Metallicity in Low Mass Stars and How it Effects their Stellar Rotation

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Background

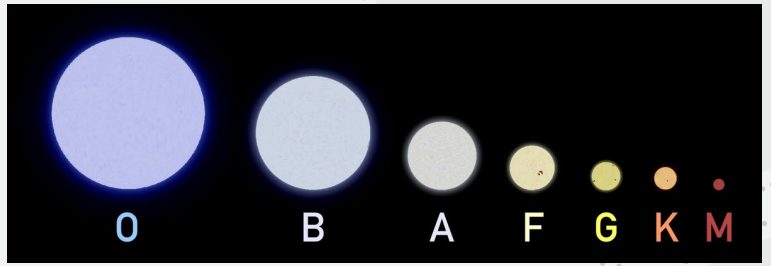
- Classification of Stars

  - OBAFGKM

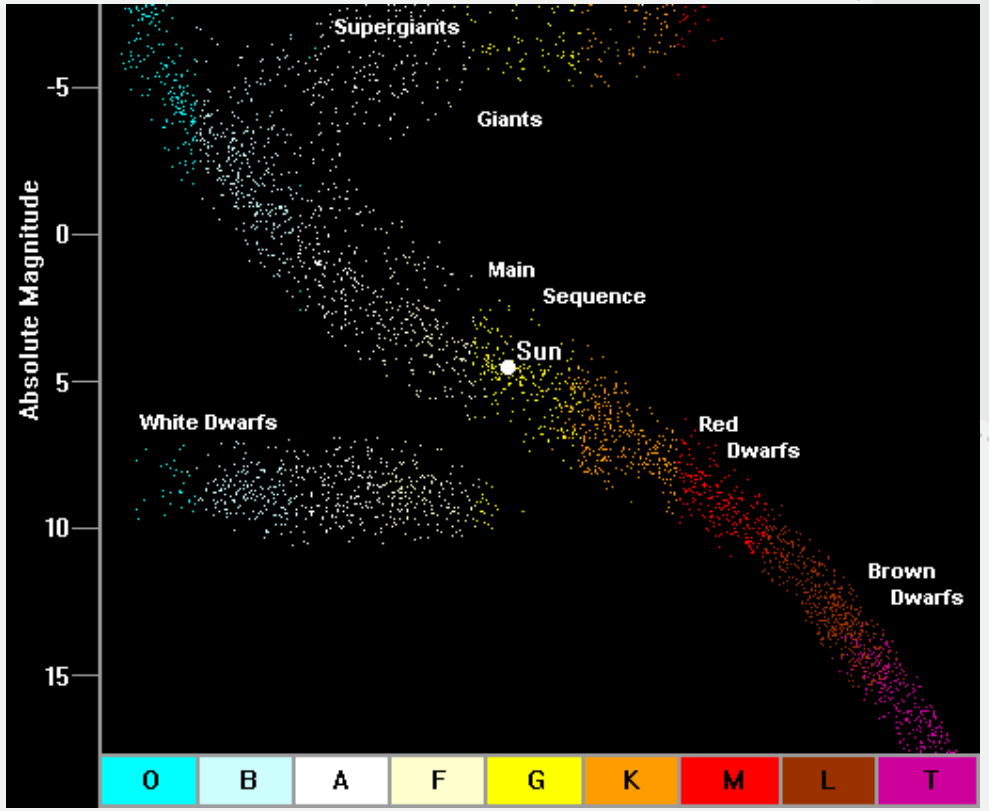
- Low Mass Stars < 1.4 M⊙

  - F through M

- Metallicity within a Star [Fe/H]



Stellar Classification - CosmosFrontier.com



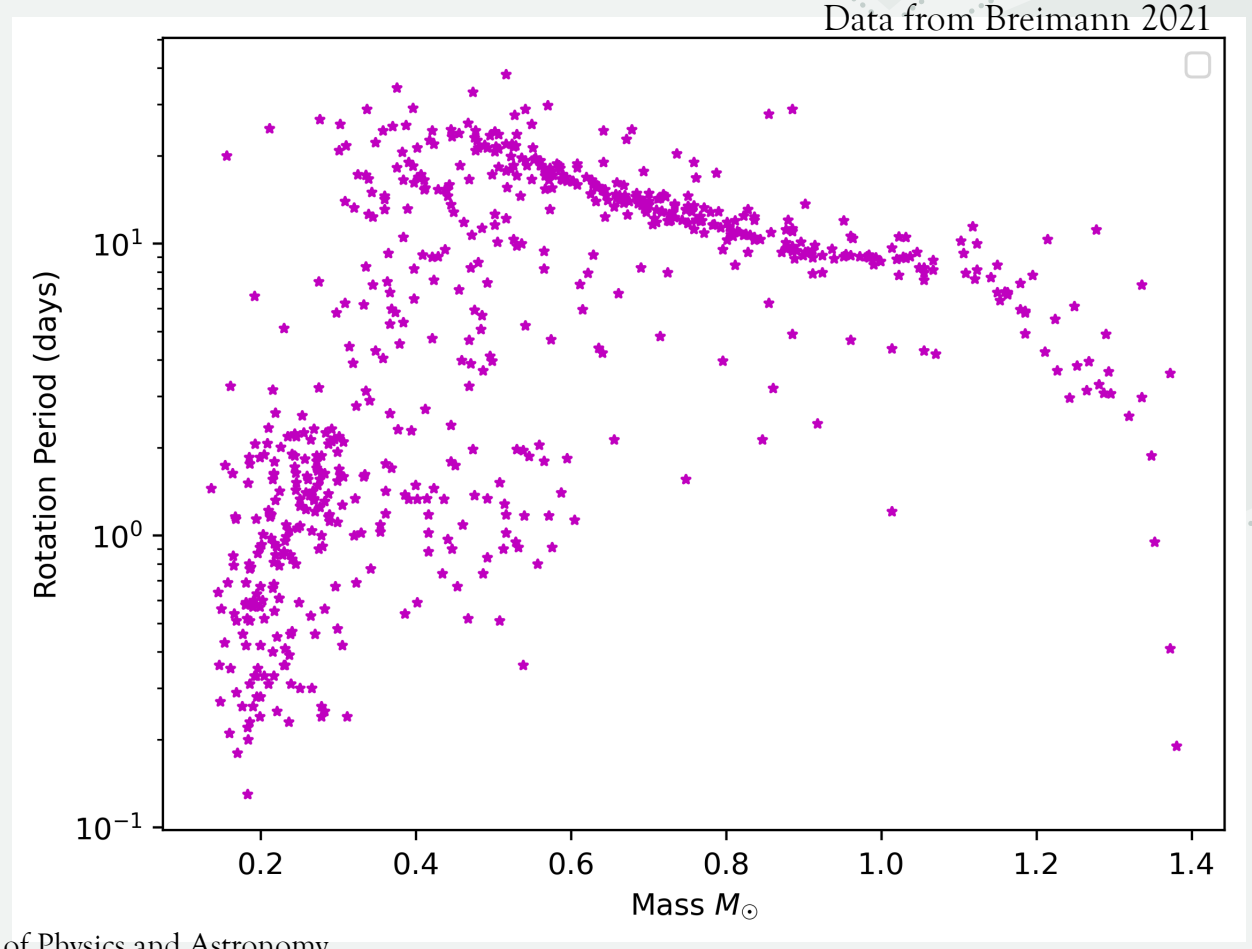
Spectral Class - Unfolded Universe (weebly.com)

Observational Data: Praesepe Cluster

- Age ~ 680 Myr
- Nearly Solar Metallicity

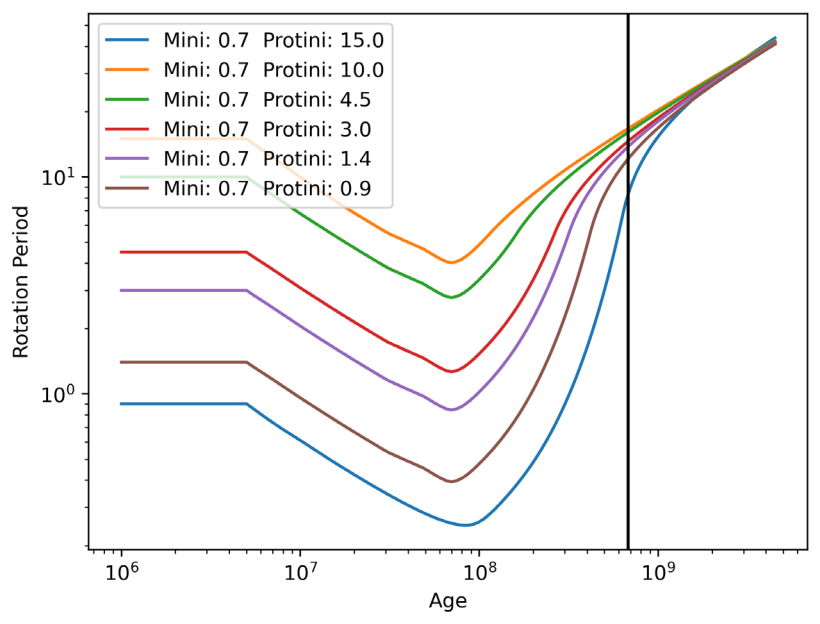
http://www.astrosurf.com/gap47/

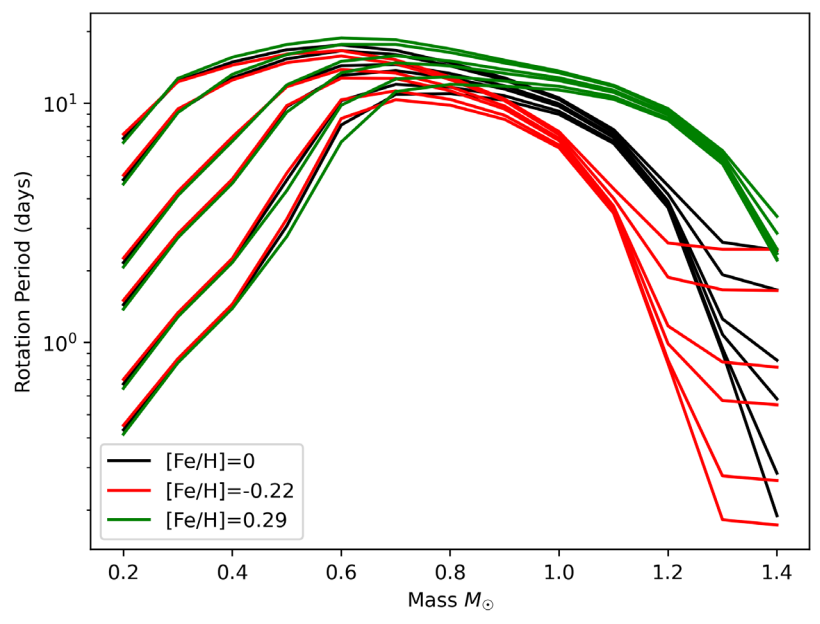
Data from Breimann 2021



Model Data

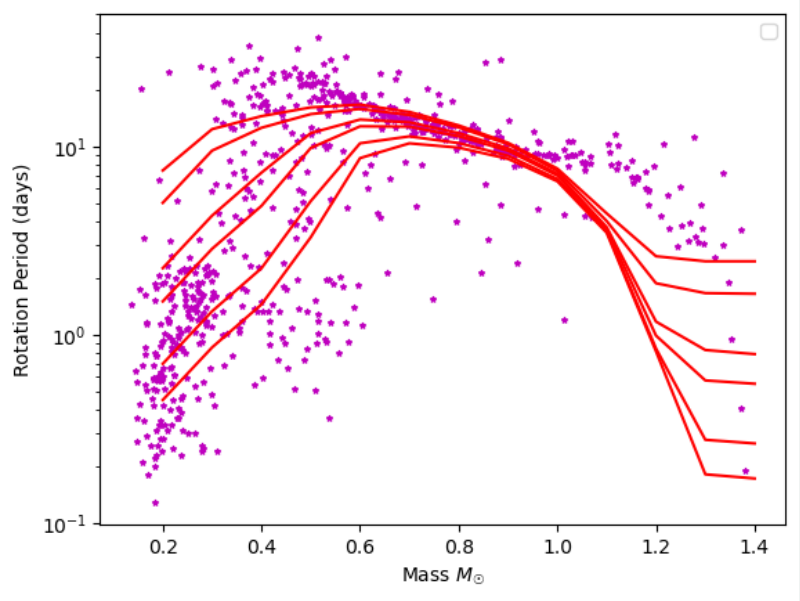
- Model data outputs from dizzyStars.py
- Trends of metallicity against initial rotation periods





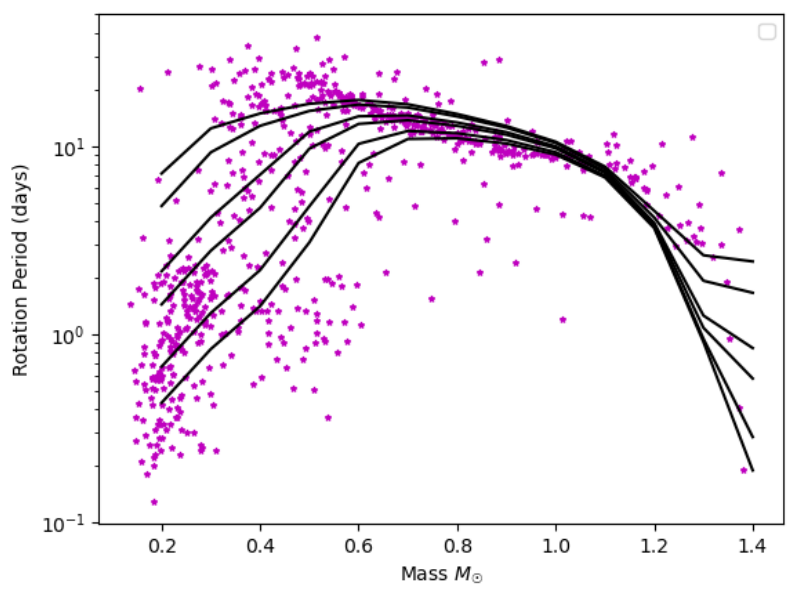
Results & Analysis

- Solar metallicity trend against the high and low metallicity trends



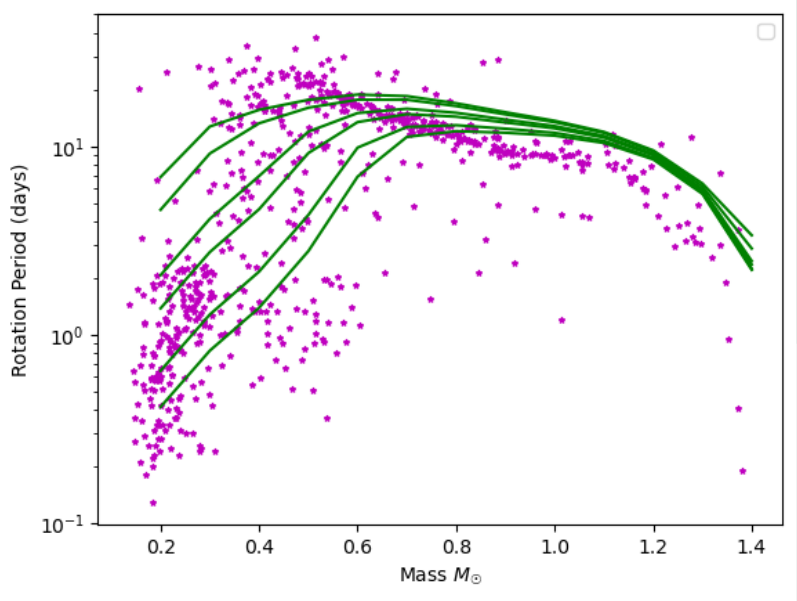
[Fe/H] = -0.22

Low



[Fe/H] = 0

Solar



[Fe/H] = 0.29

High

Upcoming Plans

- Better understand how metallicity affects rotation
  - Use plots against other cluster data
  - Find best fit plots for data
- Refine my Python skills

APOD: 2018 January 18 - Blue Comet in the Hyades (nasa.gov)

Acknowledgments

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  - David Gracia
  - Luke Garcia
  - Stephanie Hall
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  - Jenna Brustad

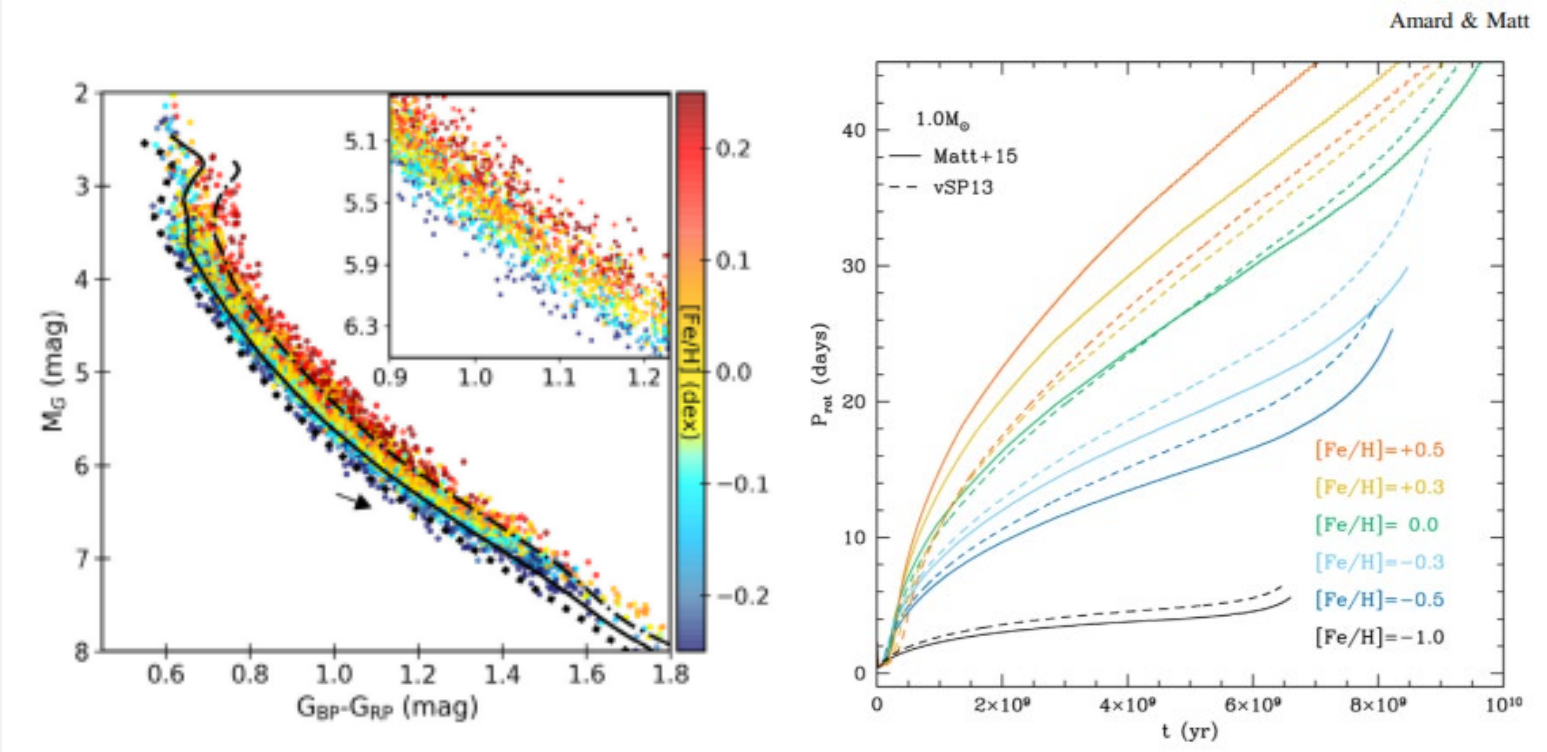

Questions?

Citations

- Amard, Louis and Sean P. Matt. “The Impact of Metallicity on the Evolution of the Rotation and Magnetic Activity of Sun-like Stars.” *The Astrophysical Journal* 889 (2020): n. pag.
- Louis Amard, Julia Roquette, Sean P Matt, Evidence for metallicity-dependent spin evolution in the *Kepler* field, *Monthly Notices of the Royal Astronomical Society*, Volume 499, Issue 3, December 2020, Pages 3481–3493, https://doi.org/10.1093/mnras/staa3038
- Breimann, Angela A. et al. “Statistical Fitting of Evolutionary Models to Rotation Rates of Sun-like Stars.” *The Astrophysical Journal* 913 (2021): n. pag.

Previous Research

- Left
  - Data collected from Gaia spacecraft
  - Metallicity on the color bar
- Right
  - Models ran from 2 different stellar-wind-torque formulation



Amard 2020