Measuring the Accuracy of Chandra/HETGS Wavelength Scale with Capella data

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Calibration of ACIS-S Geometry

- Correct Anomalous Rotation of ACIS-S Chips
- Correct Translational Offsets of the Chips
- Adjust MEG Grating Period (4001.41 to 4001.95AA)
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**CAL Observations of Capella**

- Fit APED model (better handle on blend lines) for each of four grating settings
- Select several bright emission lines (e.g., Si XIV, Mg XI & XII) for fitting

![Graph showing apparent radial velocity of Capella over Modified Julian Date](image)
CAL Observations of Capella

- Capella Aa and Ab: two cool giants of G8 III (2.6$M_\odot$) and G1 III (2.5$M_\odot$)
- Period $\approx 104^d$, Systemic Velocity $K \approx 29$ km/s

Phase Plot (HEG + MEG)
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- Residual (Observed - Expected) \(\leq 20 \text{ km/s}\) (too large to be due to defocusing)
CAL Observations of Capella

- Residual per wavelength $\approx 100\text{km/s (3}\sigma)$
- $\delta\lambda/\lambda \approx 1 \times 10^{-4}$
Summary

Calibration:

- HETGS appears very stable in a long term.
- Achieving \textit{absolute} wavelength accuracy of 100 km/s for both HEG and MEG gratings per wavelength.
- Enabling to probe a Doppler scale variation of 20 km/s in an astrophysical object.
- The mysterious trend in the residual plot: calibration issue? or just systemic error?
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Science:
- The mysterious trend...Science issue? (need a follow-up?)
- Why do these similar cool giants – G8 III and G1 III – \textit{NOT} contribute equally in X-rays?