Stellar Rotation in the Gaia Era: Revised Open Cluster Sequences

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For more details:
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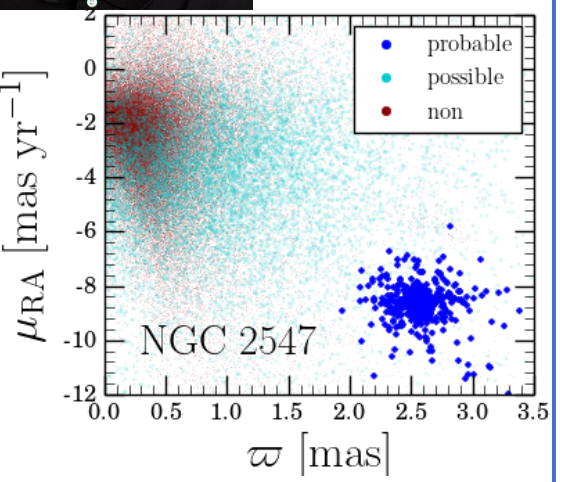

Fig. 1: Astrometric classification for NGC 2547.

- Rotation is a fundamental property of stars, and offers a potential diagnostic to infer their ages.
- Open clusters provide empirical constraints for stellar rotation, but their memberships are often be heavily contaminated by field stars. **In this work, we revise the rotational sequences of a sample of seven open clusters.**
- We use the *Gaia* data to identify probable cluster members in phase-space **(Fig. 1)**. We remove the non-member contamination to produce revised rotational sequences **(Fig. 2)**, which predominantly removes rotational outliers.
- We summarize the clean and updated sequences by collapsing them to a median period as a function of mass **(Fig. 3)**.

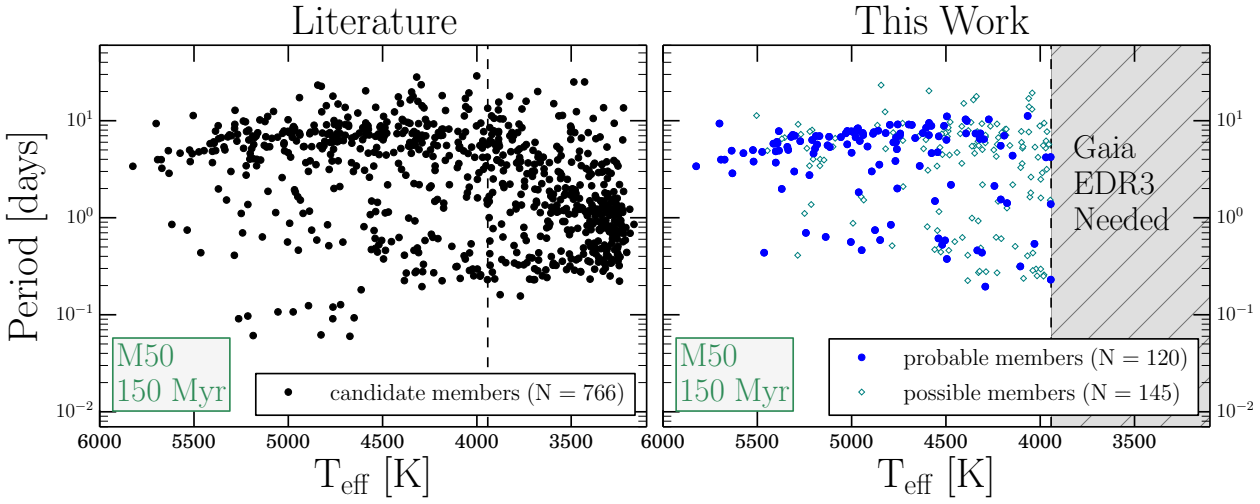

Fig. 2: Period vs. T_{eff} before (left) and after (right) our membership analysis for M50.

Results

1) The contamination in clusters observed from the ground can reach up to ~ 35%.

2) Stars in the 1.0–0.6 $M_\odot$ bin inhabit a global maximum in terms of rotation periods.

3) In the saturated domain, the rotational distributions broaden, in contradiction with existing models.

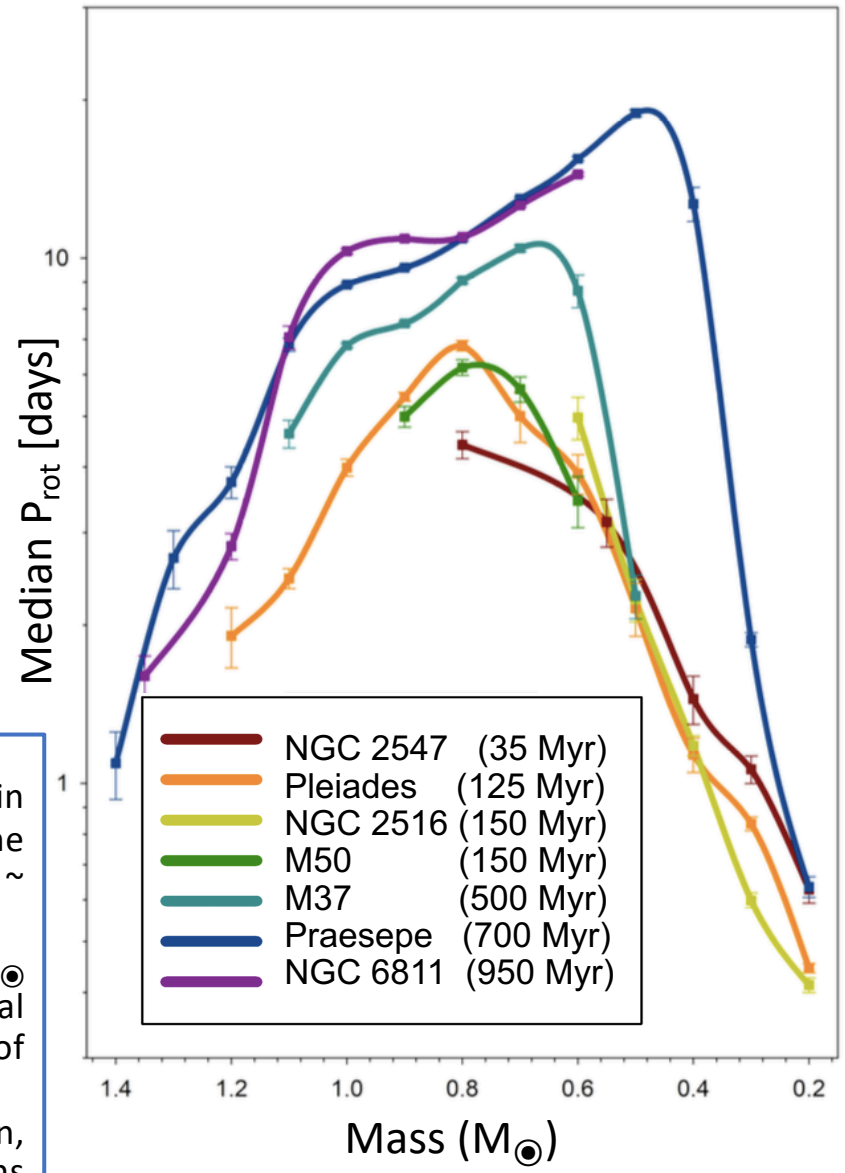

Fig. 3: Revised cluster sequences. Median period vs. mass (in 0.1 $M_\odot$ bins).