Marcella Marconi – INAF Osservatorio Astronomico di Capodimonte

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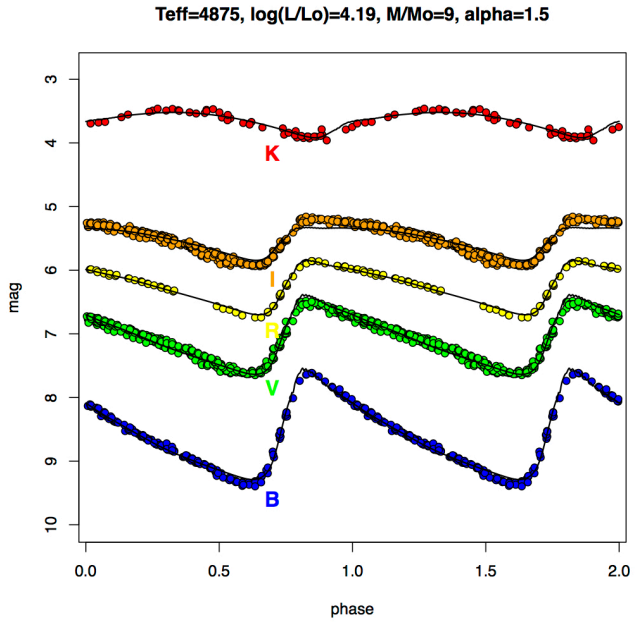
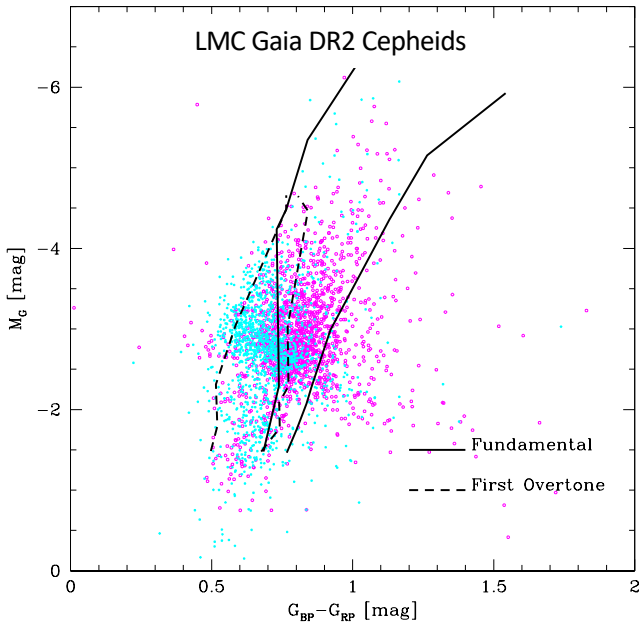
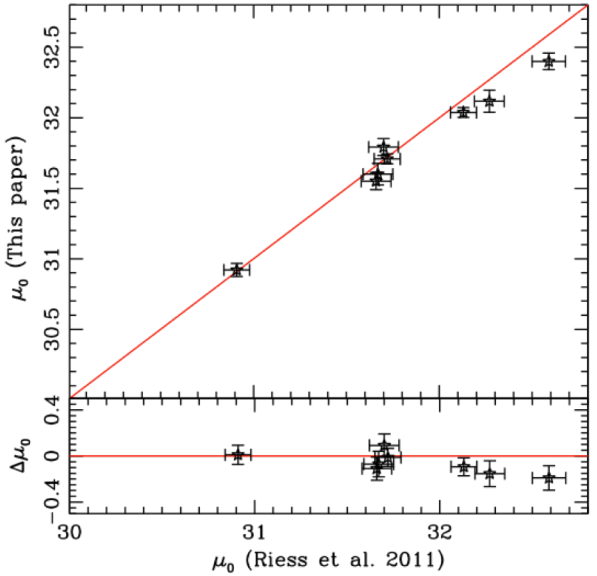
Computation of nonlinear convective hydrodynamical models of pulsating stars in different evolutionary phases.
(see Marconi+2005, +2015, +2018, De Somma+2020 and references therein)

Development of theoretical tools to use variable stars as distance indicators (e.g. Fiorentino+2013) and stellar population tracers (e.g. Marconi & Di Criscienzo 2007, Marconi+2004; +2018).



Gaia Collaboration, Clementini et al. 2017 A&A





Fiorentino, Musella & Marconi 2013

To quantify residual systematic effects in the extragalactic distance scale:

→ new finer model grids covering a wider parameter, physical and numerical assumption ranges

→ transformation of the predicted properties into all the relevant filter systems

→ comparison of predicted and empirical individual distances (parallaxes)

→ constraints on Pop I and Pop II distance scales and routes to H_0

LMC Z=0.008 Y=0.25

- $3 < M_{\odot} < 13$ $\Delta_M = 0.5$
- $4700 < T_e(K) < 6100$ $\Delta_T = 50K$
- $1.5 < \alpha < 2.1$ $\Delta_\alpha = 0.1$

12000 expected models

SMC Z=0.004 Y=0.25

- $3 < M_{\odot} < 13$ $\Delta_M = 0.5$
- $4700 < T_e(K) < 6100$ $\Delta_T = 100K$
- $1.5 < \alpha < 2.1$ $\Delta_\alpha = 0.2$

12000 expected models

IZw18 Z=0.0004 Y=0.25

- $3 < M_{\odot} < 13$ $\Delta_M = 0.5$
- $4700 < T_e(K) < 6100$ $\Delta_T = 50K$
- $1.5 < \alpha < 2.1$ $\Delta_\alpha = 0.1$

12000 expected models

M31 Z=0.03 Y=0.25

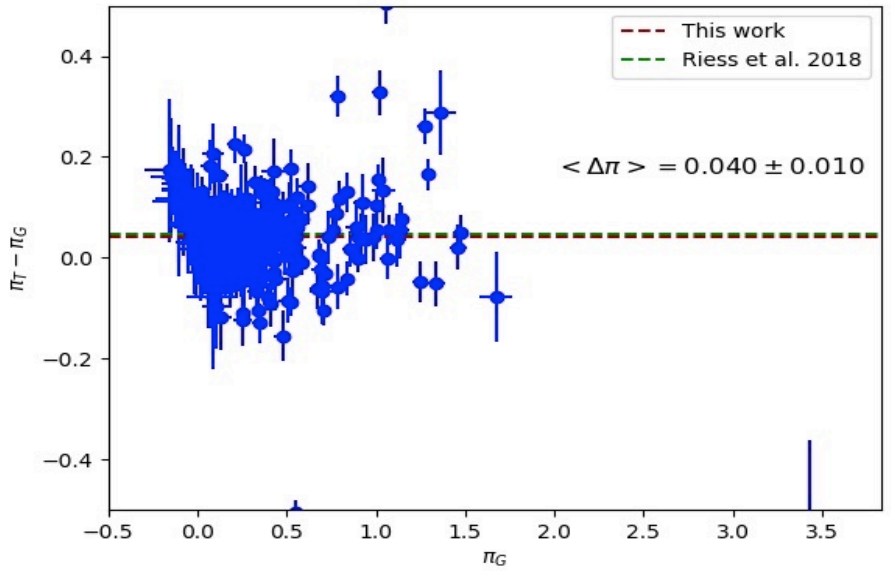
- $3 < M_{\odot} < 13$ $\Delta_M = 0.5$
- $4700 < T_e(K) < 6100$ $\Delta_T = 50K$
- $1.5 < \alpha < 2.1$ $\Delta_\alpha = 0.1$

12000 expected models

MILKY WAY Z=0.02 Y=0.28

- $3 < M_{\odot} < 11$ $\Delta_M = 1$
- $4700 < T_e(K) < 6100$ $\Delta_T = 100K$
- $1.5 < \alpha < 2.1$ $\Delta_\alpha = 0.2$
- $\log(L/L_{\odot}) = 0.90 + 3.35\log10(M/M_{\odot}) + 1.36\log10(Y) - 0.34\log10(Z) + x$
- $0 < x < 0.2$ $\Delta_x = 0.2$

810 expected Cepheids pulsation models



De Somma+2020 ApJS