Young A stars: The softest Youngsters

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Herbig AeBe stars

- young, pre-main-sequence objects
- with disks
- mass: $3-8 \ M_{\text{sun}}$

Are HAeBes the massive brothers of T Tauri stars?
HAeBe stars: X-ray properties

- 70% detection rate with ROSAT (Zinnecker & Preibisch 1994, A&A 292, 152) compared to 10-15% for A type field stars
- 80% detection rate in Chandra archive (Stelzer et al. 2006, A&A 457, 223)
- flares observed in binary V892 Tau (Giardino et al. 2004, A&A 413, 669)
- first RGS spectrum for AB Aur (Telleschi et al. 2007, A&A 468, 541)
HAeBes: X-ray origin

The emission mechanism is unknown, several scenarios are discussed:

- late-type companion (T Tauri star)?
- own corona (HAeBes as Ap progenitors)?
- stellar accretion?
- shocks in outflows?

→ Obtain well exposed, high-resolution spectrum: HD 163296 (120 ks)
HD 163296

- disk detected in radio
  (Isella et al. 2007, A&A 469, 213)

- optically detected jet

- very soft X-ray spectrum

- Chandra resolved jet emission

- Outflow signatures in UV
HD 163296: PN spectrum
HD 163296: RGS spectrum

- RGS1
- RGS2
- Fe XVII
- Fe XVII
- O VIII
- O VII triplet
- Ne X
- Ne triplet

Wavelength [Angstroem]

Total counts / bin
OVII He-like triplet

- density sensitive $(10^9-10^{12} \text{ cm}^{-3})$
- UV sensitive (1630 Å)
O VII He-like triplet: results

HD 163296: O VII f/i–ratio

4.0±2.2
Summary

• XMM-Newton allows high-resolution spectroscopy of HAeBe stars.
• late-type companion? (HST imaging)
• own corona? (kT=0.6 keV)
• stellar accretion? (f/i-ratio in O VII)
• shocks in outflows? (kT=0.2 keV)