**FUSE Literature Review**

Notes/Outline

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* Introduction to Starspots/Sunspots
  + Sunspots/starspots are dark blotches on the surface of stars.
    - They are referred to as sunspots when they are located on the Sun, and they are referred to as starspots otherwise.
  + Sunspots were first studied in the West when Galileo Galilei and Thomas Harriot first used telescopes to observe the Sun.
  + The underlying processes that govern their formation and death, as well as their affects on their host star, are poorly understood.
  + It is widely accepted by modern astronomers that starspots are caused by fluctuations in the magnetic field beneath the stellar surface, but this process is not well understood.
  + Starspots can mask the identity of distant stars by either causing superficial changes to the host star’s observable properties or by causing deep structural changes.
* Motivation – Why Study Starspots?
  + Starspots are proposed to explain the discontinuity between theoretical models and observed properties of stars, such as:
    - Mass-radius relationships
    - Model-predicted and measured stellar masses
    - Disagreements between model predictions and measurements between the mass-radius relationship for low-mass main sequence stars
  + Starspots are assumed to be cooler than the host star’s ambient photosphere.
    - Their presence on the stellar surface is theorized to reduce the total amount of emergent flux from the star
    - Therefore, the starspots disrupt a star’s thermodynamic equilibrium thereby causing it to inflate.
      * Therefore, the effective temperature of the star decreases thereby causing the star to appear more red.
* The Mottled Stars Project
  + In 2018, Dr. Feiden worked with first-year undergraduate Amanda Ash on a project titled: “Improving Age Estimates for Young Stars in the Planet Formation Era”
    - This is part of the larger Mottled Stars project headed by Dr. Feiden to gain a better understanding on starspots in general.
    - Their project shoed that starspots might just be transient features on the surface of some stars.
    - They made two key predictions after the conclusion of their research.
      * Transient spots require that a star have 75% of its surface covered by spots
      * Spots that cause deep structural changes require that only half of the star to be covered by spots