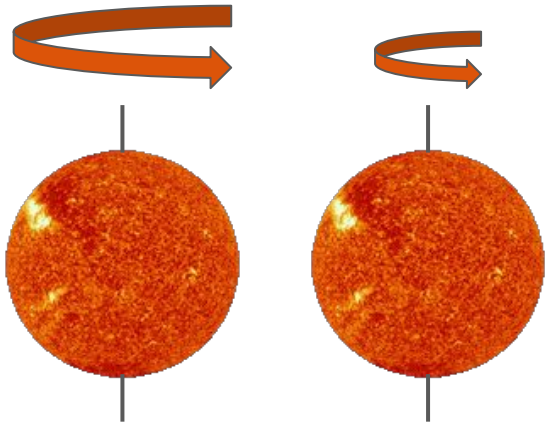
Ages are hard to measure for low mass stars!

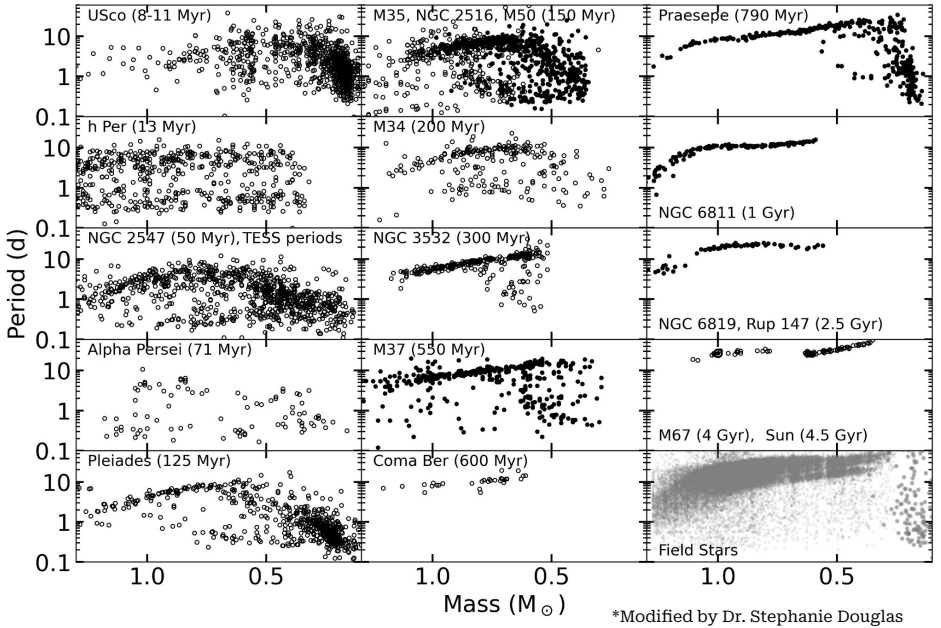
1. Rotation rates provide insight.



young + fast old + slow

this is an outrageous oversimplification

➪ ***GYROCHRONOLOGY***



*Modified by Dr. Stephanie Douglas from Bouvier et al. (2014)

2a. Analytical models struggle.

2b. Calibration data is not sampled uniformly.

ML + Bayesian inference outperforms traditional models!

3. We developed a framework to infer posterior age probability distributions.

$$p(\tau \mid P_{rot}, C_0, \sigma_C) = \frac{p(\tau \mid \sigma_C) \cdot p(P_{rot}, C_0 \mid \tau, \sigma_C)}{p(P_{rot}, C_0, \sigma_C)}$$

age prior · likelihood · model evidence

$$p(P_{rot}, C_0 \mid \tau, \sigma_C) = p(P_{rot} \mid C_0, \tau, \sigma_C) \cdot p(C_0 \mid \tau, \sigma_C)$$

4. We trained a normalizing flow to learn P_{rot} evolution conditioned on observables.