Gyro-Kinematic Ages for around 30,000 Kepler Stars

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Motivation

- The age of a star is one of its most important, yet difficult to determine, quantities.
- Difficulty: The observable features of stars---their luminosities and temperatures---change very slowly while on the main sequence.
- This is particularly true of low-mass K and M dwarfs.
- Isochrone fitting is currently the most productive method to infer ages for individual field stars [1] [2][3]. However, these ages can often have uncertainties that are more than 50% for K and M

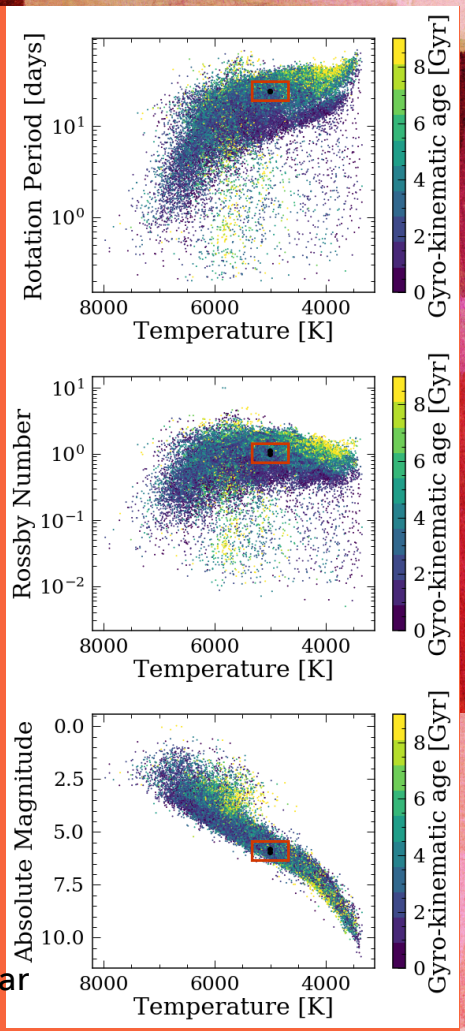
Method

Assumptions:

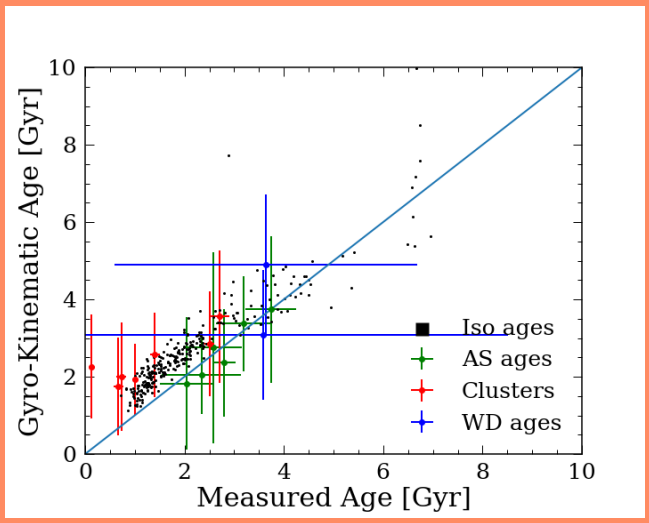
- Age velocity dispersion relation (AVR), vertical velocity dispersion increases with age [4].
- Gyrochronology [5][6], stars spin down overtime.

Method:

- Stars with similar temperature, Rossby number, absolute magnitude, rotation periods should have similar age.
  - Bin in 4-D phase space and obtain



Results



References

[1] Nordstorm et al., 10.1051/0004-6361:20035959
[2] Buder et al., 10.1051/0004-6361/201833218
[3] Berger et al., arXiv:2005.14671
[4] Yu et al., 10.1093/mnras/stx3204
[5] Barnes et al., 10.1086/367639
[6] Barnes et al., 10.1086/519295