GWP-S-650-08000 **Radial velocity by CC in Fourier space**

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CYCLE 2

GWP-S-650-09000 **V sin *i* determination in Fourier space**

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CYCLE 3

GWP-S-650-08000

Radial velocity by CC in Fourier space – The method

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C. Delle Luche

Petrov et al. (1986):

$$I(\nu) = S_r(\nu)\, S^*(\nu)$$

$I(\nu)$ = **Fourier** Cross-spectrum

$S_r(\nu)$ = **Fourier** transform of the template: $S_r(\lambda)$

$S(\nu)$ = **Fourier** transform of the spectrum: $S(\lambda)$

If good template: $S(\lambda) \sim S_r(\lambda - \lambda\, u/c)$

$$I(\nu) \sim e^{2i\pi\lambda_0 u/c} \,|\, S_r(\nu) \,|^2$$

Chelli (2000): $\times\ e^{-2i\pi\lambda_0 v/c}$

when: $v \rightarrow u$

then: $\mathrm{Im}\left(\frac{I(\nu) \times e^{-2i\pi\lambda_0 v/c}}{\sigma} \right) \rightarrow 0$

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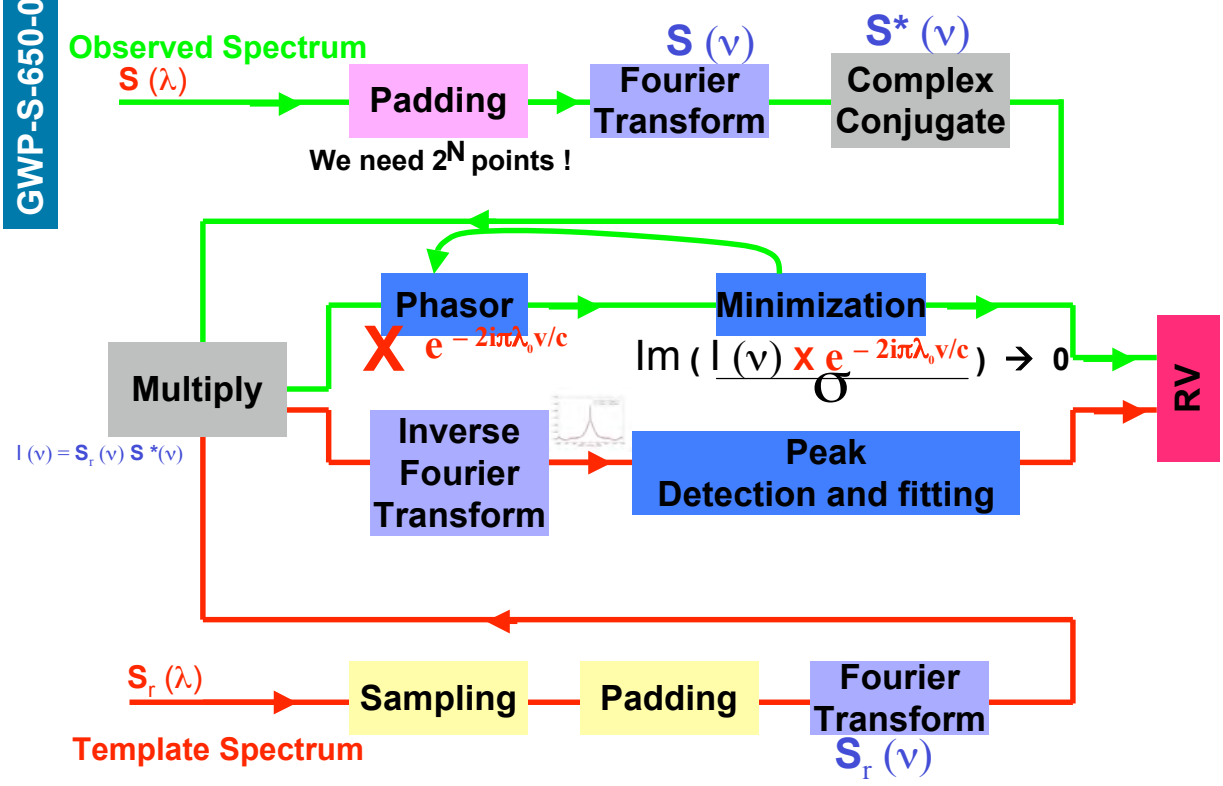
Radial velocity by CC in Fourier space – The Procedure



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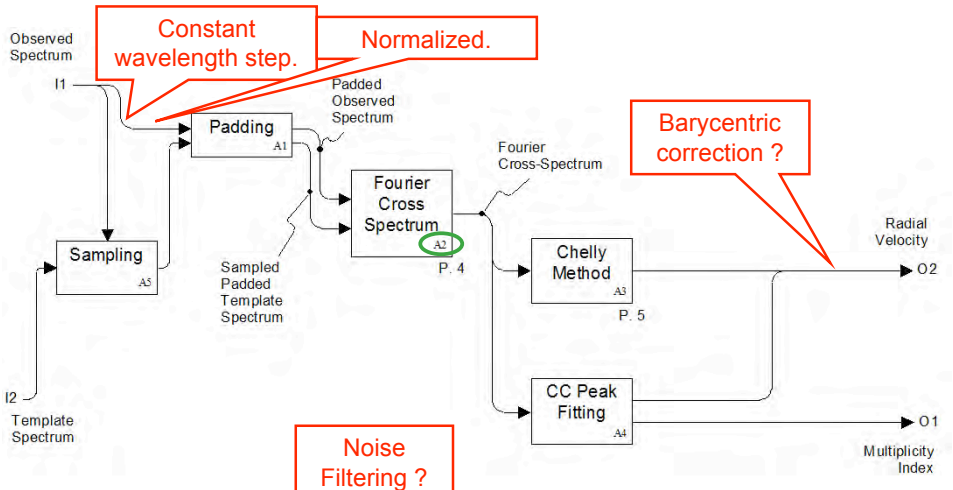
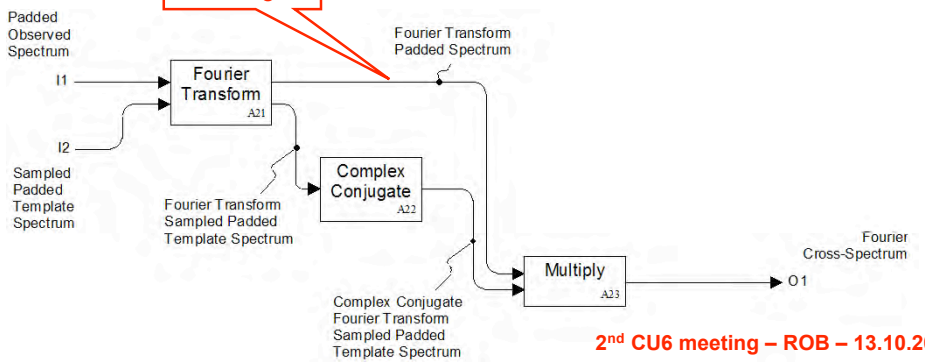
Radial velocity by CC in Fourier space – SADT



A2 :



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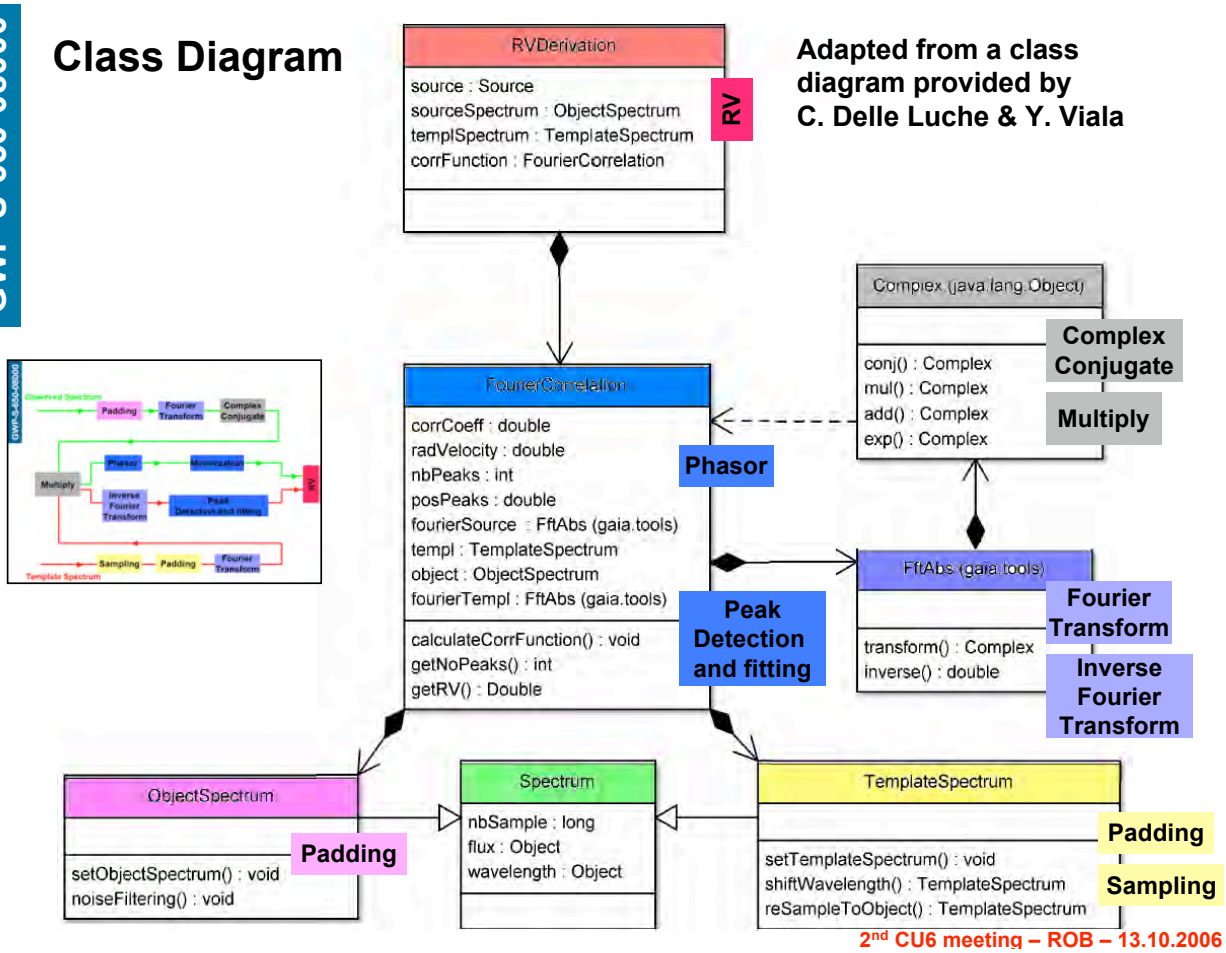
Class Diagram



Adapted from a class diagram provided by C. Delle Luche & Y. Viala

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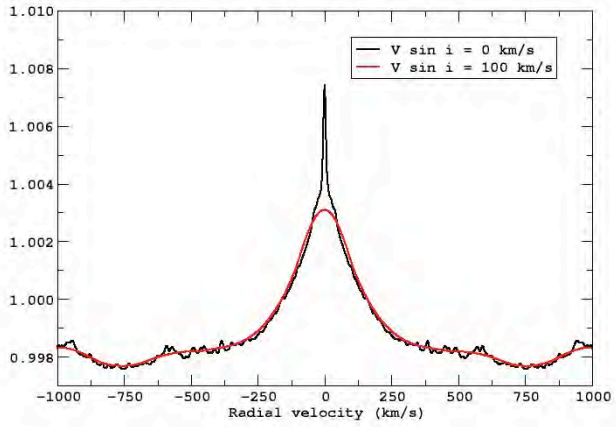
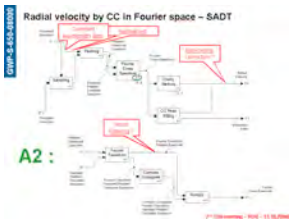
First tests with the FORTRAN-prototype

CC between 847 – 874 nm



Teff = 5500 K
log g = 4.50
RV = 20 km/s



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Very simple normalisation procedure

Applied to the observations and to the template

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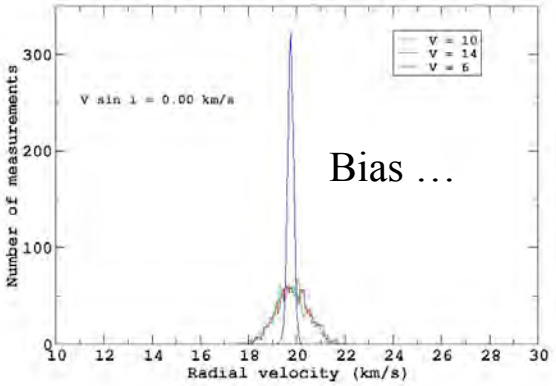
First tests with the FORTRAN-prototype

1000 trials



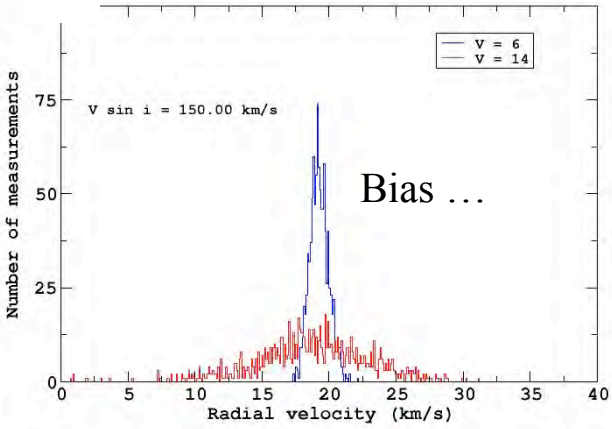
Teff = 5500 K
log g = 4.50
RV = 20 km/s

CC between 847 – 874 nm
Single transit

Magnitude V = 6 : **RV = 19.75 ± 0.15 km/s**
Magnitude V = 10 : **RV = 19.79 ± 0.81 km/s**
Magnitude V = 14 : **RV = 19.84 ± 0.83 km/s**

Magnitude V = 6 : **RV = 19.27 ± 0.81 km/s**
Magnitude V = 14 : **RV = 18.94 ± 4.42 km/s**

	11.5	12.5	13.5	14.5	15.5	16.5	17.0	17.5
K0V	≤ 1	≤ 1		2.0	4.8	12.0	22.0	
K0III	≤ 1	≤ 1						
K0III MP	≤ 1	≤ 1						
G0V	≤ 1	≤ 1		3.1	7.5	20.3	> 30.0	> 30.0
F0V					12.5		> 30.0	> 30.0
A0V				15.1			> 30.0	> 30.0
B0V							> 30.0	> 30.0



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Development plan

- 3 Nov. 06: Delivery of the Software Requirements Document (SRD).
- 1 Dec. 06: Delivery of the Software Design Document (SDD).
- 30 March 07: Delivery of the software products, of the Performance Report Document (PRD) and of the Software User Manual (SUM).
- 11 May 07: completion of the software integration, validation and test.

Mid – December 2006: end of the fortran prototype test phase. Starting the JAVA implementation of the PETROV/CHELLI algorithm.

Beginning March 2006: Tests of the JAVA algorithm.