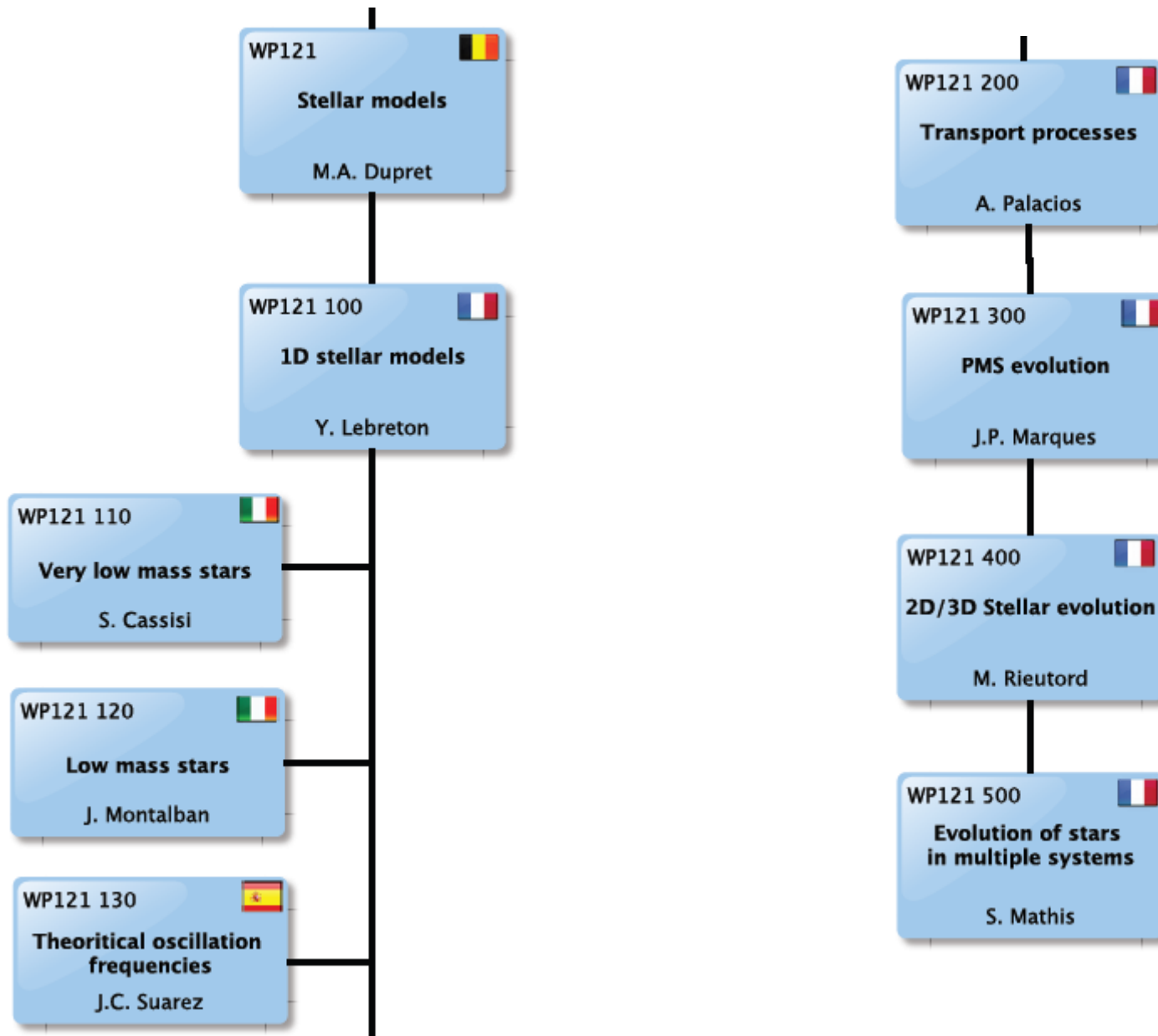
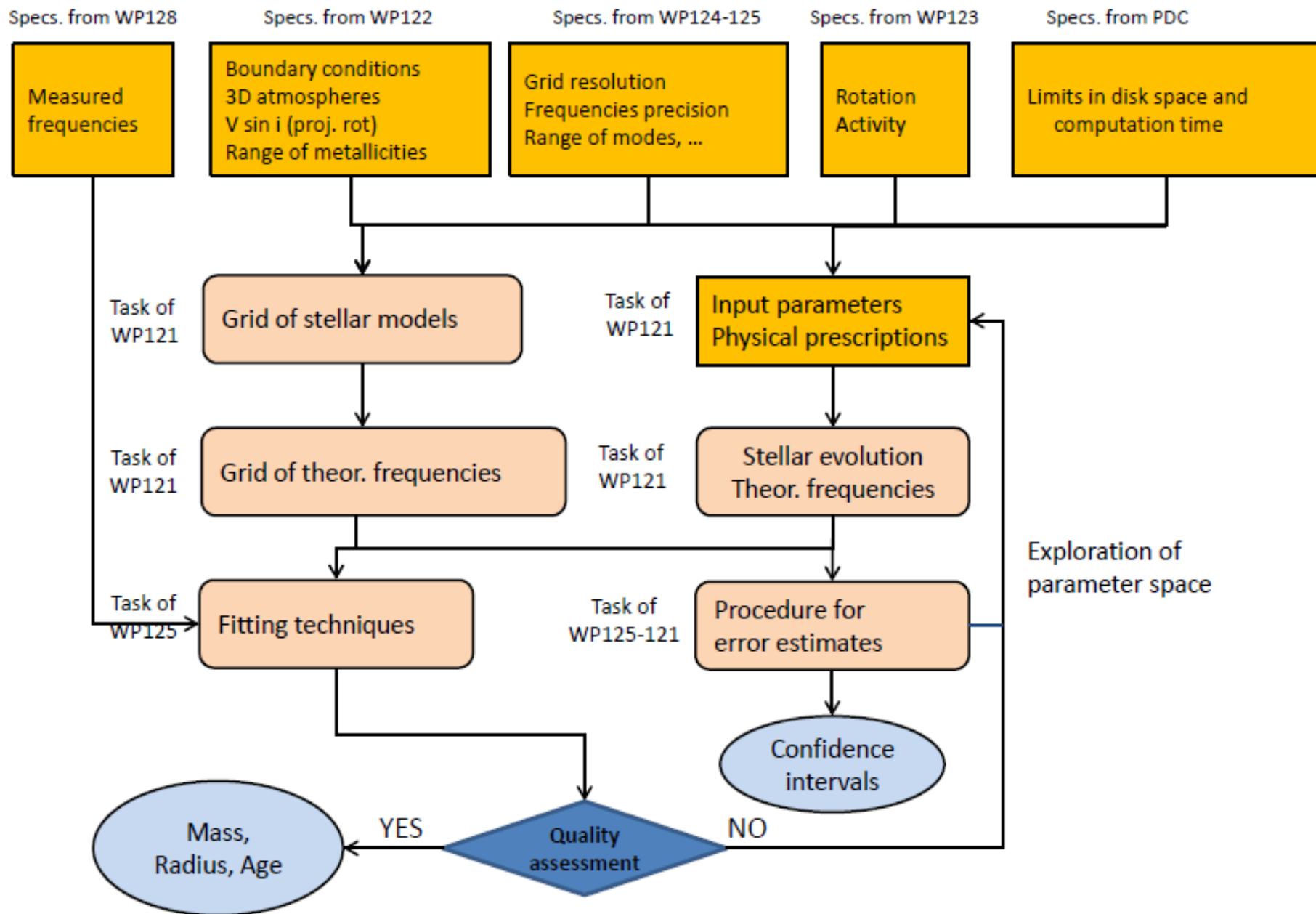


PLATO WP 121 Stellar models





PLATO WP 121 Stellar models

The sources of uncertainty :

Defining a strategy ...

- One reference grid for the M,R, age measurements
- Procedure for error estimates
 - User friendly softwares to move in the parameter and physical assumption spaces
 - Discussion with WP124 (seismic diagnostics) and WP125 (Determination of stellar parameters)

Forget isochrones fitting !!

PLATO WP 121 Stellar models

The sources of uncertainty :

Convection : MLT, CM, 3D

MLT : alpha must be calibrated

- Simus 3D
- Sismo (CoRoT-Kepler)
- Binaries

Other treatments: CM, ...

Simus 3D : for calibration

Interaction with WP 122100 (3D sim. Asplund) and WP 123 200 (1D-3D Kupka)

Preliminary grid : sol calibrated MLT

Final grid : 3D-seismic-rotation-calibrated alpha

Other treatments for error estimates

PLATO WP 121 Stellar models

The sources of uncertainty :

Convection : Convective cores:

- Classical limits, μ -gradient region :

Precise determination of Brunt-Vaisala freq.

- Overshooting : Extra-mixing only ? Diffusive ?
Adiabatic gradient ? ...

- Calibration : - Sismo (CoRoT-Kepler)

- Binaries

- Clusters

- Simus 3D

Preliminary grid : Extra-mixing only

Final grid : Seismic-3D calibrated α_{ov}

- Undershooting ?

Other treatments for error estimates

PLATO WP 121 Stellar models

The sources of uncertainty :

Transport of chemicals and angular momentum :

State of the art ? Microscopic diffusion, meridional circulation,
rotational turbulence, waves, magnetic field, ...

Impact on ages ?

What should be done ?

Asteroseismic constraints

- Could be a not so significant source of errors but must be justified through appropriate tests
- Included in error estimate procedure

PLATO WP 121 Stellar models

The sources of uncertainty :

- Opacities
- Equation of state
- Atmosphere models

Interaction with WP 122 (T. Morel)

We need a grid of 3D atmospheres from

WP 122100 (3D sim. Asplund) and WP 123 200 (1D-3D Kupka) !!

PLATO WP 121 Stellar models

The sources of uncertainty :

Advanced stages of evolution:

Specific difficulties ?

Very low mass stars

Mass loss

PLATO WP 121 Stellar models

Defining the parameter space of the grid

- Boundaries : $[\alpha_{\text{MLT}}]$, $[\alpha_{\text{ov}}]$, $[Y]$, ... ?

How using CoRoT-Kepler's legacy ?

- Resolution ?

Mixed modes in subgiants

Input from WP124 and WP125

PLATO WP 121 Stellar models

Calendar

1. Our stellar evolution code

Quality criterion and comparisons of models

Proposition: Web portal for exchanges of models,
tests and comparisons, documentation, ...

Taking legacy of previous studies (ESTA, ...) into account.

PLATO WP 121 Stellar models

Interface with other WPs

Input from :

3D atmospheres

Resolution of the grid, mesh points, ...

Requirements for scenario of minimization

Requirements from PDC, disk space, computation times...

Ranges of modes ?

Precision of theoretical frequencies

Range of metallicities

Rotation

Activity

PLATO WP 121 Stellar models

Output to :

Grid of models

Evolution and oscillation codes

Procedure for error estimates

Documentation about our softwares and our models

PLATO WP 121 Stellar models

Goal of the workpackage

State of the art

Specific developments

- Estimates of performances
- Tests of performances with expected PLATO data

PLATO WP 121 Stellar models

Specific developments

- Improvements of the tools: the stellar evolution code(s)
 - Biases on precision and accuracy
 - Improvements
 - Tests
 - Procedures for validation
 - Sample of benchmark observed stars

