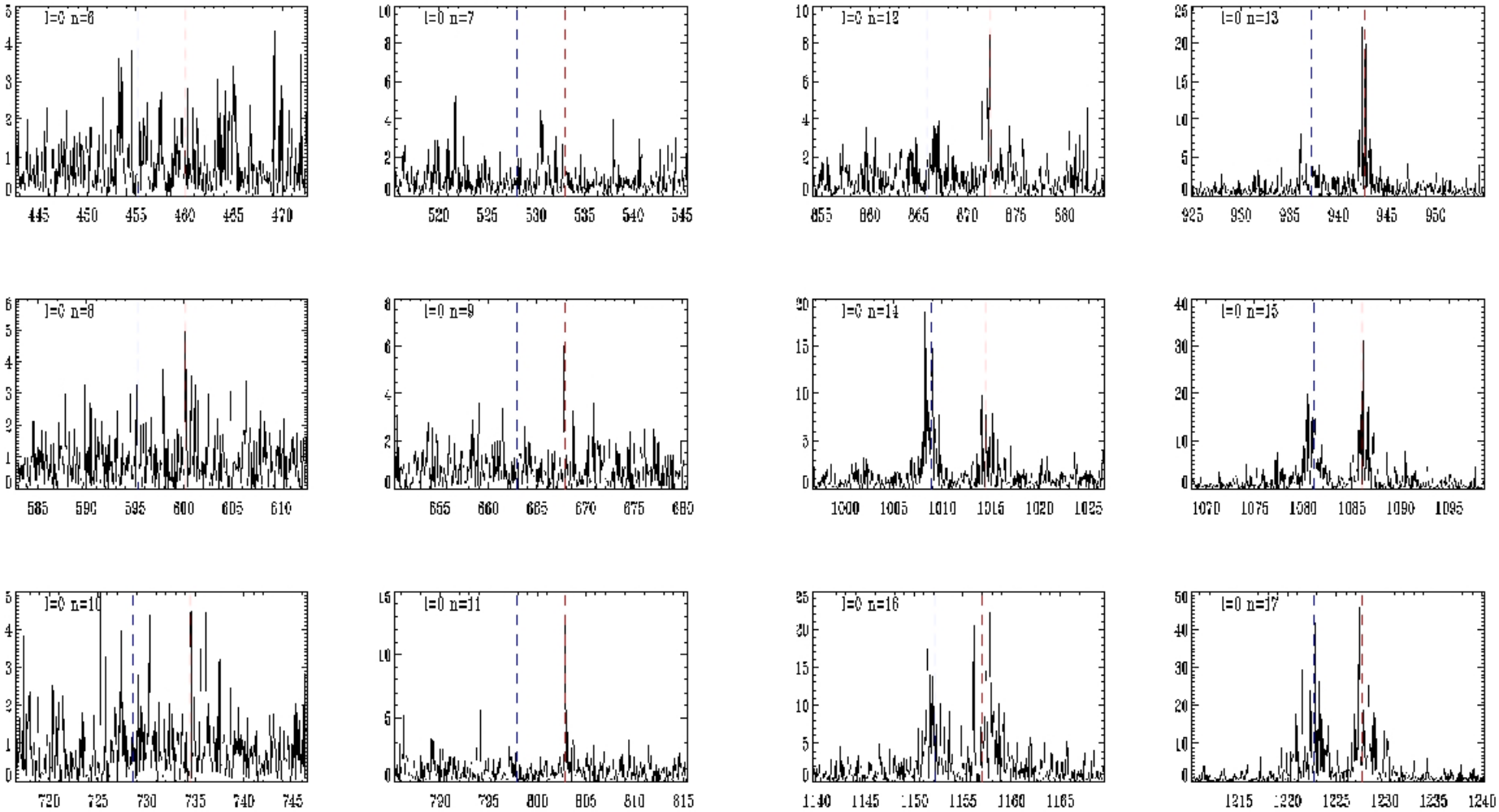


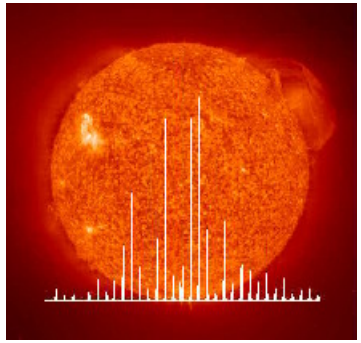
Resultant frequencies and Big difference

* Candidate modes (not present in all the estimators)



Periodogram (l=0):

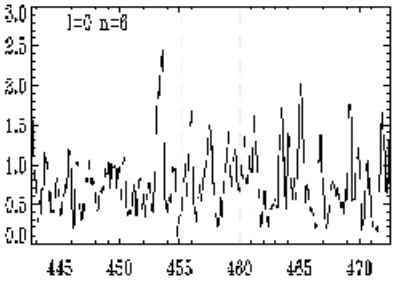


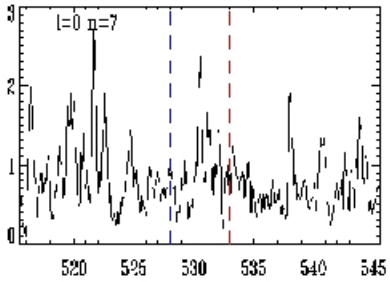


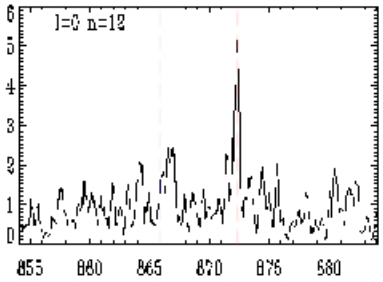
DSM - DAPNIA

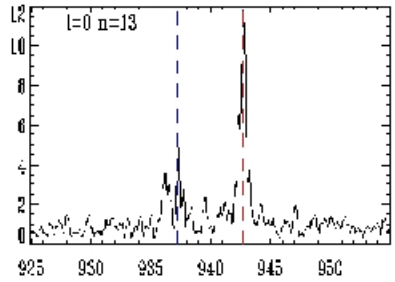
SAp

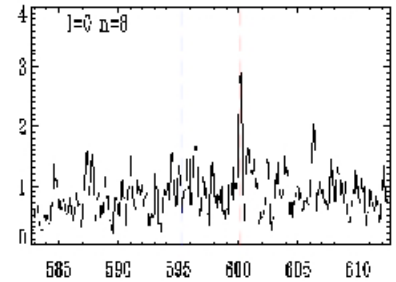
Multitaper (l=0):

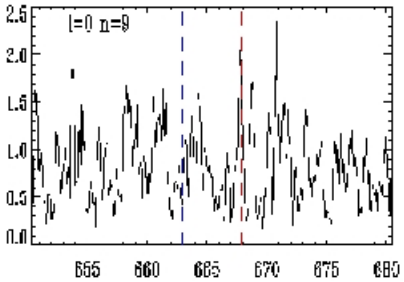


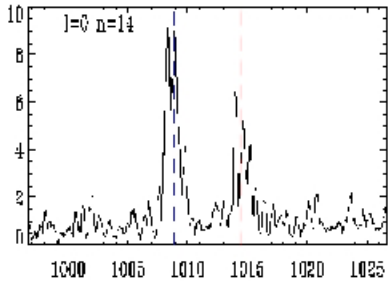


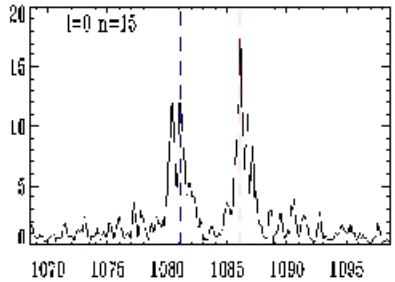


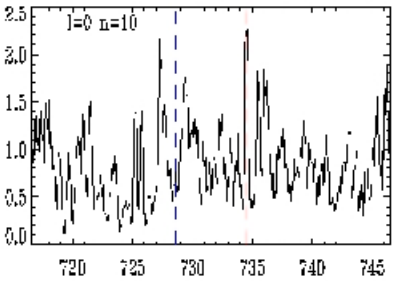


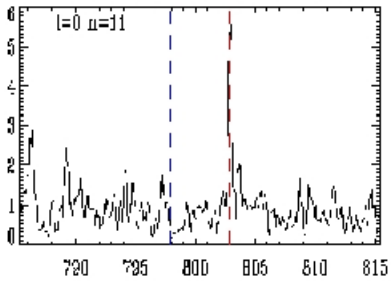


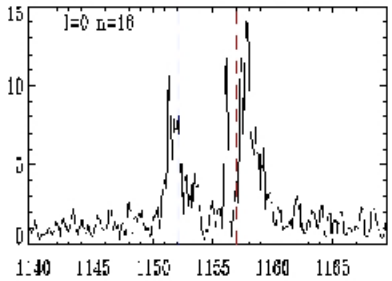


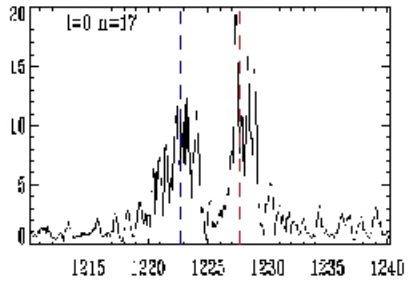


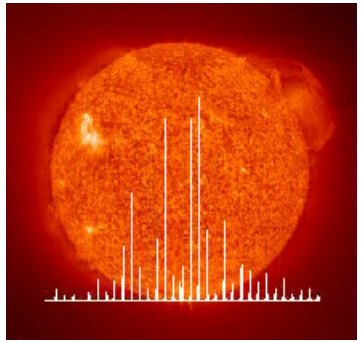




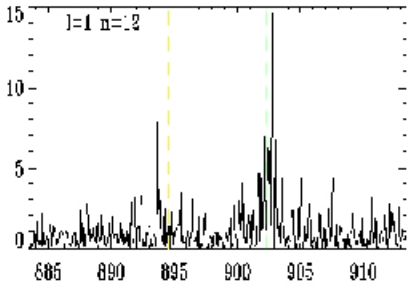


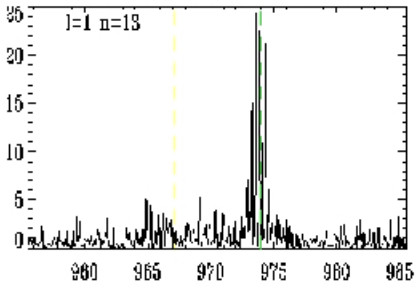


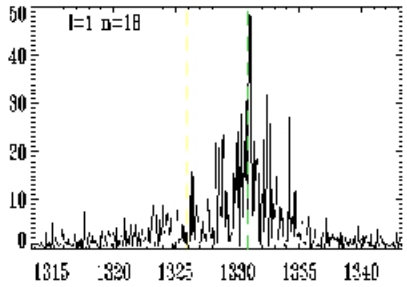


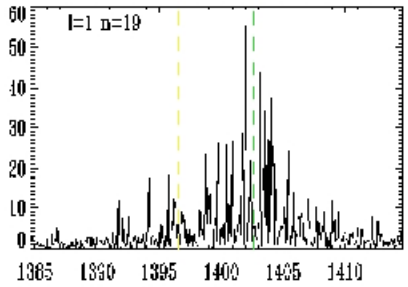


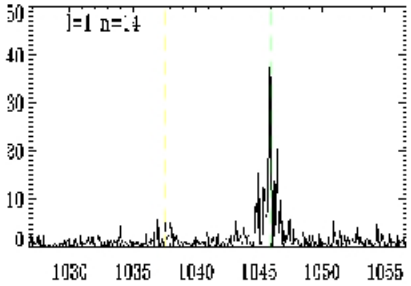
Periodogram (l=1)

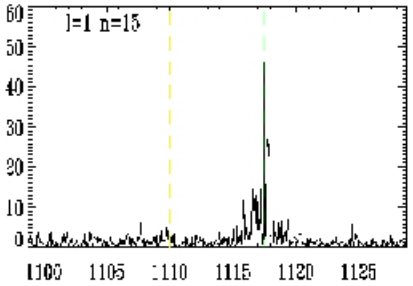


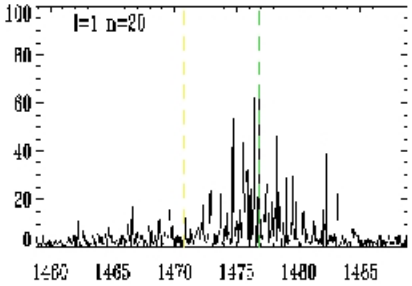


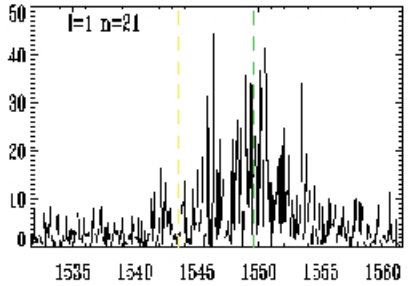


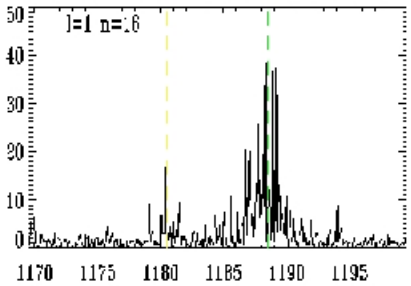


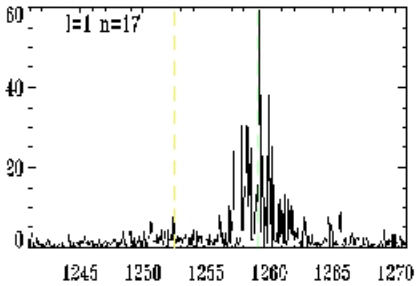


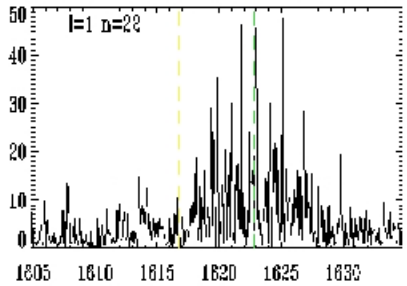


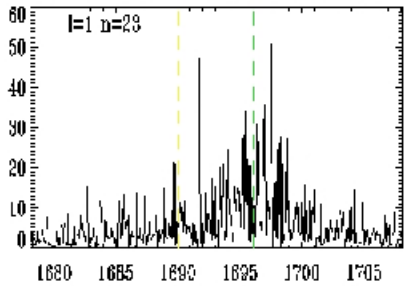


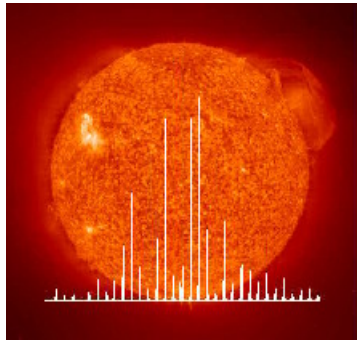








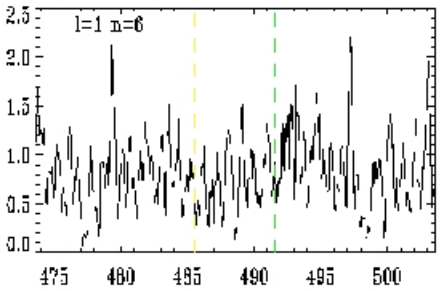


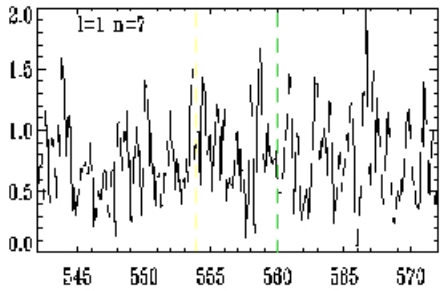


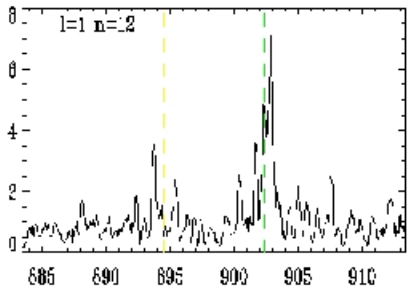
DSM - DAPNIA

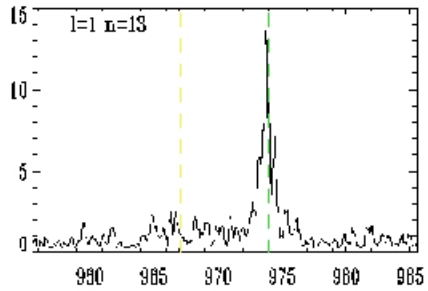
SAp

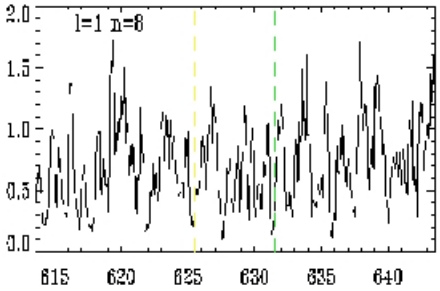
Multitaper (l=1)

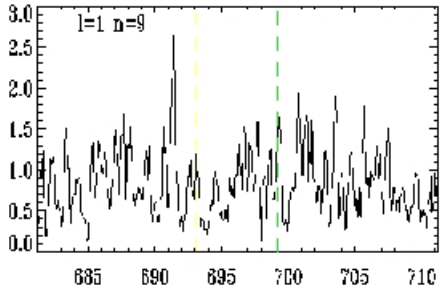


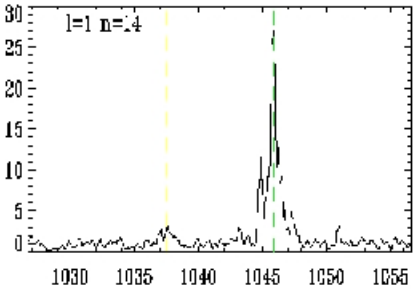


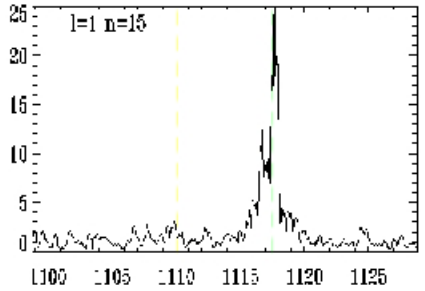


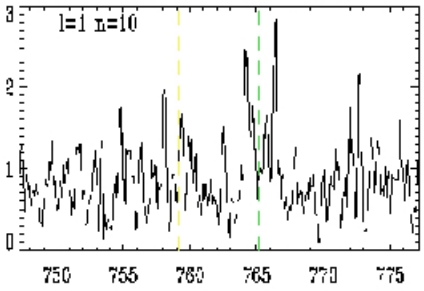


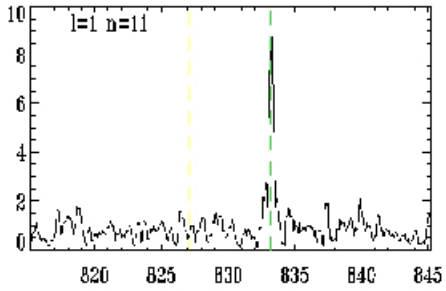


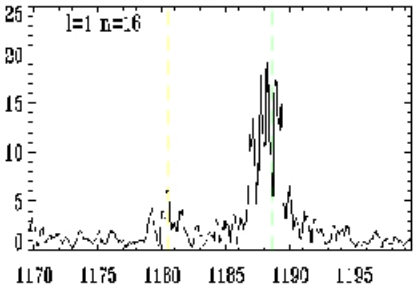


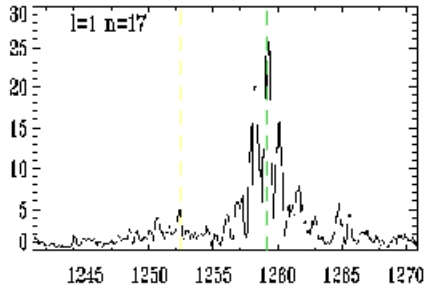


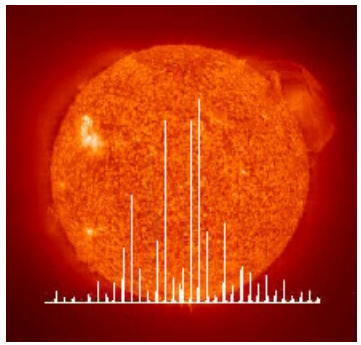












CONCLUSIONS :

- Improving the algorithm for :
  - Fully automatic research
  - Find a criteria to select the modes form the different computed estimators
  - When a fit fails:
    - To reduce the number of free parameters
    - Using general trends for Amplitude & Line-width
- How to determine the splitting????
  - Is it a key parameter for the Stellar models????