*Highlights of Spanish Astrophysics VIII, Proceedings of the XI Scientific Meeting of the Spanish Astronomical Society held on September 8–12, 2014, in Teruel, Spain. A. J. Cenarro, F. Figueras, C. Hernández-Monteagudo, J. Trujillo Bueno, and L. Valdivielso (eds.)*

# Constraining the intermediate-mass range of the Initial Mass Function using Galactic Cepheids

**R. Mor[1], F. Figueras[1], A. C. Robin[2], and B. Lemasle[3]**

[1] Dept. d'Astronomia i Meteorologia, Institut de Ciències del Cosmos, Universitat de Barcelona (IEEC-UB), Martí Franquès 1, E08028 Barcelona, Spain.
[2] Institut UTINAM, OSU THETA, Université of Franche-Comté, Besançon, France
[3] Anton Pannekoek Institute for Astronomy, University of Amsterdam, Science Park 904, PO Box 94249, 1090 GE, Amsterdam, The Netherlands.

## Abstract

**Aims.** To use the Besançon Galaxy Model (Robin A.C. et al., 2003) and the most complete observational catalogues of Galactic Cepheids to constrain the intermediate-mass range of the Initial Mass Function (IMF) in the Milky Way Galactic thin disc.
**Methods.** We have optimized the flexibility of the new Besançon Galaxy Model (Czekaj et al., 2014) to simulate magnitude and distance complete samples of young intermediate mass stars assuming different IMFs and Star Formation Histories (SFH). Comparing the simulated synthetic catalogues with the observational data, we studied which IMF reproduces better the observational number of Cepheids in the Galactic thin disc.
We analysed three different IMFs: (1) Salpeter, (2) Kroupa-Haywood and (3) Haywood-Robin, all of them with a decreasing SFH from Aumer and Binney, 2009.
**Results.** For the first time the Besançon Galaxy Model is used to characterize the Galactic Cepheids. We find that for most of the cases the Salpeter IMF overestimates the number of observed Cepheids and Haywood-Robin IMF underestimates it. The Kroupa-Haywood IMF, with a slope $\alpha = 3.2$, is the one that best reproduces the observed Cepheids. From the comparison of the predicted and observed number of Cepheids up to V=12, we point that the model might underestimate the scale-height of the young population. The effects of the variation of the model ingredients need to be quantified.
**Conclusions.** In agreement with Kroupa and Weidner (2003), our study shows that the Salpeter IMF ($\alpha = 2.35$) overestimates the star counts in the range $4 \leq M/M_{\odot} \leq 10$ and supports the idea that the slope of the intermediate and massive stars IMF is steeper than the Salpeter IMF .