Stars in HETDEX

Jennifer Marshall

Texas A&M University

Don’t throw them away!

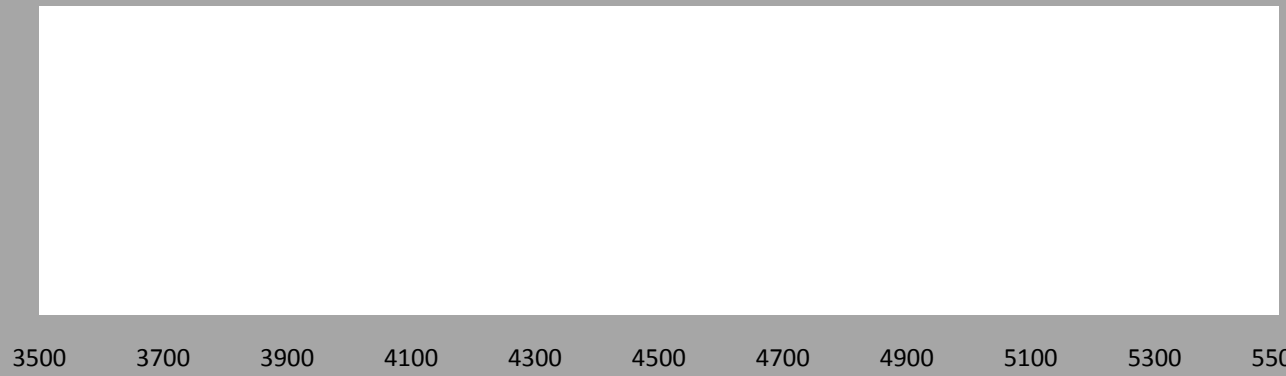
There will be a LOT of stars in HETDEX—they don’t have to be simply contaminators.

Lots of interesting things to do with them!

Stellar Spectroscopy with HETDEX

- Resolution R~700 from 350-550 nm
- This is 2.5x lower resolution than SDSS

NLTT 341
[Fe/H]=-1.42
Teff=5600



NLTT 1059
[Fe/H]=-1.03
Teff=4800

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HETDEX
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Stellar Spectroscopy with HETDEX

- Magnitude limits V~16-22 mag
- Star counts in 420 sq degree HETDEX field
  - Total star count ~0.25 million for V=16-22 mag
    - S/N~10 per resolution element at V=22 mag
    - S/N~75 per resolution element at V=18 mag
    - 150,000 FGK stars

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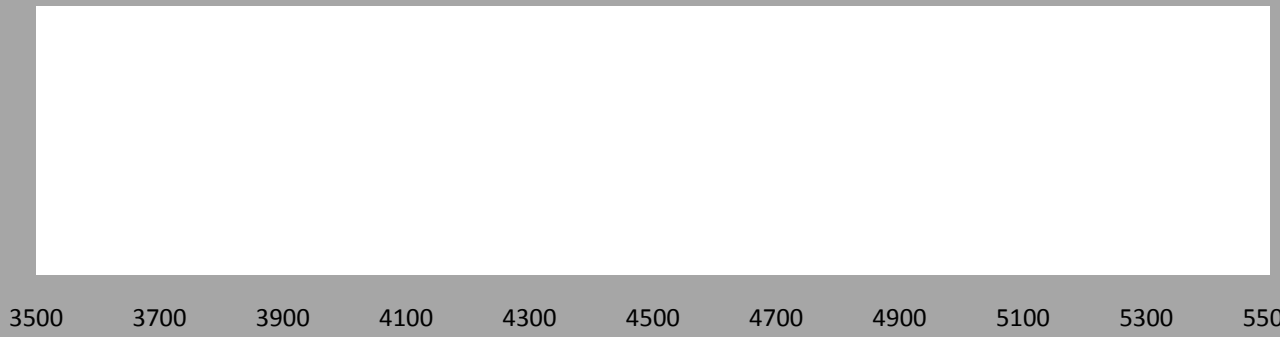
Metallicities

- Spectral range covers CaH+K and MgB lines
- Use these lines to estimate metallicities
- SEGUE (R~1800) reports σ([Fe/H])=0.23 dex, we can expect somewhat less precise metallicities



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[Fe/H]=-1.42
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Radial Velocities

- Use Mg lines to measure radial velocities
- Should get RVs 2.5x less precise than SDSS
  - σ(RV)~12 km/s
  - What other factors influence RV precision?
    - Spectrograph stability
    - Temperature fluctuations
    - Fibers
    - Should be similar to SDSS
- Adequate precision for Galactic kinematic studies

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Galactic Archaeology

Can use this data set to find:

- Galactic streams
  - To study merger history of Milky Way
- Moving groups
  - To study Galactic potential
- Metal-poor stars
  - To study chemical evolution of MW
- Wide separation binaries
  - To study DM content of MW

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Galactic Streams

- Dynamically associated group of stars moving through Galaxy
  - SDSS Field of Streams (Belukorov et al. 2006)
- Can be found through Galactic space motions
  - Radial velocity
  - Proper motion
  - Distance

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Moving Groups

- Relics of ancient Galactic merger events (De Silva et al 2008)
- Chemically distinct from other populations
- Can use HETDEX metallicities to find and confirm moving groups
  - Follow-up with high resolution abundance analysis for chemical tagging

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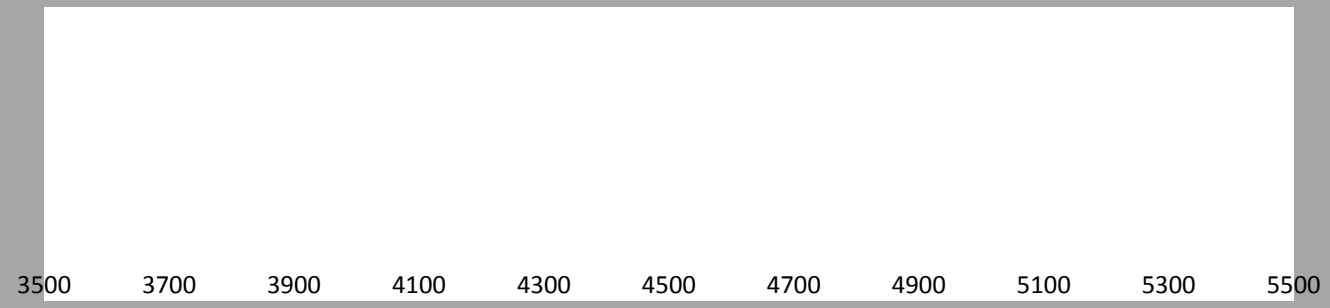
Metal-poor stars

- Should find many MP candidates
  - Large scale studies of MP stars can constrain Galactic formation scenarios (Bullock & Johnston 2005)
- Can follow-up V=16-18 mag stars now with 8m telescopes
  - MIKE on Magellan, HIRES on Keck
- Follow-up with GMT
  - V=18-20 mag stars with GMT HROS
  - V=20-22 mag stars with GMACS



NLTT 49482
[Fe/H]=-3.0
Teff=3800

Wide-Separation Binaries

Binaries can be used to constrain Galactic dark matter density models (Yoo et al 2004)

- Wide binary candidates selected from proper motion surveys (Chaname & Gould 2004)
- Need radial velocity confirmation of binaries
- True binaries put constraints on MACHO models

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Synergy with other projects

Can combine HETDEX RVs and metallicities with other datasets

- GAIA (2016)
  - Distances/proper motions to V=20 mag
  - Gives full Galactic space motions
  - Only measures RVs to V=17 mag
- RAVE (Now)
  - RVs of 1 million stars to V=16 mag with σ(RV)<5 km/s
  - HETDEX extends to fainter stars (at lower precision)
- (Photometry from DES/LSST)

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