Calibration of Rotating Stellar Models through the Evolutionary History of the ONC

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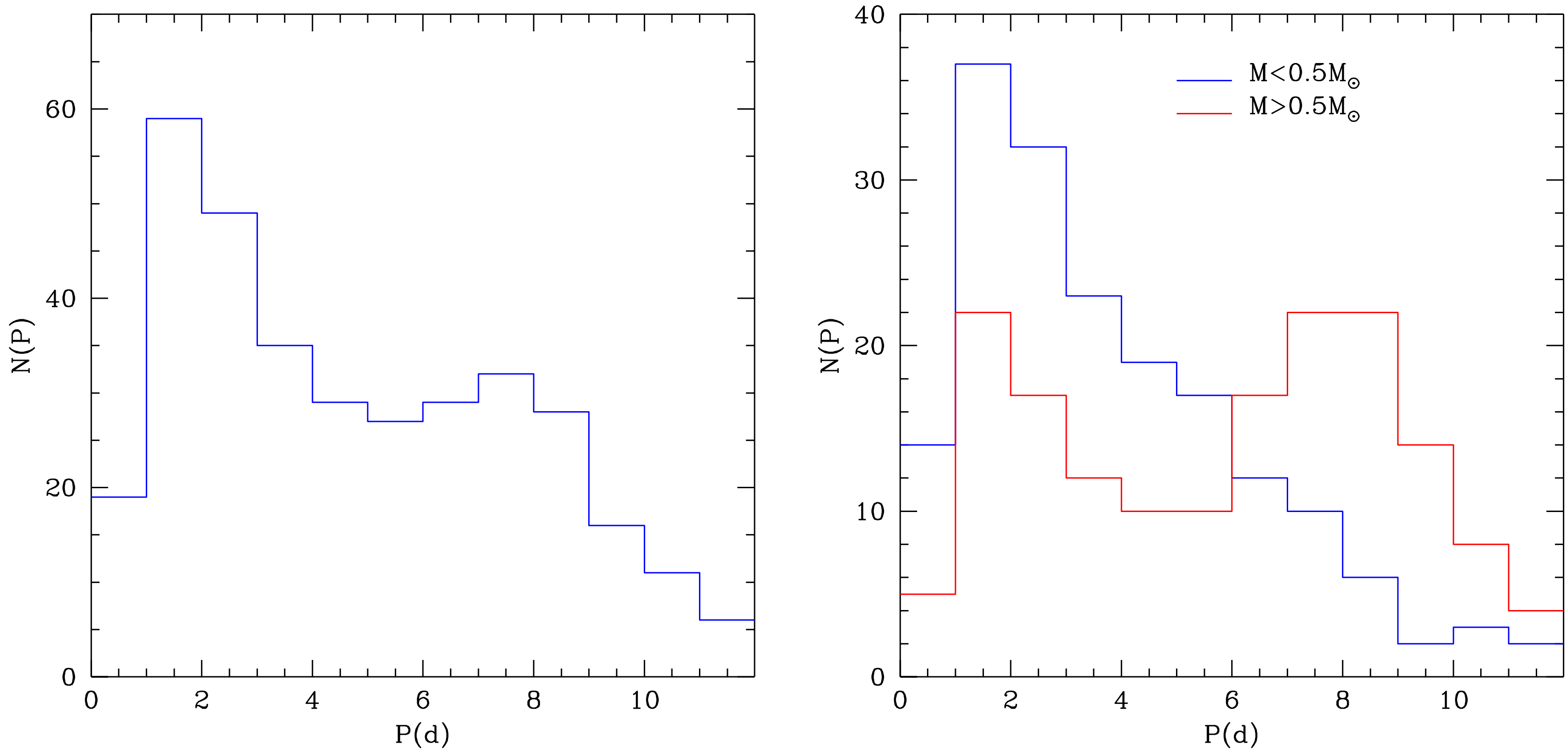
Introduction

- We examine the observed rotational properties of the ONC stars (Stassun *et al.* 1999 and Herbst *et al.* 2002) by means of our new set of rotating, non-grey tracks, obtained with an updated version of the ATON stellar evolutionary code (Landin *et al.* 2005, submited).
- The rotation was implemented according to the approach followed by Endal & Sofia (1976) and modeled by using the solid body approximation. The initial angular momentum was estimated according the Kawaler 1987 prescription. For $M < 0.6 M_{\odot}$ this description does not work. For less massive models than $0.6 M_{\odot}$ it is used just as a first attempt.
- The atmospheric boundary conditions was obtained with non-grey models (NextGen PMS, Allard *et al.* 2000).
- In our analysis of ONC data, we could confirm, in agreement with D'Antona & Montalbán 2003, that a less efficient model of convection is required in the PMS compared to later evolutionary phases.

The Rotational Properties

The bimodal observed distribution of periods (left) is related to a dichotomy in the rotational properties of stars with different mass (right). It indicates the presence of a mechanism acting to prevent stellar spinning up - disck-locking acting mainly in larger mass stars.



Disk-Locking or a Constant Angular Momentum Evolution

Our criterion (P>8d) to establish the presence of a disk is consistent with the distribution of the IR excess $\Delta[I-K]$.

Solid lines: $J_{in}=J_k$, dashed lines: $J_{in}=3\times J_k$.

$J_k = 1.566 \times 10^{50} \left(\frac{M}{M_\odot}\right)^{0.985}$ cgs.

For low-mass stars ($M<0.6M_\odot$) we suggest the use of $J_{in} \sim$ 2-3 times J_k.