Scientific validation of the PIC

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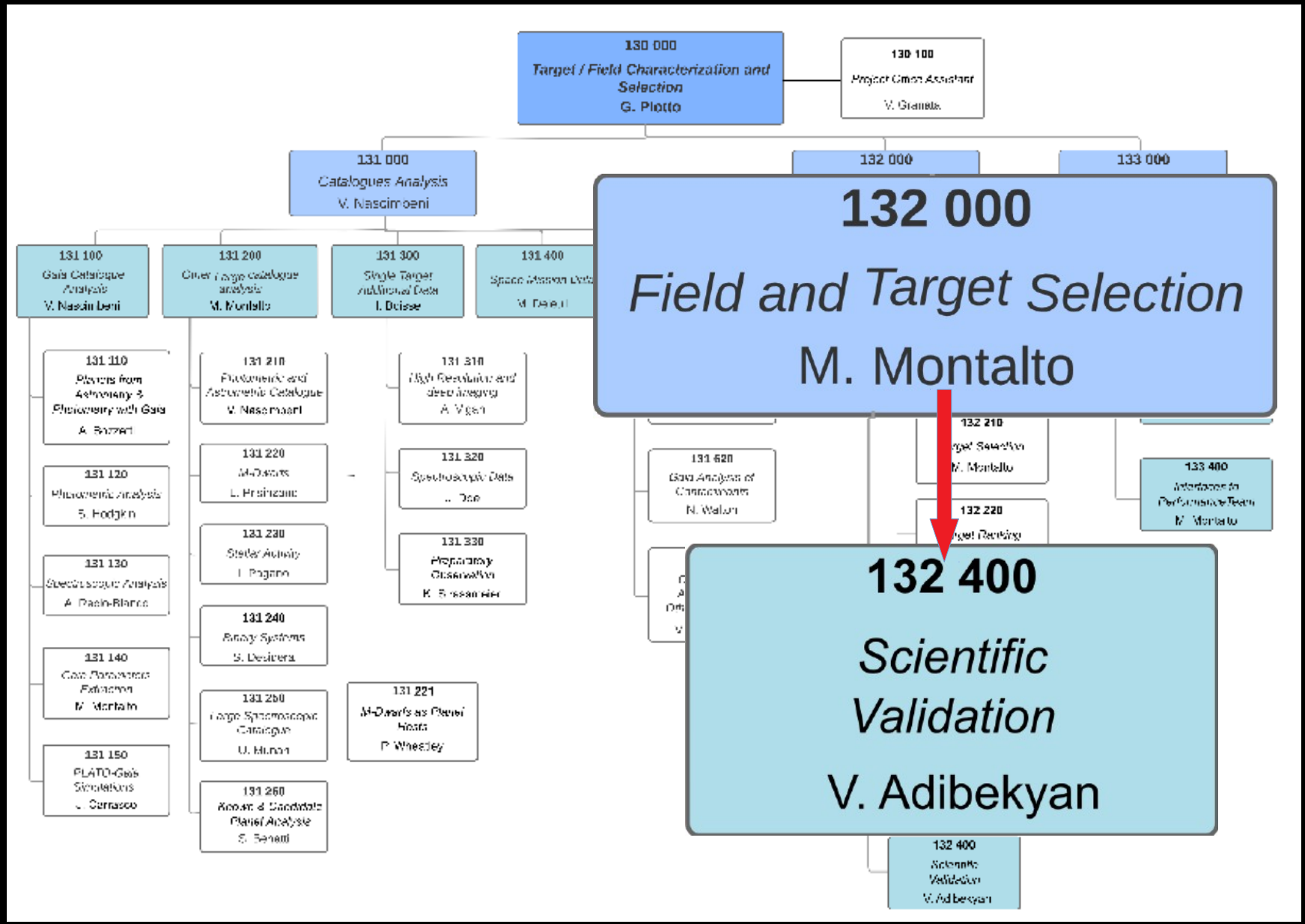
Institute of Astrophysics and Space Sciences

and the WP #132 400

24-26 September 2019, Padova, Italy

WP 13 work breakdown structure and WP132 400



The PIC and its scientific validation

PIC – select best targets for the PLATO scientific goals

Scientific validation of PIC - ensure (scientifically validate) that the PIC meets the main scientific goals of PLATO

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Validate:

- **Criteria (e.g. selection)**
- **Methods (e.g. selection, characterization)**
- **Targets/catalog (double check)**

Evaluate the potential biases and their impact on PiC

plato

PIC has already been *somehow* scientifically validate during its construction!

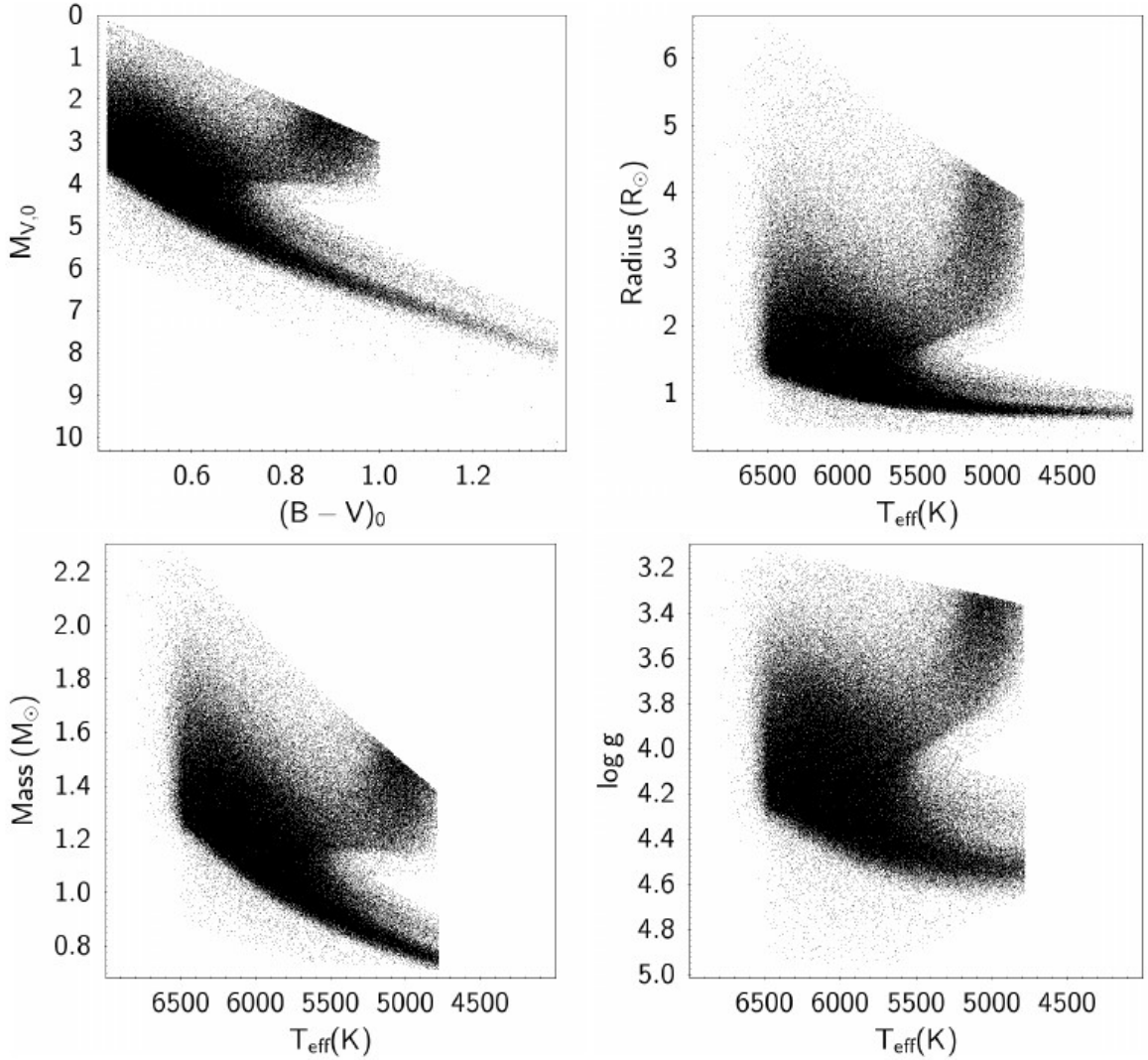

Figure 4: *Upper left*: selection region of PIC1.0.0 stars in the intrinsic absolute $(B-V)_0$, $M_{V,0}$ color magnitude diagram. *Upper right*: stellar radius (in solar radii) vs effective ($T_{\rm eff}$) temperature diagrams. *Lower left*: stellar mass (in solar masses) vs effective temperature diagram. *Lower right*: $\log g$ vs effective temperature diagram.

Sample P5
PIC 1.0.0 – 290,153 stars
Required – 245,000 stars

From PLATO-UPD-SCI-TN-015
M. Montalto and the WP130000

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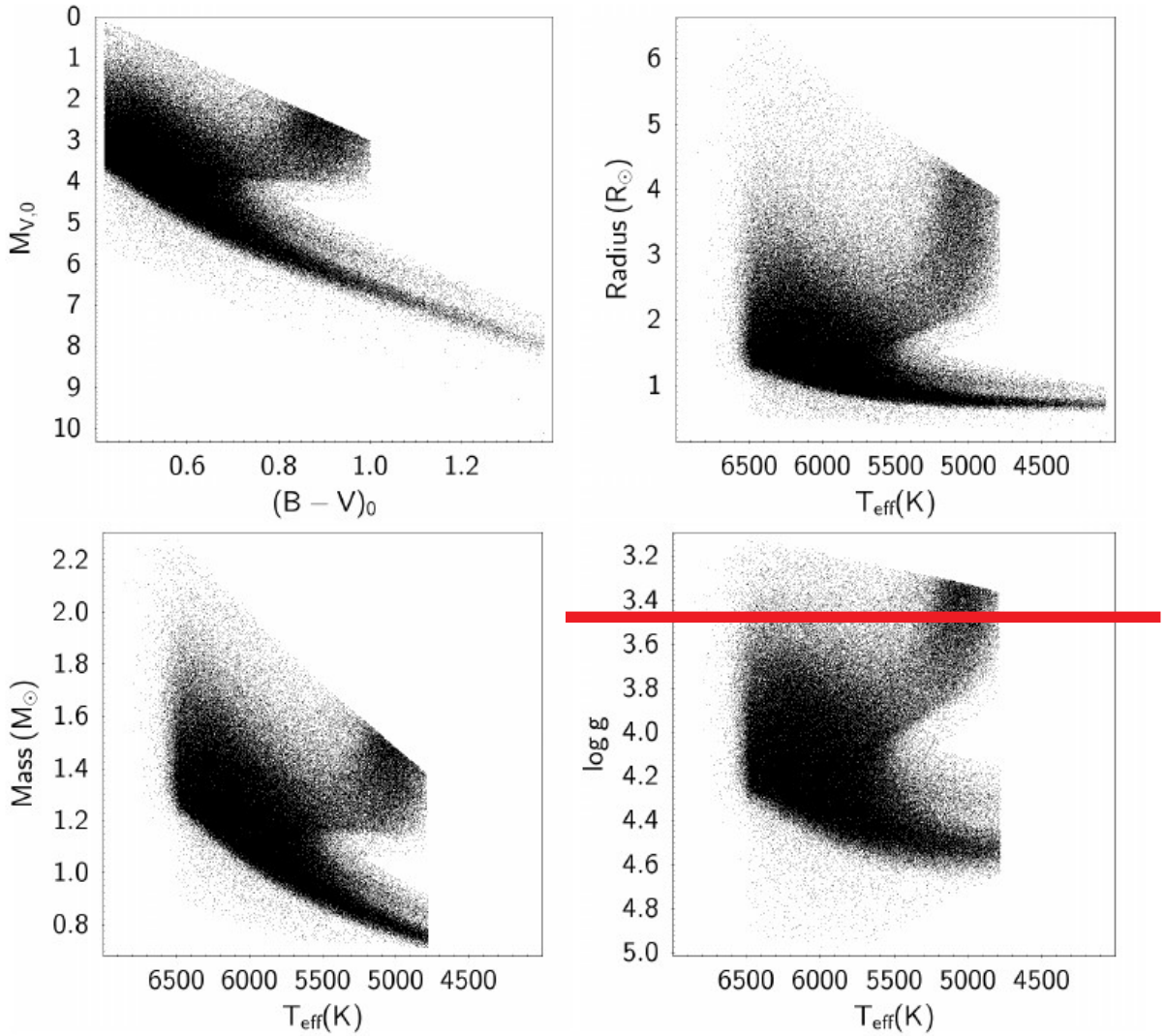

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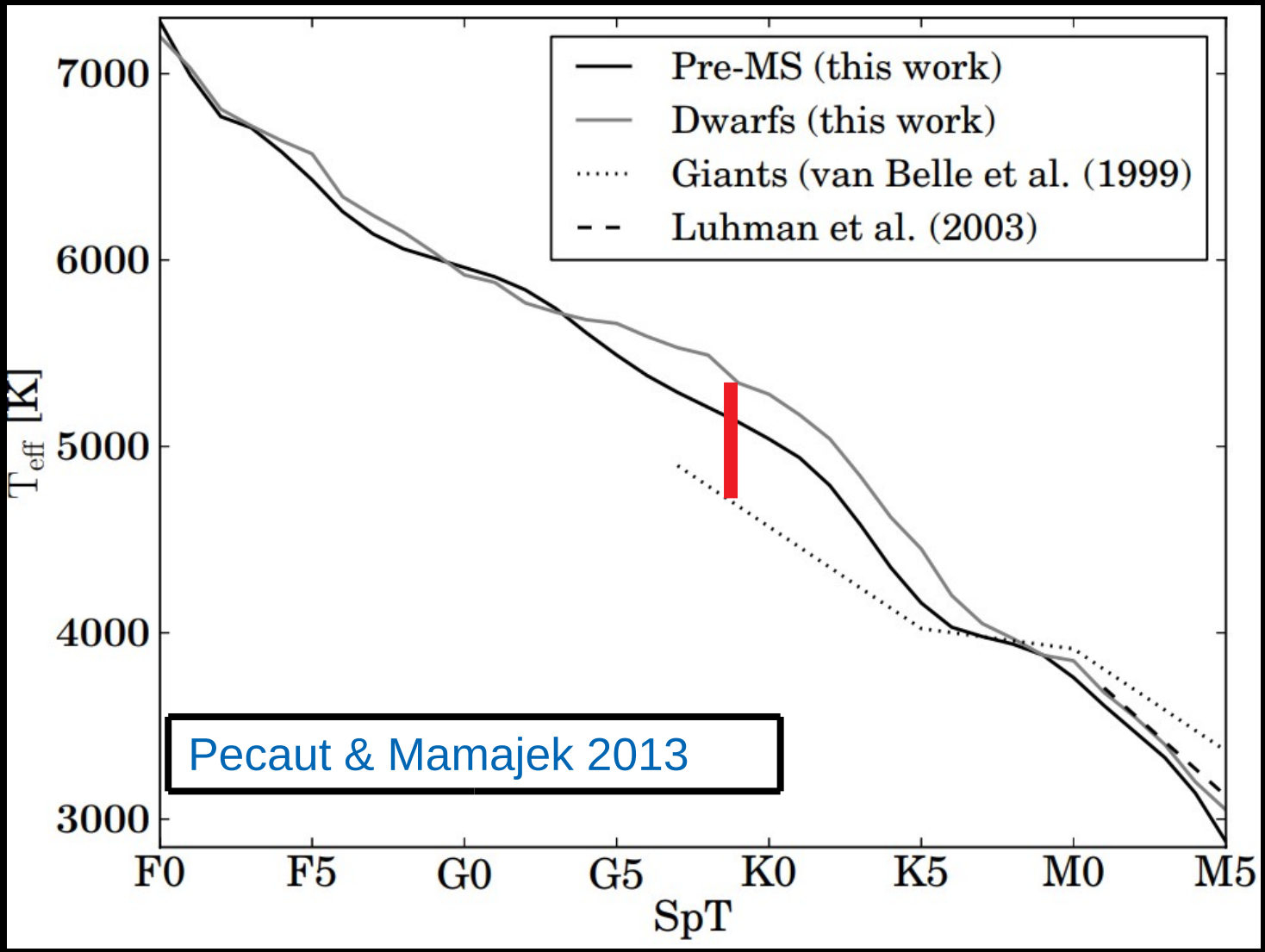
Scientific validation of the PIC: Selection criteria

PLATO P1, P2, and P5 samples: F5-K7 dwarfs and sub-giant
Teff: 4050 - 6510 K (Pecaut and Mamajek 2013) *– true for MS stars with [M/H] = 0*



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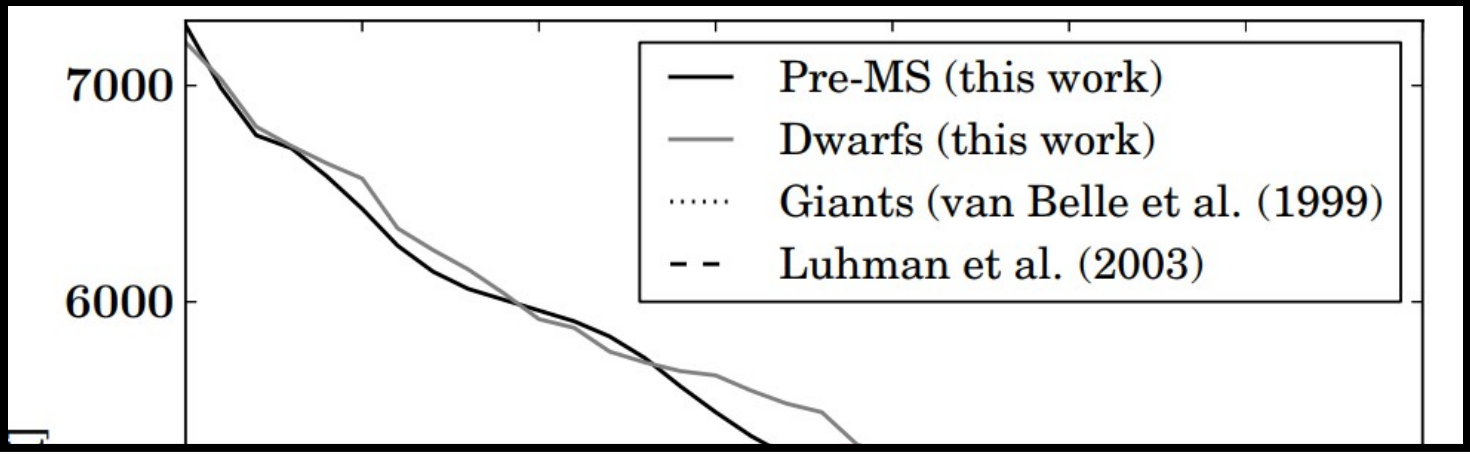
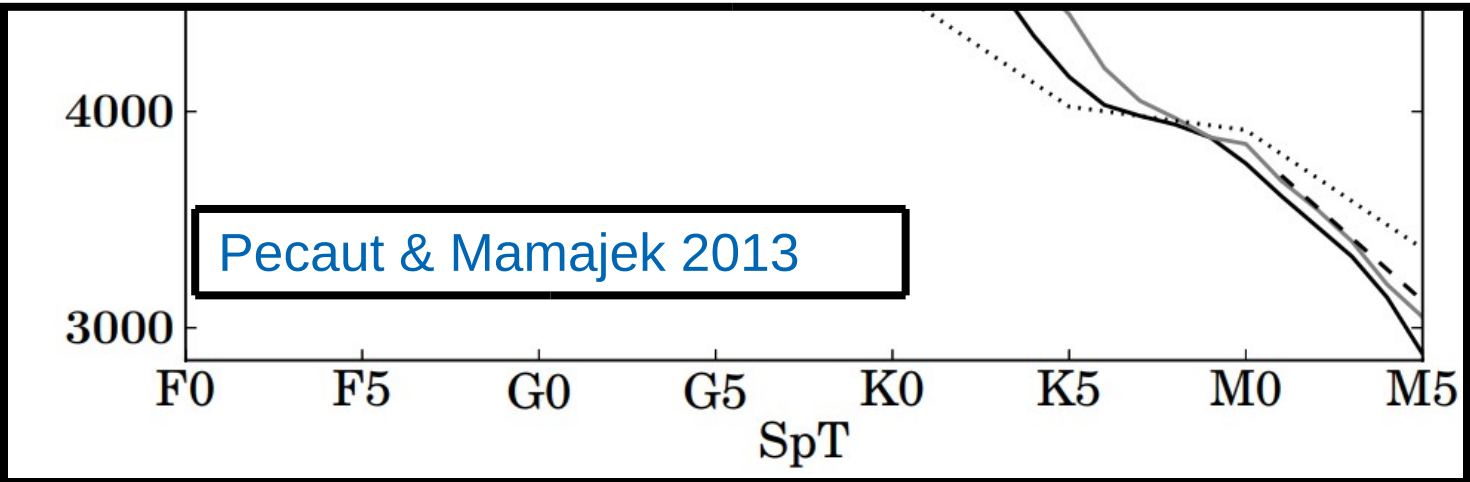
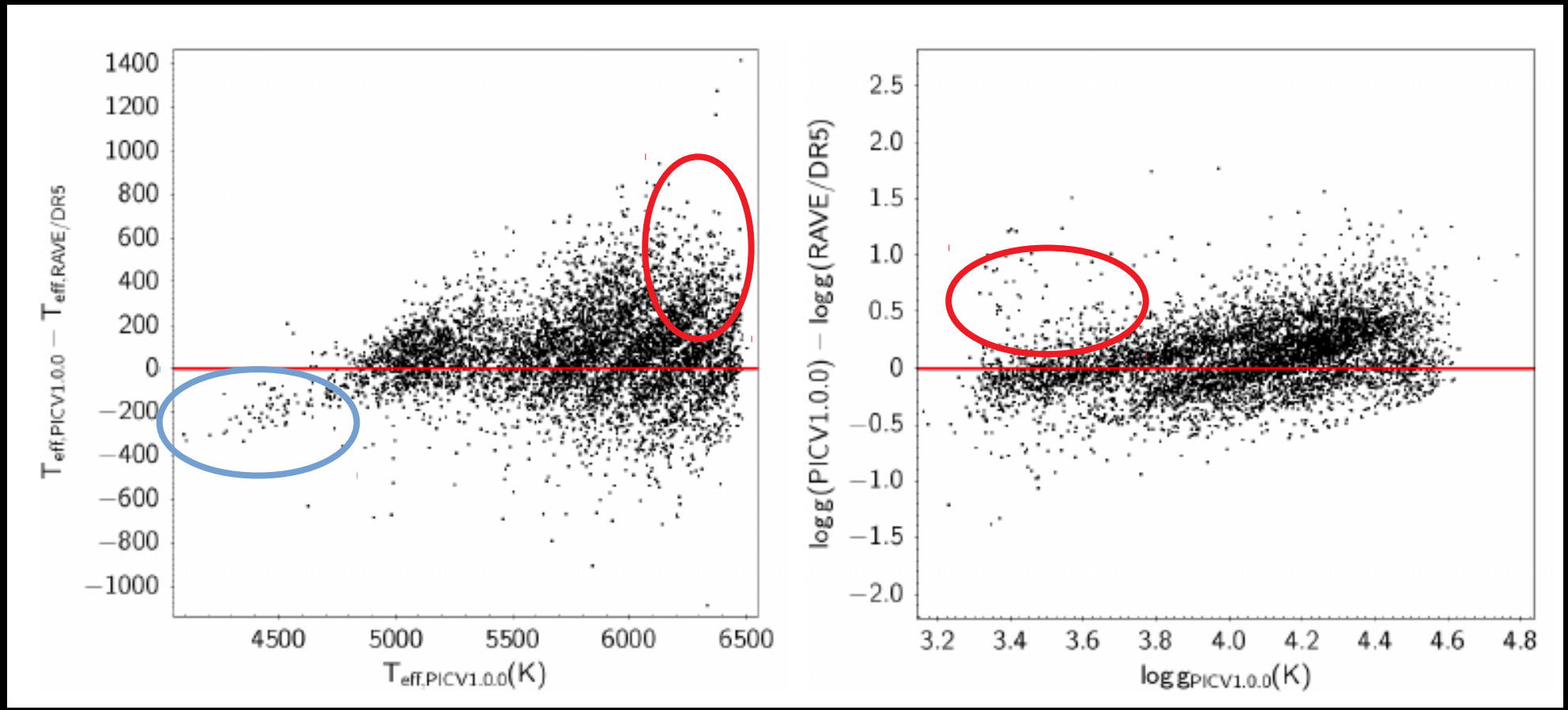


WP12 can help in providing the Teff/color range for F5-K7 dwarfs/giants with different metallicities



Scientific validation of the PIC: Determination of stellar parameters



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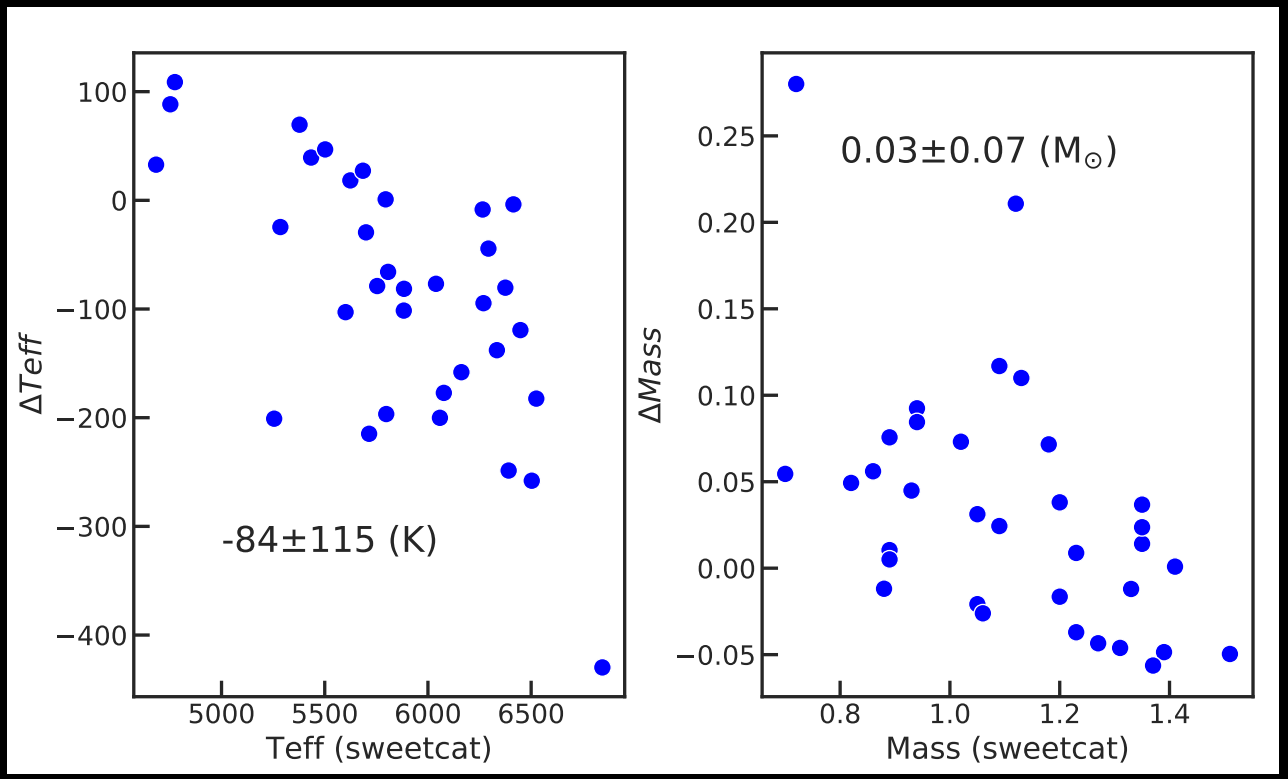
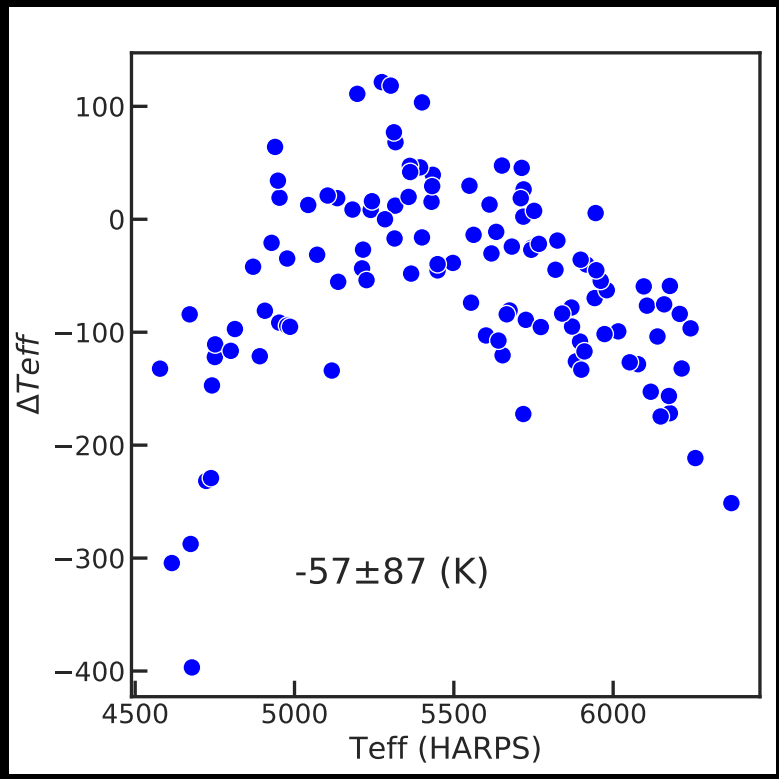
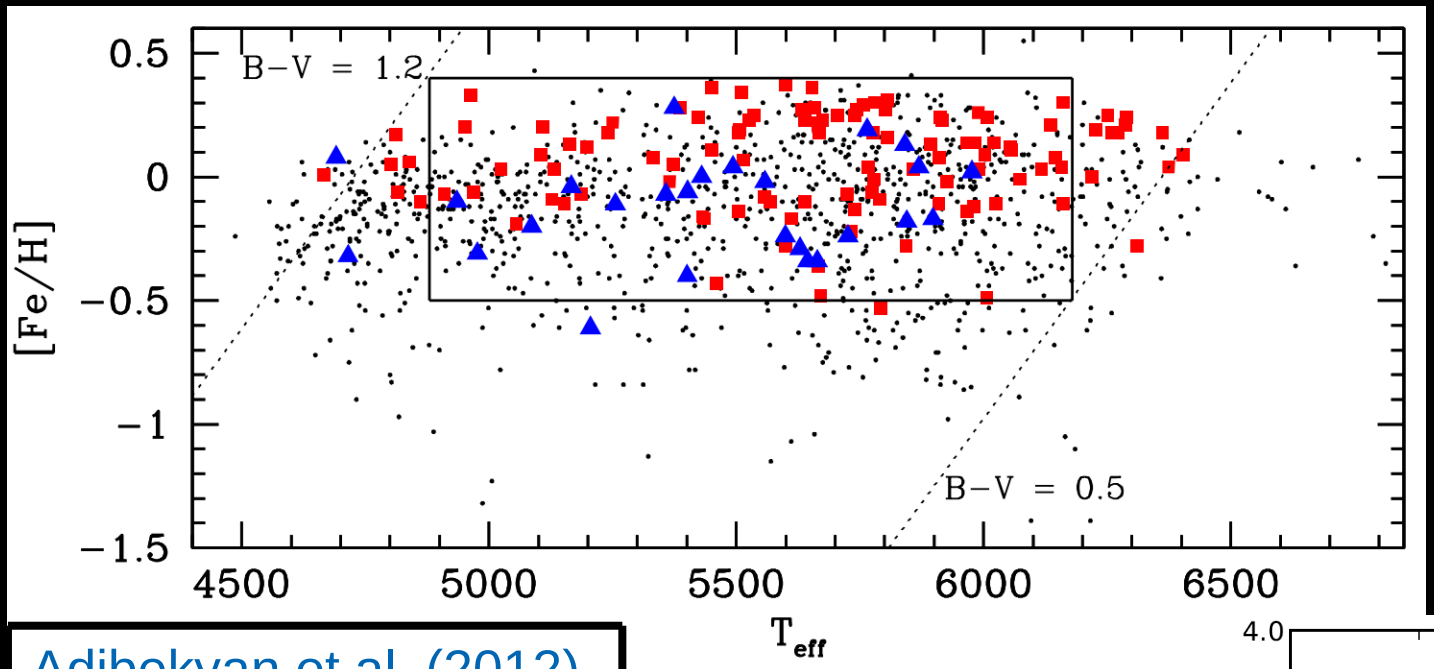


Logg [3.37 – 4.73] dex
[Fe/H] [-0.38 – 0.37] dex



Logg [3.85 – 4.9] dex
[Fe/H] [-1.39 – 0.37] dex

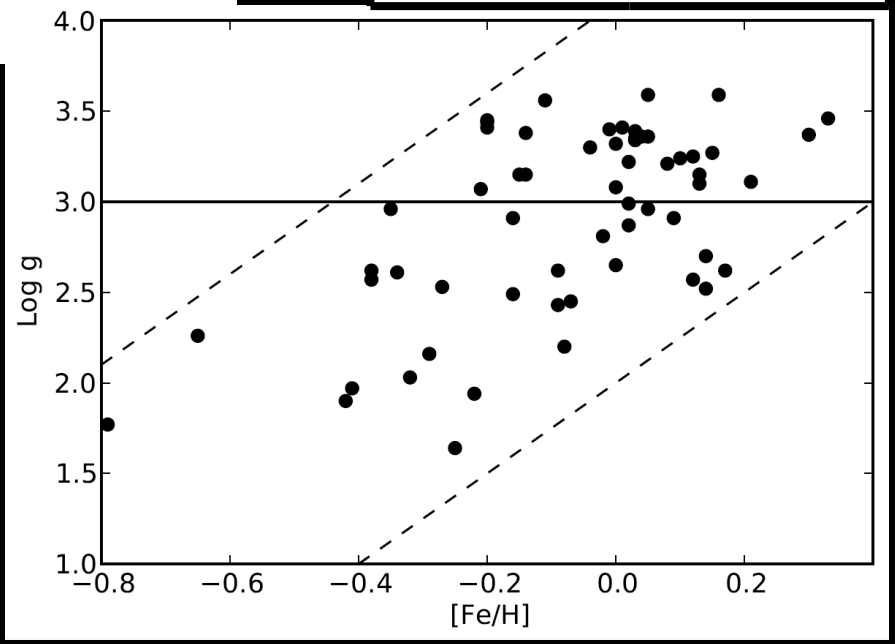
Scientific validation of the PIC: Possible biases



Adibekyan et al. (2012)

Color-cuts can introduce biases (e.g. in metallicity)

Mortier et al. (2013)



Scientific validation of the PIC:

Before the main tasks:
***Reproduce* the PIC1.0.0**

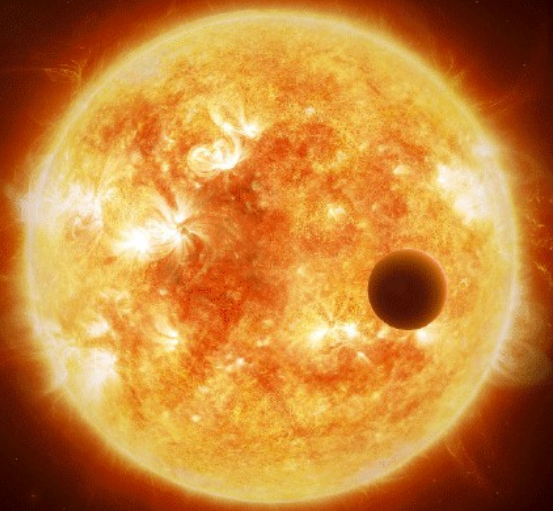
Main tasks:

- **Validate the selection criteria for the P1-P5 samples**
- **Validate the estimation methods and the sources (of catalogs) for extraction of stellar characteristics of the PIC targets.**
- **Estimate the possible biases in the PIC samples**
- **(if applicable) provide recommendations on how to improve the PIC - selection criteria for the PIC 1.0.0, perhaps, should be relaxed given the uncertainties in the current parameter estimates**

Exoplanets in the era of Gaia

MW-Gaia WG3 Workshop

Porto, Portugal
18-20 November, 2019



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