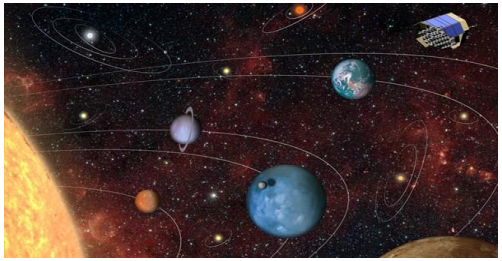


Splinter sessions

Observatoire de Paris

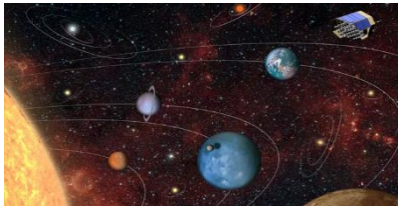
MJ Goupil- K Belkacem

1. WP 120 responsabilities
2. Stars of the core program
3. WP120 structure
4. Example of a pipeline
5. WP120 definition document
6. HH1 and issues
7. Splinter sessions

Paris April 9-10th 2015

WP120 responsabilities

Or what have we promised ?

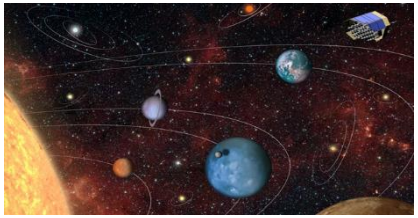


Deliverables by PDC

Calibrated light curves and centroid curves	DP1	L1
Planetary candidate transits and their parameters	DP2	L2
Asteroseismic mode parameters	DP3	L2
Stellar rotation and activity	DP4	L2
Stellar masses and ages	DP5	L2
Confirmed planetary systems and their characteristics	DP6	L2

Specifications from WP120

WP120 responsabilities



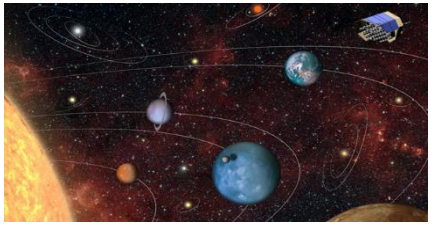
1. to provide specifications to determine all possible characteristics **of stars of the core program**

- *stellar mass, radius and age*
- *stellar activity, rotation, inclination angle, limb darkening, …*

2. Grids of stellar models, evolutionary and oscillation code(s)

3. Validation of PDC implementation

WP120 responsabilities



Specifications for stellar mass, radius and age **with an accuracy of:**

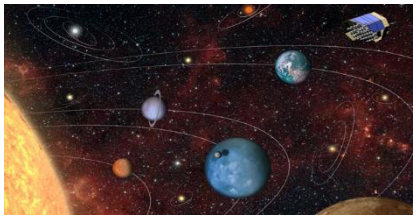
- Radius ~ 1% for the reference^* star with mv=10 (goal mv=11) (R-SCI-L0-55)

- Age ~ 10% for the reference star with mv=10 (goal mv=11) (R-SCI-L0-12)

- Mass of a planet orbiting a reference GOV (bright enough) star : 10% or better (R-SCI-L0-15)

*Reference star : a G0V star with 6000 K, $1R_{\odot}$, $1M_{\odot}$

Stars of the core science



Seismic core program

Later than F5; mass up to 1.4-1.5 Msun

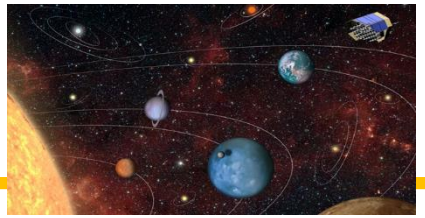
Planet host dwarfs
and subgiants

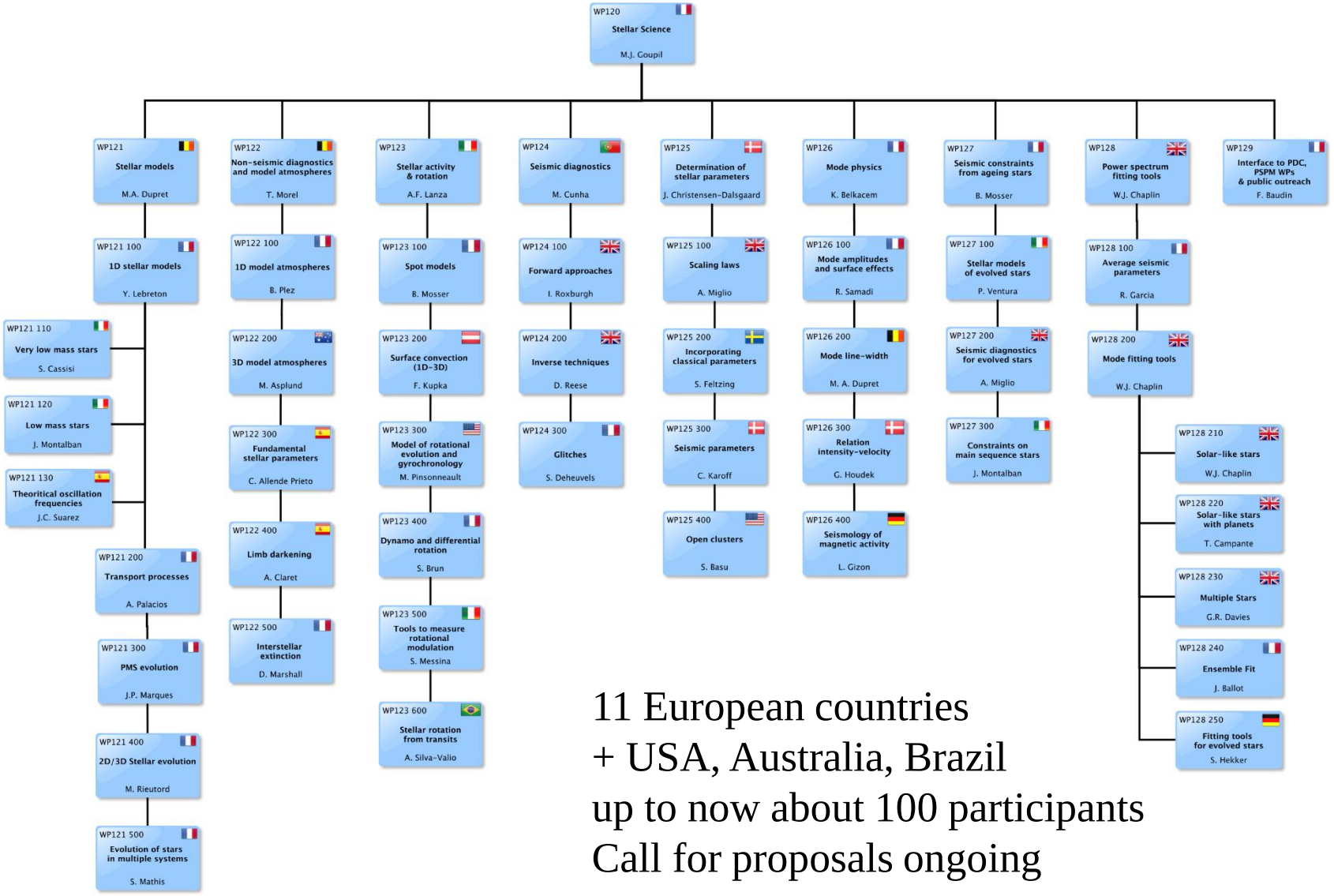
F5-K7 spectral type

Core sample

Stellar ensembles, binaries, clusters and low mass red giants as tools to improve the description of physical processes used in stellar models

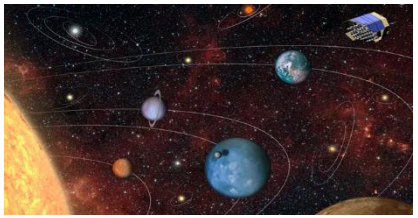
WP120 structure

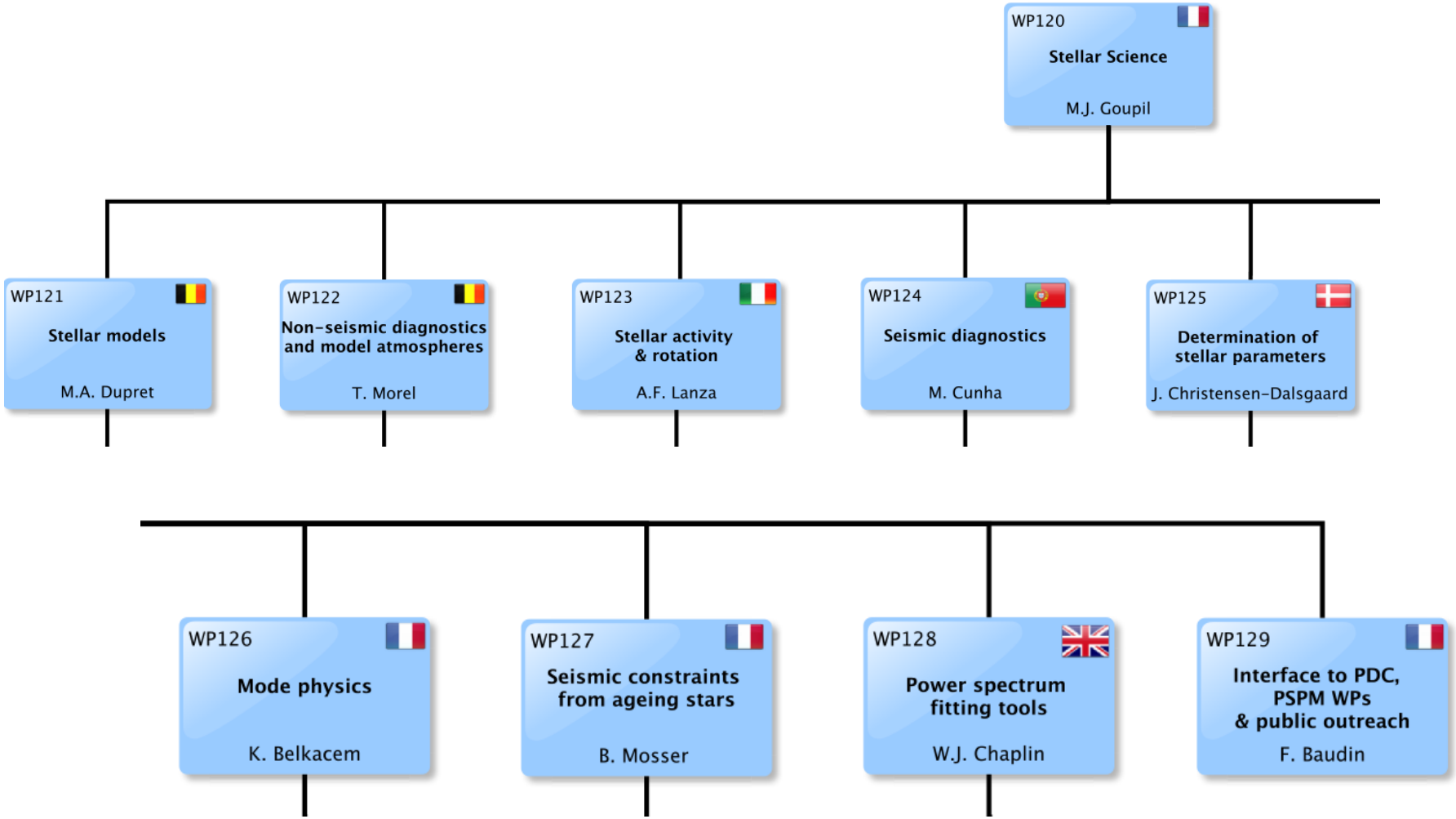




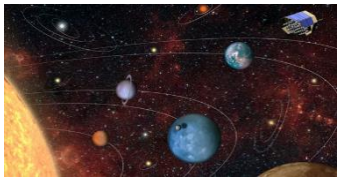
11 European countries
+ USA, Australia, Brazil
up to now about 100 participants
Call for proposals ongoing

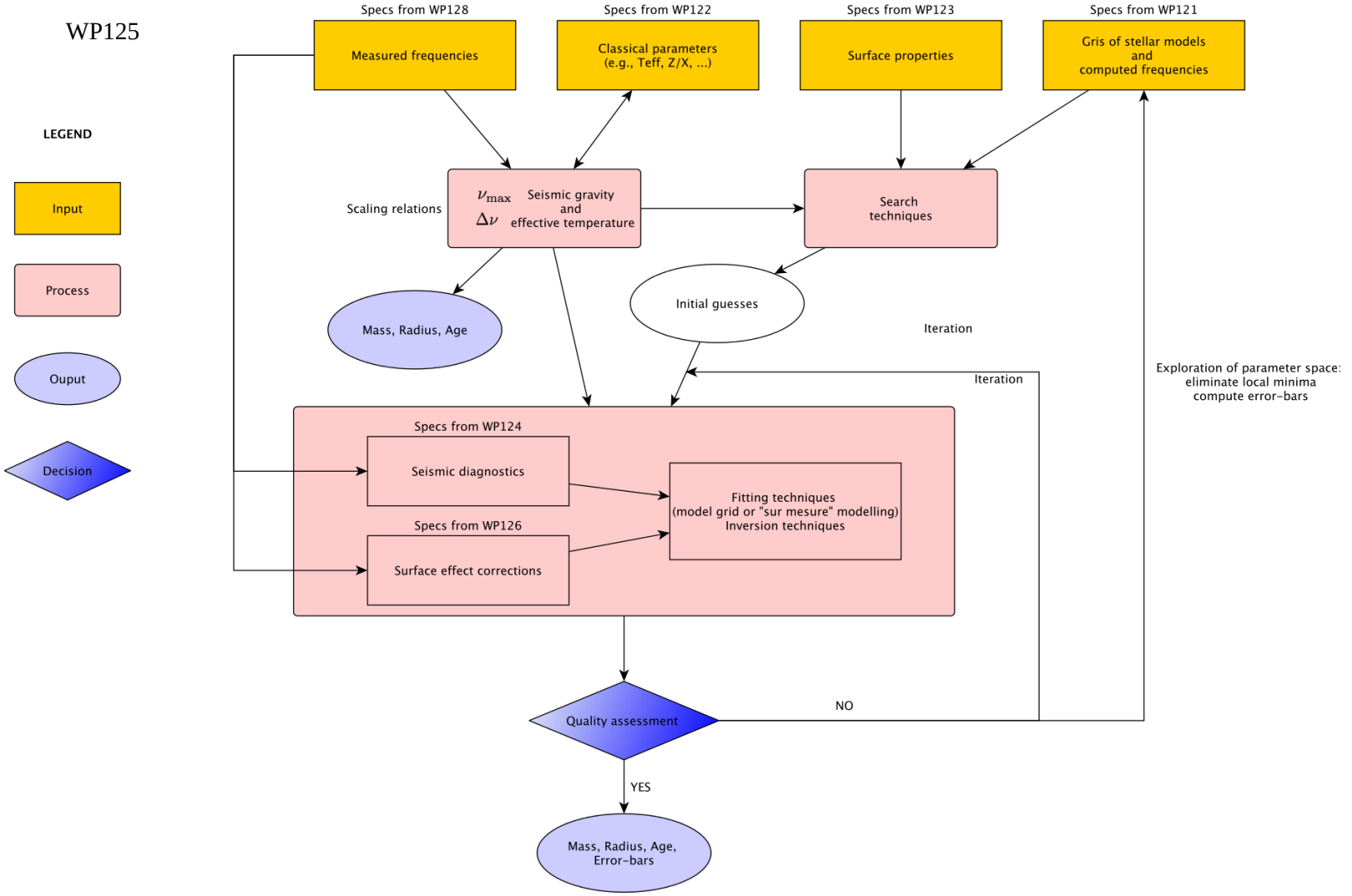
WP120 management



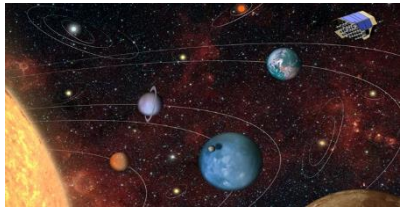


Example of a pipeline





PLATO timeline for WP120



SciRD v5 issue 4/3/2015

SGS PDCR 12/3/2015

9-10 avril
WP120
Paris

15 avril
Perfomance team: quantifiy accuracy of stellar mass, radius and age

June
- Financial
- costing
- WP120
- draft

2015

SMP

Data package B1 delivery

2015

Oct- Nov2015

SRR

Adoption

1st delivery to PDC

2016

Feb-March 2016

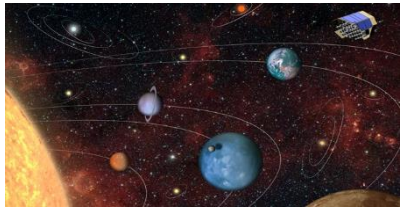
End june 2016

End B1

End 2016

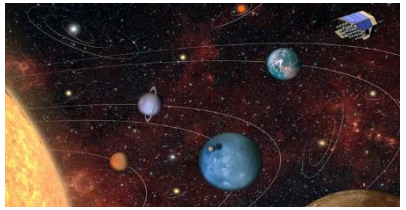
mid B2

Documents: B1 datapackage



- Science Requirement Document
- Science Justification Document
- Definition study report (to be ready by March 2016)

WP120 Definition Document



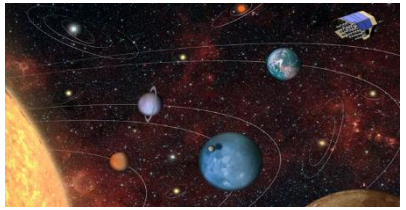
Content:

• Definition of the procedures with existing tools, data and methods (possible options, needs not choose today)
• Estimations of current performances
• Definition of future improvments and associated tests (HH) of performance

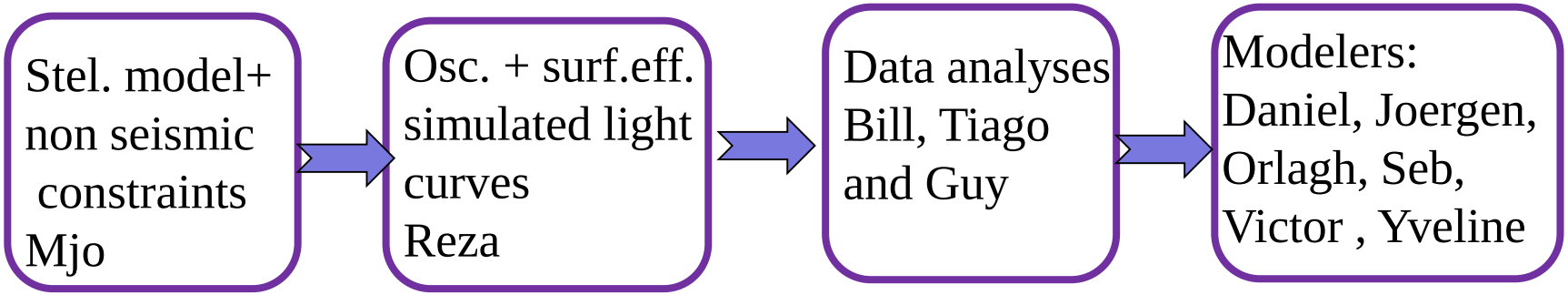
Objective: to demonstrate how to achieve the PLATO specifications 9 years from now, with more details than are written in the red book

This will constitute the input for the first draft of WP120 specification document to be delivered to the PDC end of 2016

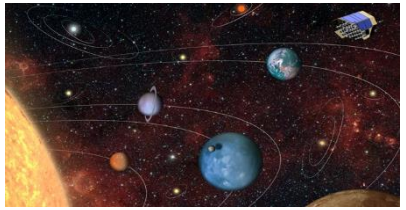
HH1
Some preliminary results



As an opening for the discussion during the splinter sessions, some results of the first WP120 HH1 recently carried out for a star similar but not equal to the Sun nor the reference star

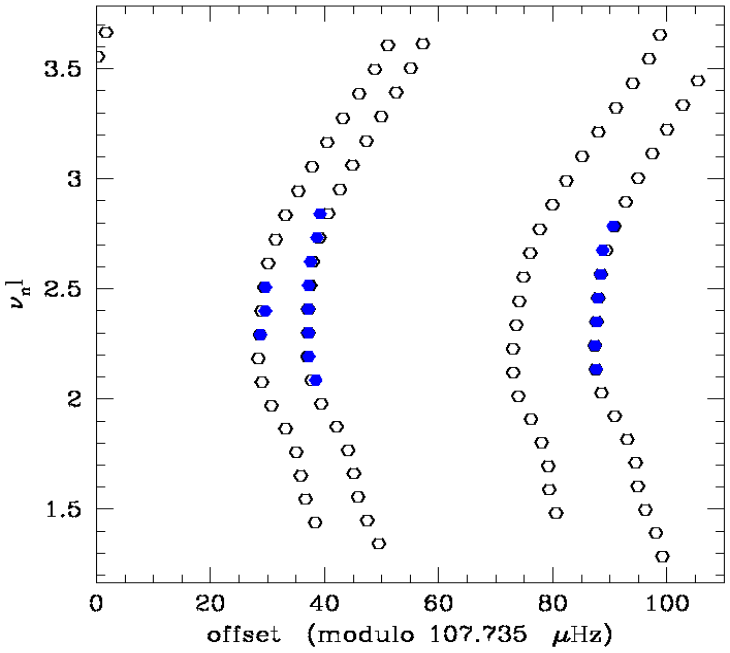


HH1
Some preliminary results

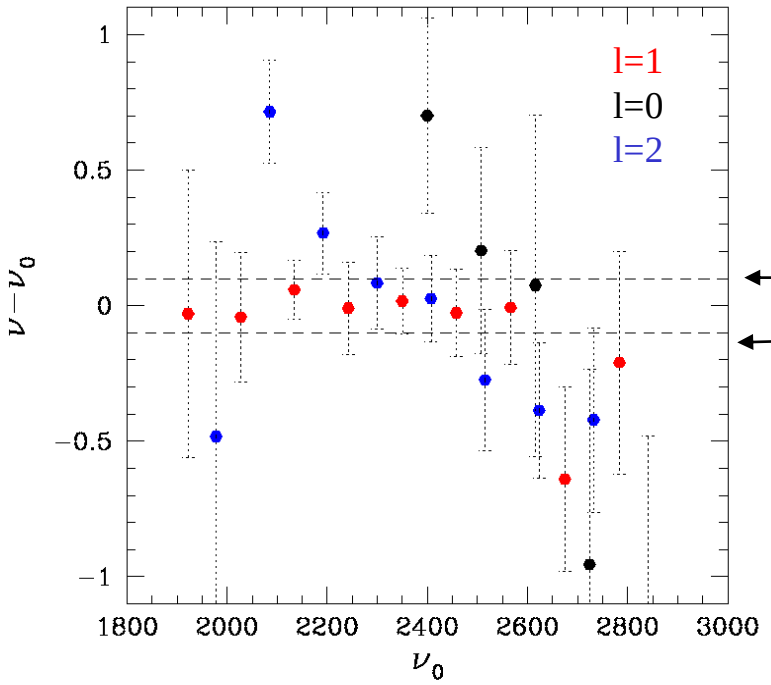


Simulated light curve: 2 years run, no gap, cadence 100 s, solar-type 'star' with mag 9, Plato estimated noise

Echelle diagram



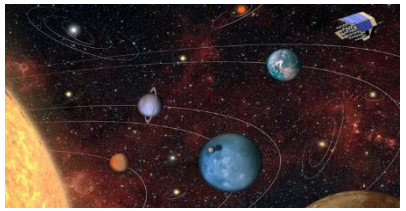
Frequency differences



Spec.
0.1 μHz

Black open dots : initial frequencies
Blue filled dots : detected frequencies

Room for improvment:



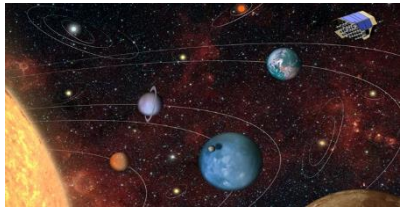
- **WP126 :** Simulation of Plato light curves for seismic analyses

  - to decrease the noise level (to agree with spec.)
  - to decrease the surface effects (overstimated in HH1 light curves)
  - to increase mode heights (underestimated in HH1)
  - more realistic mode linewidths

→ HH2 (on going)

  - is the model for the background realistic?
  - are the prescriptions for mode height, and width satisfying?

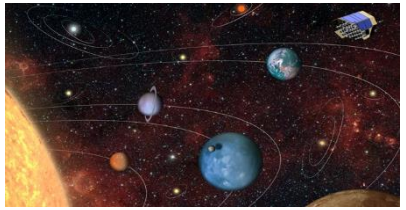
Some issues:



- **WP128** Data analyses

- Improved results from HH1 to HH2 ?
- Impact a priori input about surface effects, variation of width, height with frequency ?
- Impact of gaps ?
- Cadence for K stars ?
- Performances for 3 months data?
- What is the gain going from 2 months to 3 months observing runs?
- Performances with 80 ppm in one hour instead of 34 ppm in one?
- Performances with 16 , 12, 8 telescopes instead of 32
- Measurements of rotational splittings ?

HH1
Some preliminary results



Radius –mass (relative errors)

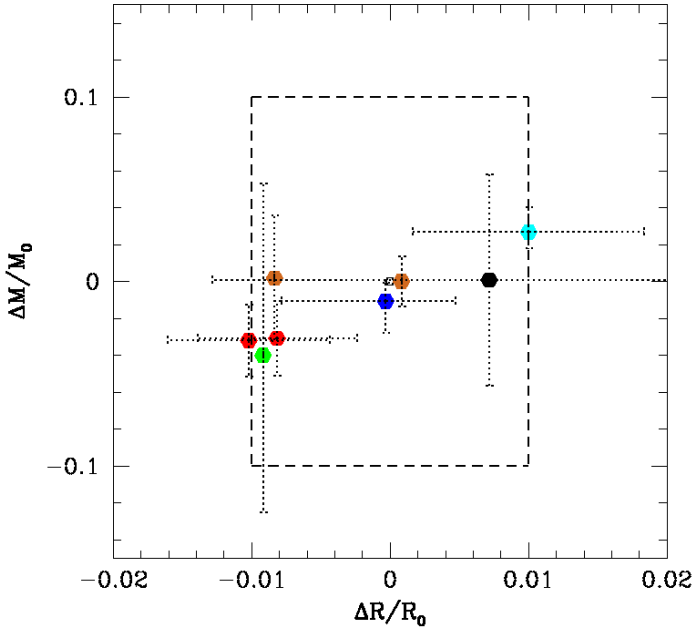
Input to modellers: V = 9

log L/L = 0.250 ± 0.026

[Fe/H] = -0.064± 0.020

Teff= 6080 ± 80 K

Frequencies and error bars

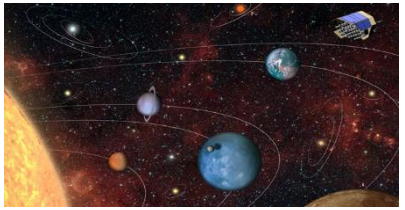


Each colour = one modeler
Dashed box = Plato2.0 spec.

Systematics: slope ~ 3

$\Delta\nu \leftrightarrow$ mean density

HH1
Some preliminary results

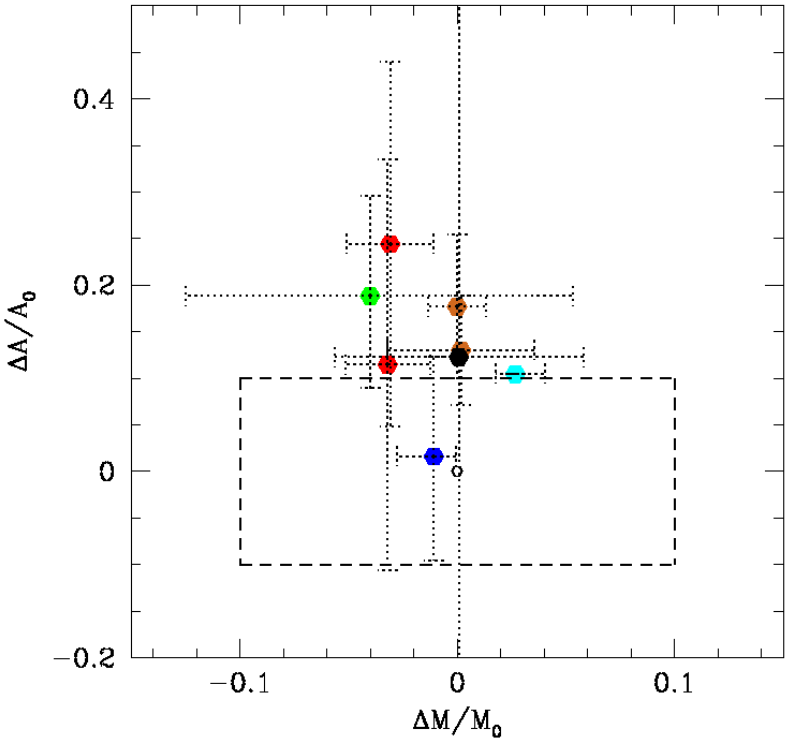


mass – age (relative errors)

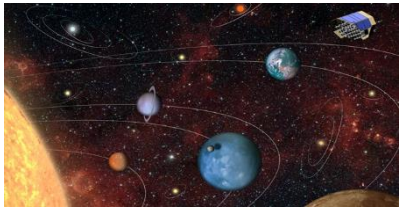
Mass and radius already within the spec.

Ages systematically higher ~ up to 20% for the present case (low surface effects)

Ages systematically lower for high surface effects



Some issues:



WP122 :

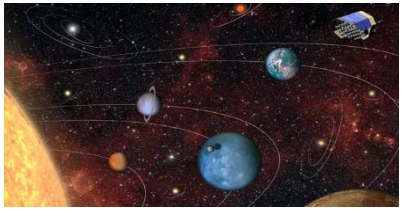
- Are the assumed input incertainties reasonable in 9 years from now ?

log L/Lsun = 0.250 ± 0.026
[Fe/H] = -0.064+/- 0.020 : too small error bar → 0.5 today 0.05 in 2024?
Teff= 6080 +/- 80 K : internal precision

- 1D model: assess accuracy of the determination methods - HH to be carried out

- Impact of systematic biases (1D/3D) - HH to be carried out

Some issues:



WP124-W125:

- Are the HH1 results reproducible?
- Interpretation of HH to correct for the impact of systematic errors
  * HH1-HH2 (Plato)
  * HH (Space In) : age ~22% ; mass ~4% ; radius ~1.5% (Reese et al in prep)
- Different pipelines for different objectives ?
- Securing the estimations of error bars
- Performances of model-independent meghods/model dependent methods?
- Impact of a precise luminosity measurements?

WP126:

- Influence of empirical surface effect correction?
- Improved modeling of surface effects, mode amplitudes and heights

Some issues:

WP121:

- How good are grid interpolations depending on the evolutionary phase/mass of the star?
- For real assessment of accuracy in HH, several options must be available for the description of a given physical process (concerns mainly transport processes)
- what can we do with M darfs (probably no seismic data)?

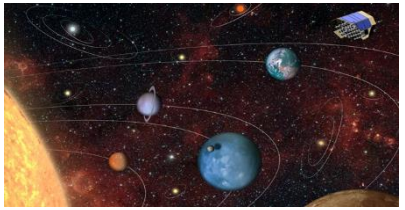
WP123:

- How good will be the measurements of the surface rotation period with Plato data ?
- Stellar activity and spot modeling: HH might also be necessary

WP127:

- what are the specifications fro giant stars ?
- What can we learn on the physics of their progenitors on the MS?

Splinter sessions



This afternoon:

14:00- 19:00 Splinter sessions

- WG1: Salle des Séminaires (at IAP)

- WG2: Salle du Batiment B (at Observatoire de Paris)

- WG3: Salle du Conseil (at Observatoire de Paris)

- WG4: Salle de l'Atelier (at Observatoire de Paris)

- WG5 : Salle du Conseil (at IAP)

A coffee break will be organised at 4 pm for all WGs at the entrance of the Salle du Conseil (Observatoire de Paris)

Tomorrow: 9h00 at Cassini hall (Observatory of Paris)
WG1-WG5 synthesis + discussion about external + internal interfaces