

ROTATING STARS FROM *Kepler* OBSERVED WITH GAIA

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ABSTRACT

Rotating stars. overlap between samples

1. INTRODUCTION

of course, *Kepler* useful for calibrations for Gaia, e.g. $\log(g)$ (Creevey et al. 2013) two period distribution found for M dwarfs in McQuillan et al. (2013), confirmed in up to K dwarfs McQuillan et al. (2014) for full *Kepler* mission (Borucki et al. 2010) the Gaia mission (Gaia Collaboration 2016), Data Release 1 (Gaia Collaboration et al. 2016)

2. THE *Kepler*–GAIA DATA

using CDS X-Match service, we match the catalogs from

3. SELECTING MAIN SEQUENCE STARS

first we create the HR diagram, using the absolute Gaia magnitudes from the TGAS parallaxes, and the temperatures reported from McQ14

4. EXTENDING THE SPIN-DOWN GAP

this feature first observed in rotation period by McQuillan et al. (2013) for M dwarfs

here we show it appears to extended to nearby higher mass stars in the *Kepler* field.

the reason this feature did not appear in earlier *Kepler* studies is the inability to select main sequence stars from turn-off or subgiants using the KIC

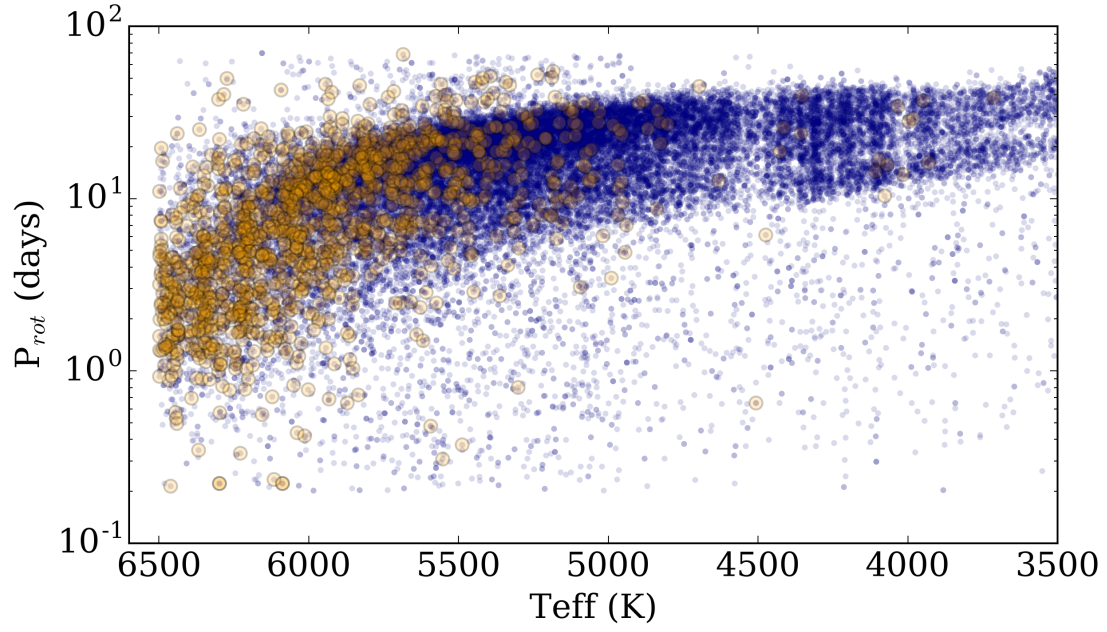


Figure 1.

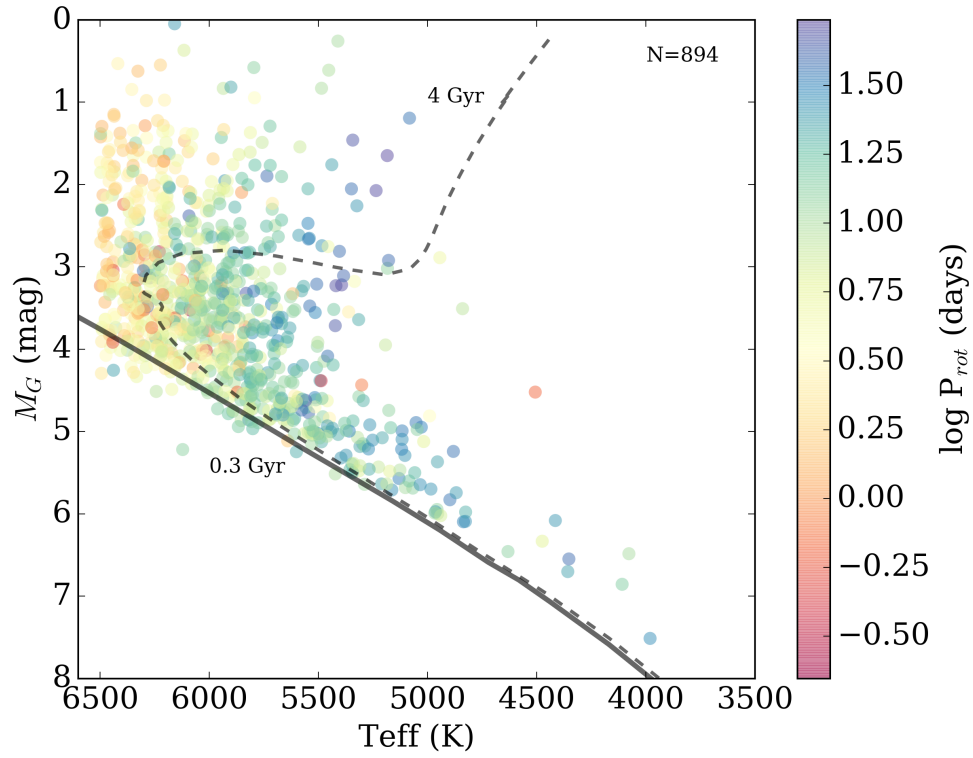


Figure 2. isochrones from Bressan et al. (2012)

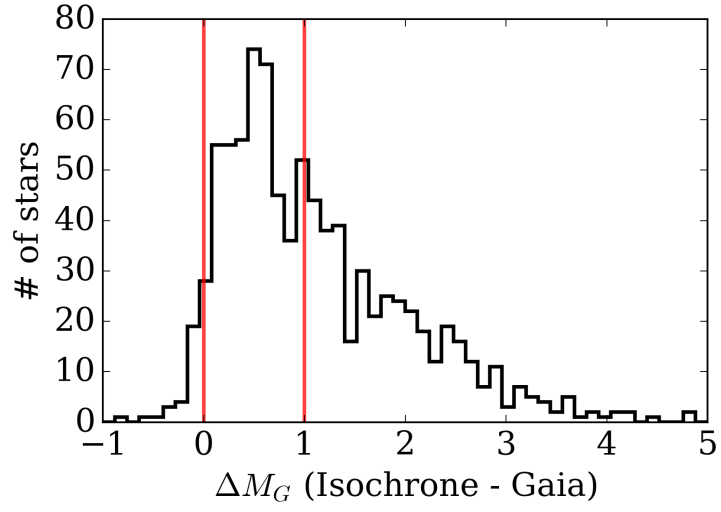


Figure 3.

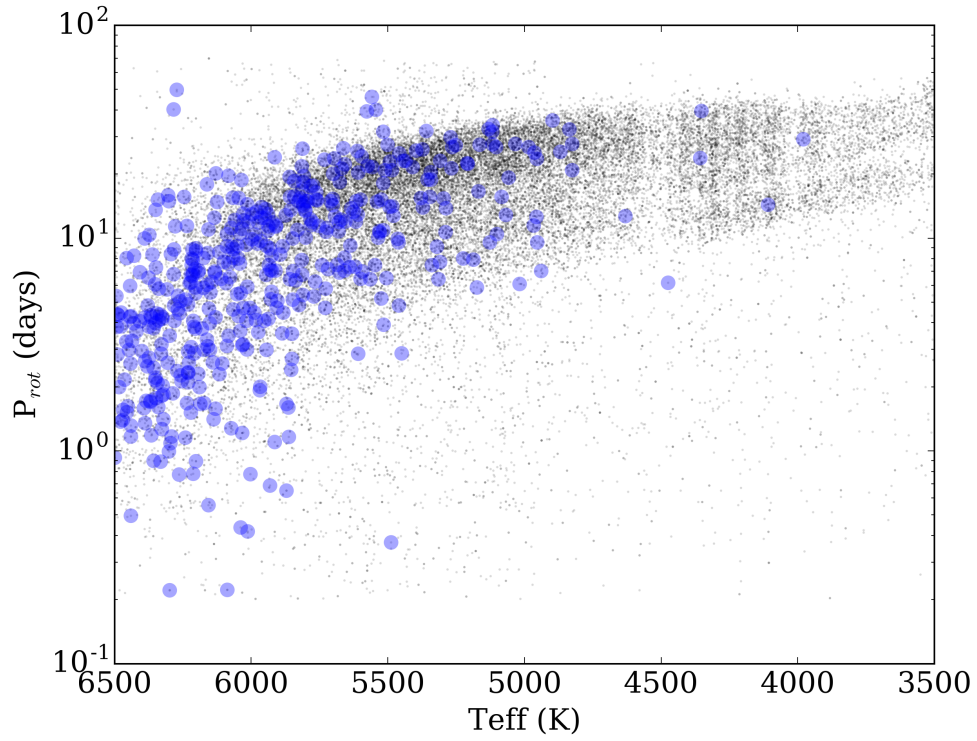


Figure 4.

5. DISCUSSION

gaia useful for determining the age distribution of the nearby field have shown utility for using Gaia data, combined with detailed light curve statistics from kepler, to reveal hidden structure in properties of field stars

the bimodality may be another manifestation of the “Vaughan Preston gap” (Vaughan & Preston 1980), e.g. discussed for rotating stars by Kado-Fong et al. (2016). either due to fast evolution thorough intermediate stellar activity, or could be an age gap.

another way the full Gaia release could further contribute to this mystery is to model the star formation history of the stars in the *Kepler* field, as well as the whole Milky Way (e.g. Bertelli et al. 1999). this will help A) improve gyrochronology relations by selecting only main sequence stars, and B) independently constrain age distribution for rotating stars to see if this gap is confirmed.

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