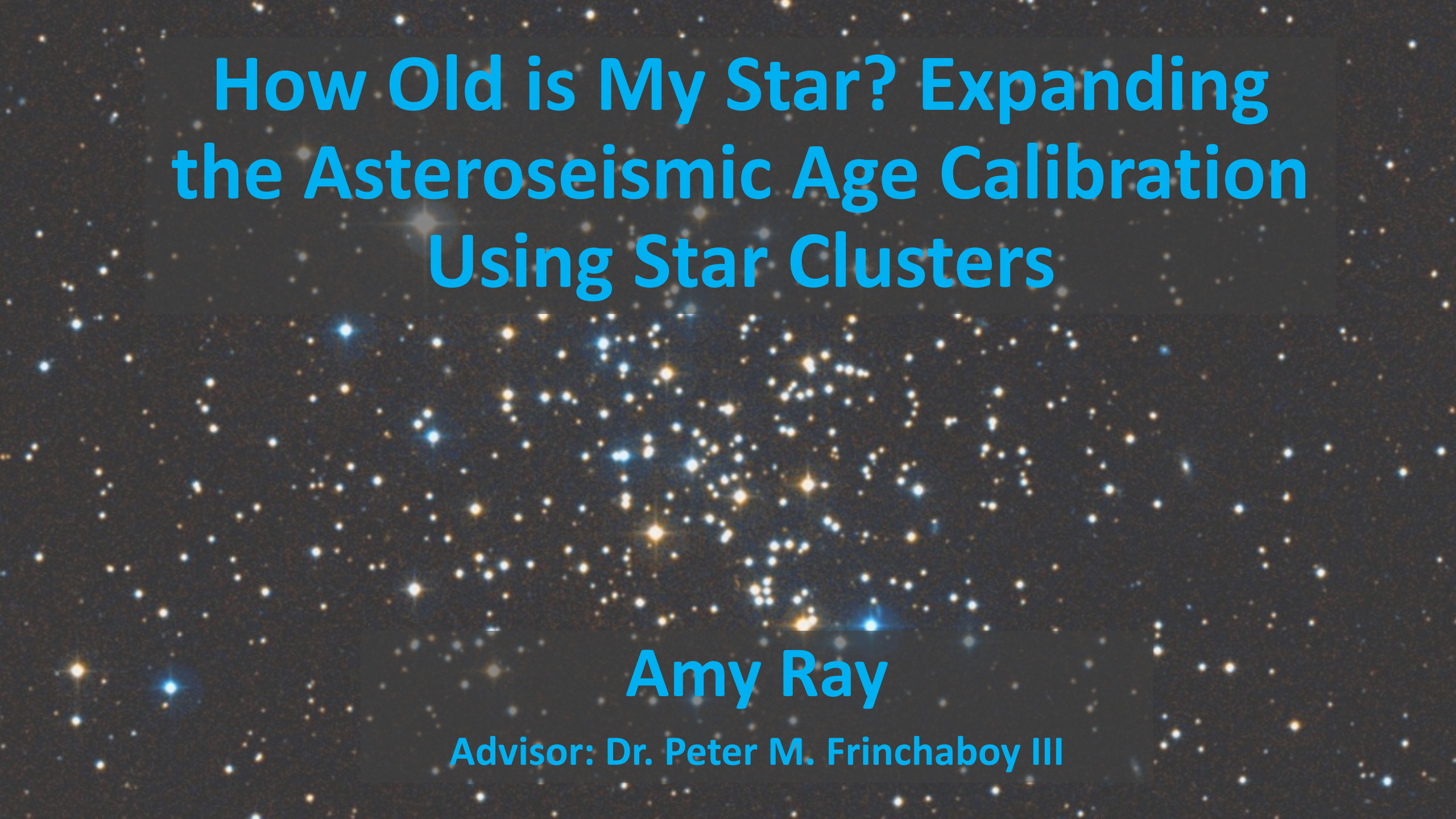
How Old is My Star? Expanding the Asteroseismic Age Calibration Using Star Clusters

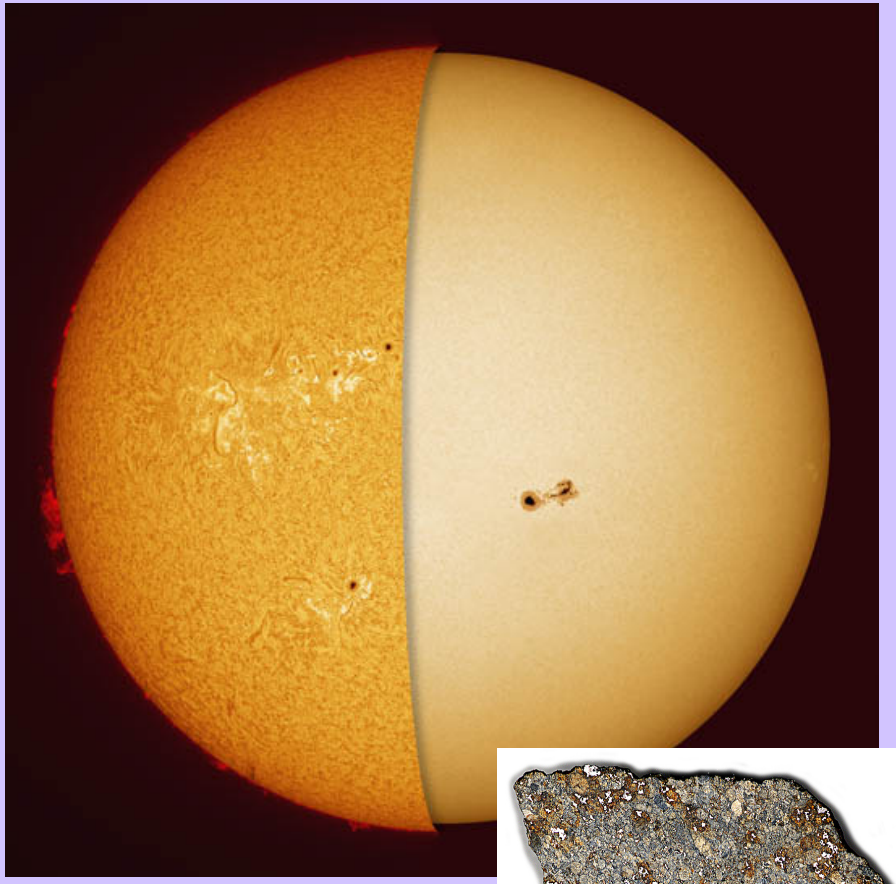


Amy Ray

Advisor: Dr. Peter M. Frinchaboy III

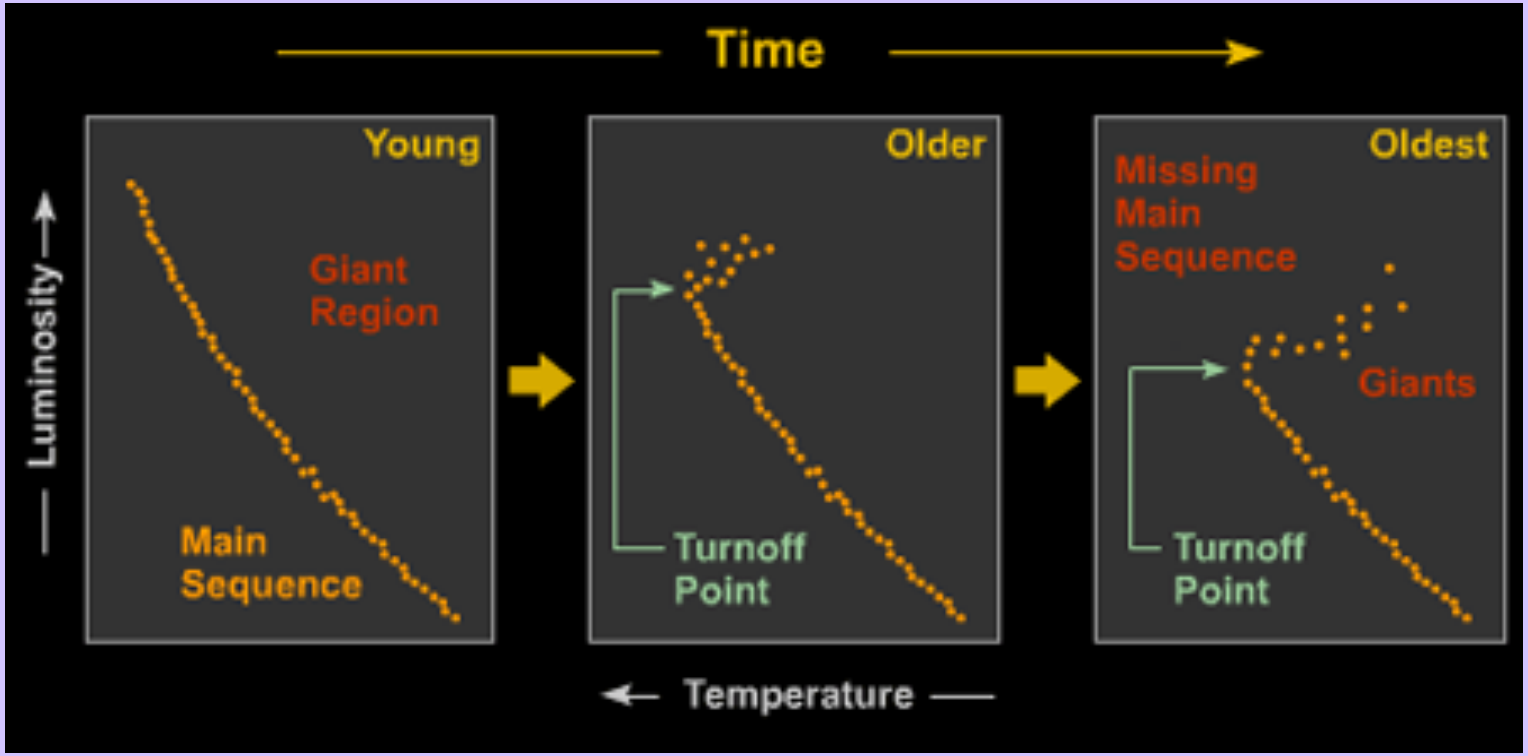
Importance to the Field

- Ages of stars are crucial for understanding evolution of Milky Way
- Only star with well known age is the Sun due to carbon dating
- Asteroseismology (star quakes) is being used to determine more accurate ages



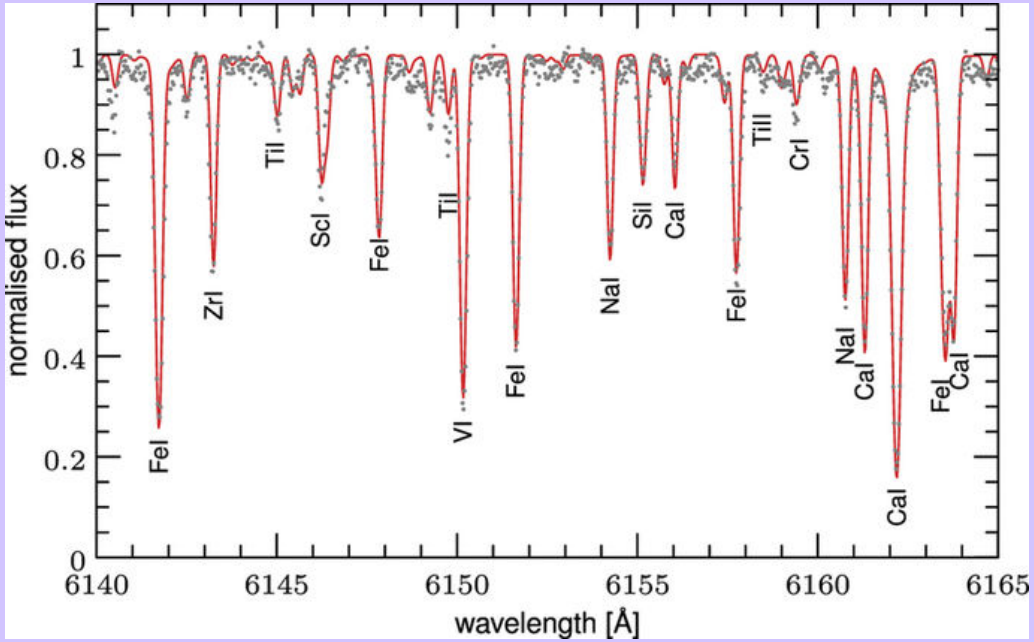
Open Clusters

- Contain up to a few thousand stars
- Found in the disk of the Milky Way
- Good environments for studying age because they have many types of stars



Multiple Mirror Telescope (MMT)

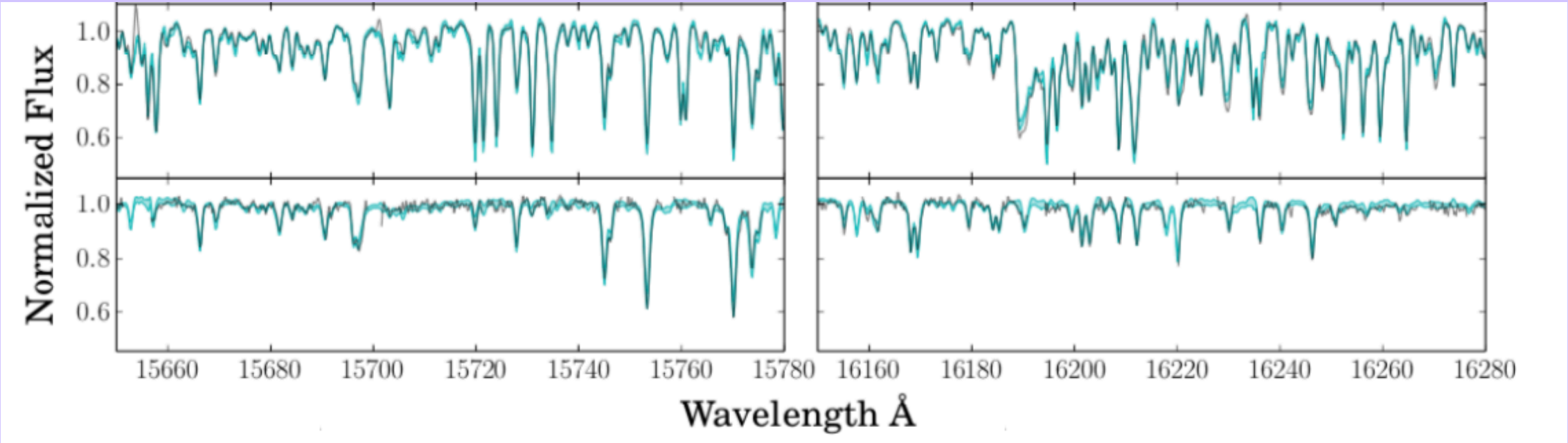
- Observed stars in 10 clusters using the MMT
- Wavelength range: 6100-6440Å



The *Cannon* Abundance Determination

- First step: create a training set from reference objects

- Second step: apply training set to the rest of the red giants in sample



SciCom Statement

Star clusters have been incredibly useful tools for studying the history of the Milky Way because they allow us to determine relative ages based on their chemical abundances. However, most stars are not in clusters, and current methods used to determine ages for individual stars produce substantial uncertainties. A new age method enabled by the precise photometry data of the NASA Kepler satellite is asteroseismology. Asteroseismology allows us to probe the internal structure of stars that are affected by age and composition. This research aims to calibrate the relationships between age, chemical abundances, and asteroseismology by analyzing data of stars in star clusters, which provide an independent measure of the stars' ages. This project aims to expand upon the currently used age and chemical abundance range and triple the number of open star clusters used to calibrate the asteroseismic age-mass-chemical abundance relation. We have combined asteroseismology data for stars in clusters within the Kepler 2 campaign fields with uniformly determined follow-up spectroscopic abundances from observations from the MMT.