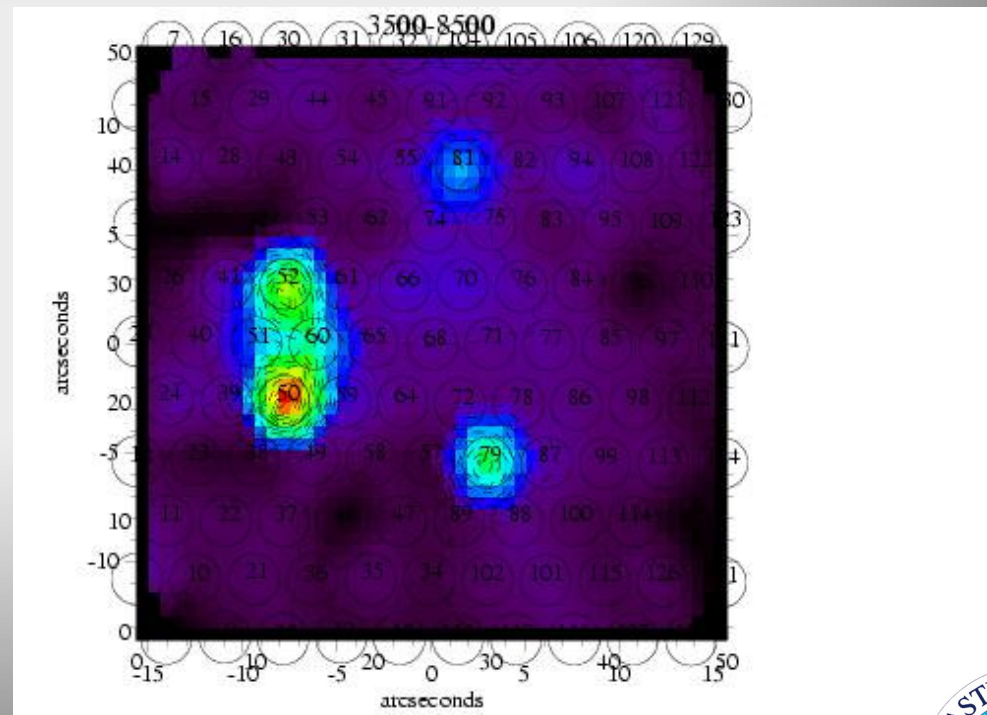
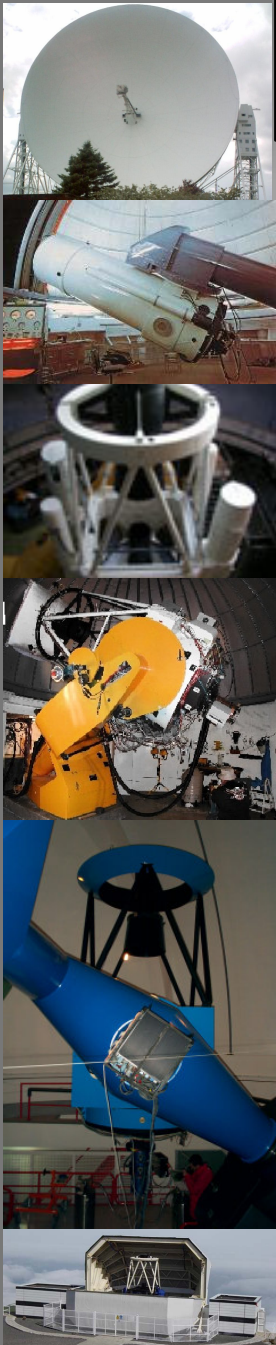


Santander (Spain), 15th-17th December 2004

## 2D Spectroscopy and microlensing for J1004+4112



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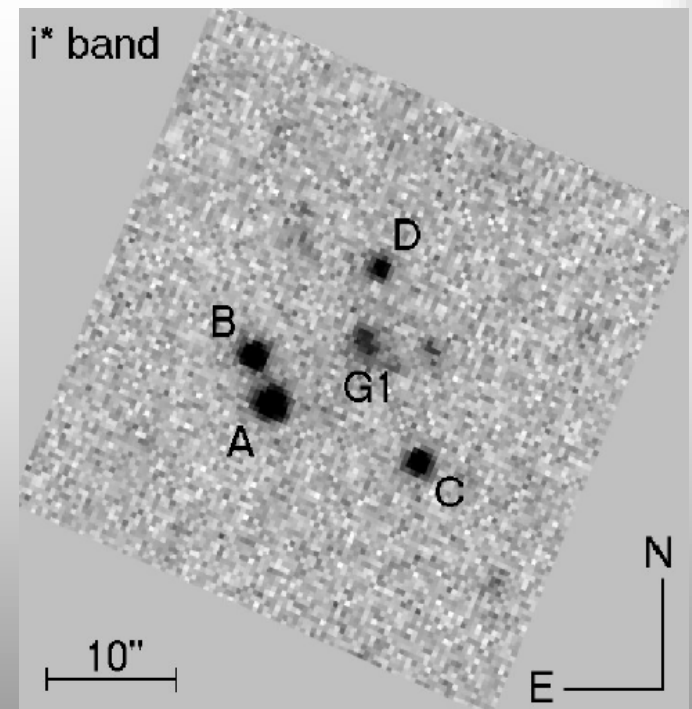


# Introduction

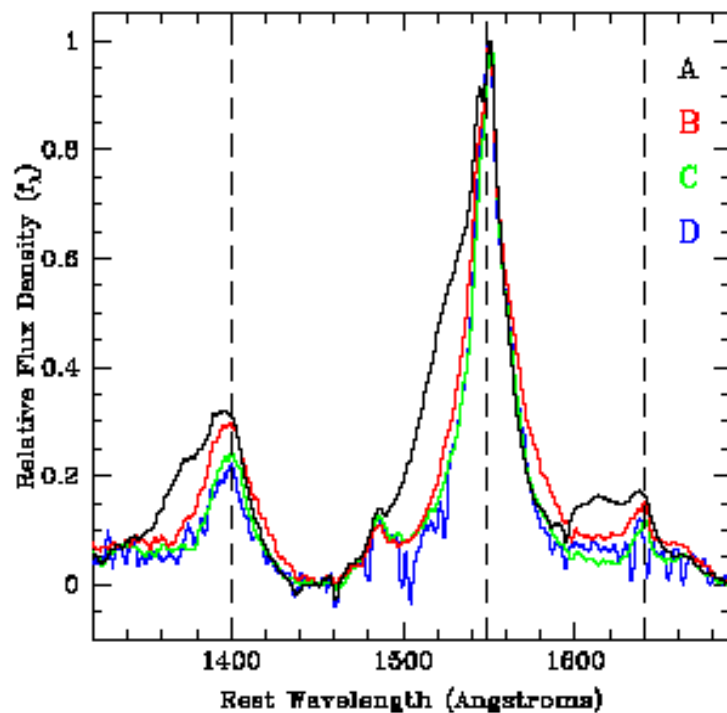
- Microlensing routinely observed in the continuum of multiply lensed QSOs.
- First assumptions assumed BLR  $\sim 1$  pc
  - » Too wide for undergoing microlensing by  $\sim M_{\odot}$
- Reverberation methods (Wandel et al. 1998, Kaspi et al. 2000) revealed BLRs  $\sim .01$  pc
  - » Opens new windows to microlensing for high-ionization lines of the BLR (modeled by Abajas et al. 2002; Popovic 2001)

# J1004+4112

- Discovered by SDSS (Inada et al. 2003)
- Quadruply-lensed QSO
- Maximum separation (C-D) 14.6''
- $z_s=1.734$
- Lensed by a galaxy cluster @  $z\sim 0.68$
- Modeled time delay  $\simeq 32$  days (Oguri et al. 2004)

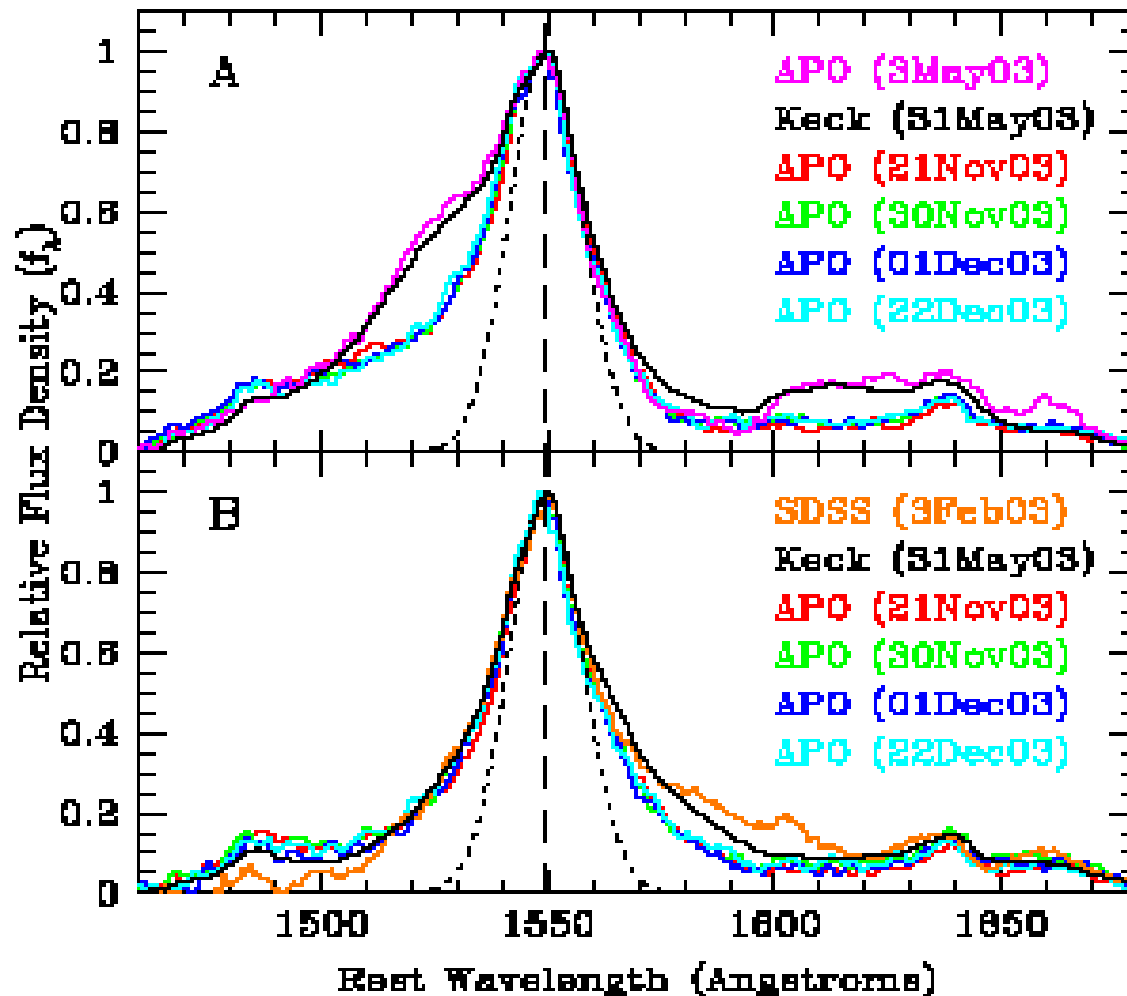


# First “microlensing” event (Oguri et al. 2003)



- Unsymmetrical blue-wing in comp. A high-ionization lines (Si IV, CIV & HeII)
- Tentatively explained by microlensing of the BLR

# 2003 Monitoring (Richards et al. 2004)

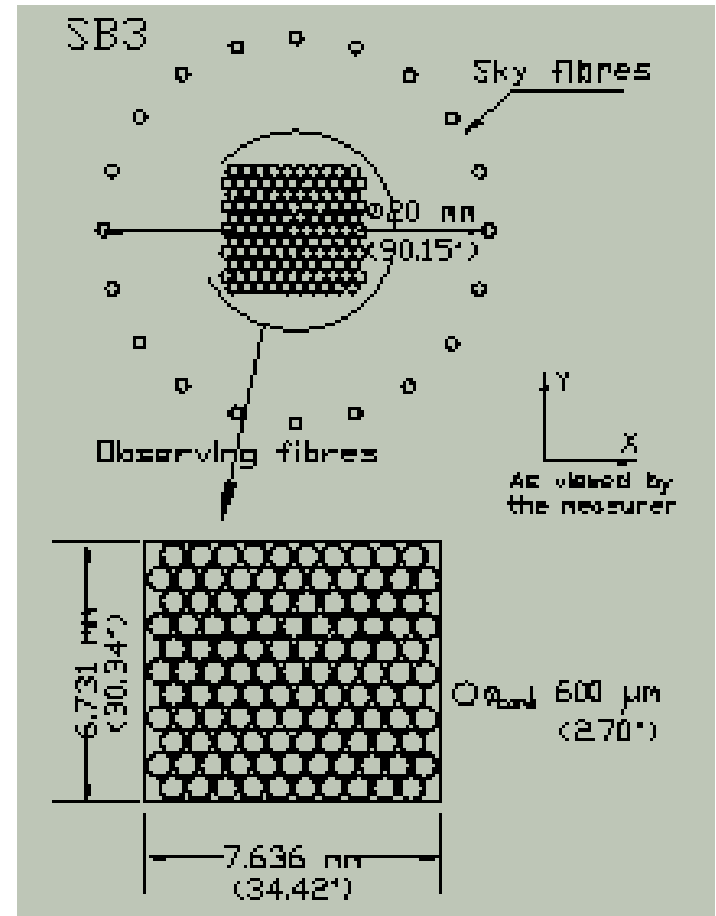
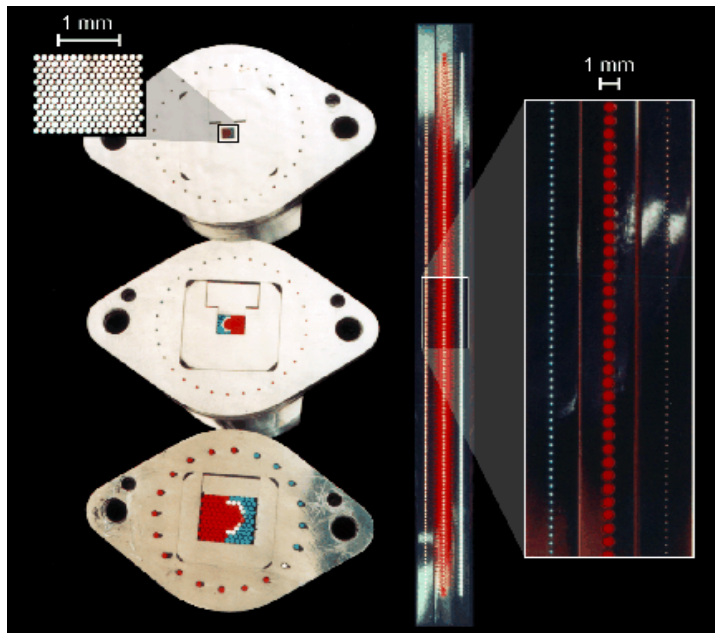


# configuration

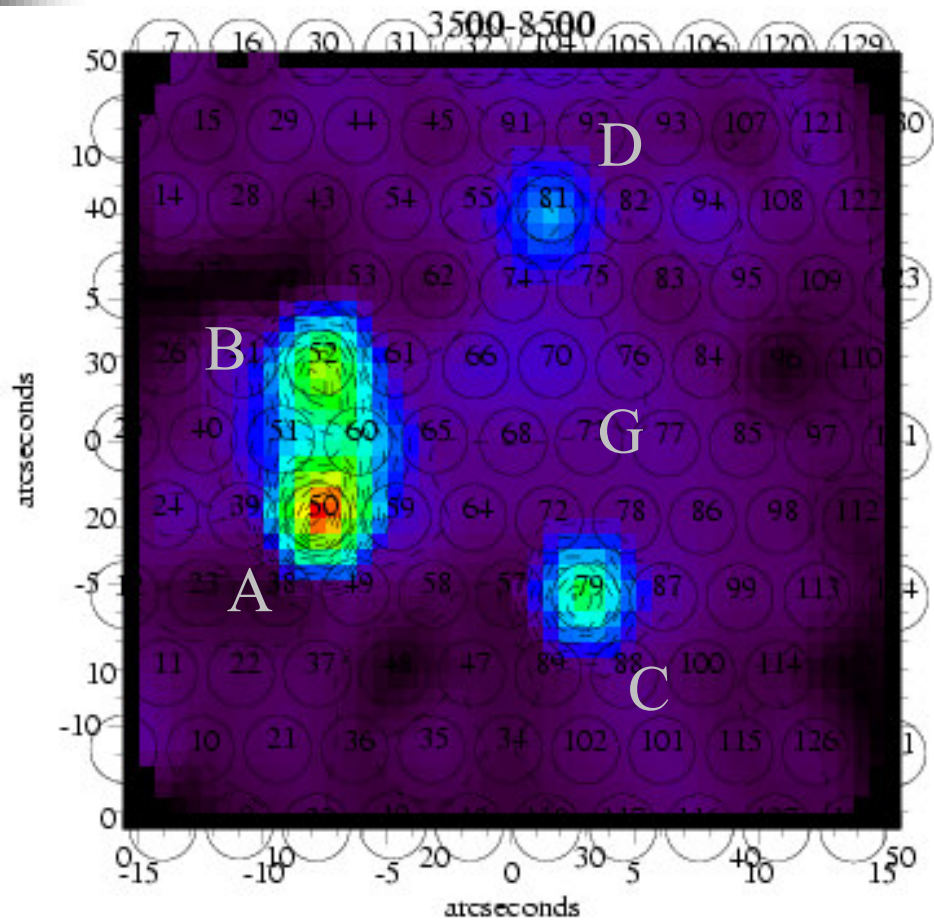
# INTEGRAL+WYFFOS(



- Fibre diameter = 2.7"
- 205 Fibres (175 + 30):
- Sky coverage 34" x 29"
- Spectral resolution = 19 Å
- Spectral dispersion = 6.2 Å/pix
- Spectral Coverage = 3725 - 9750 Å

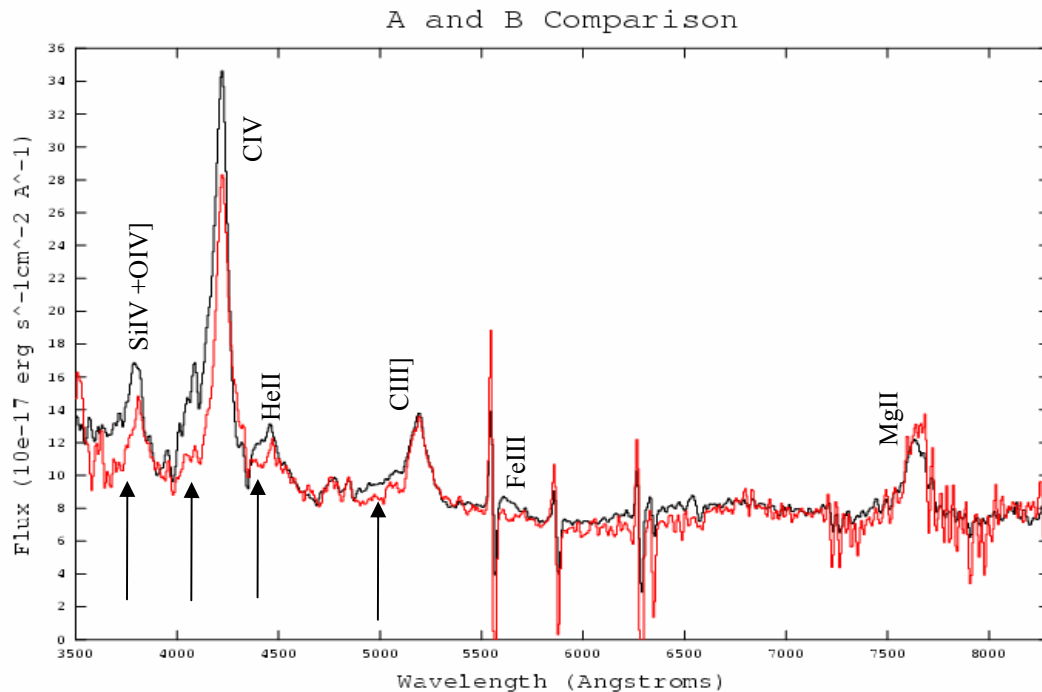


# Integral Observations



- 19 January 2004
- WHT (La Palma)
- Two sets of 3x1800s
- Medium seeing (1.5")
- Standard reduction techniques (IRAF + IDL)

# A & B comparison (Jan 2004)

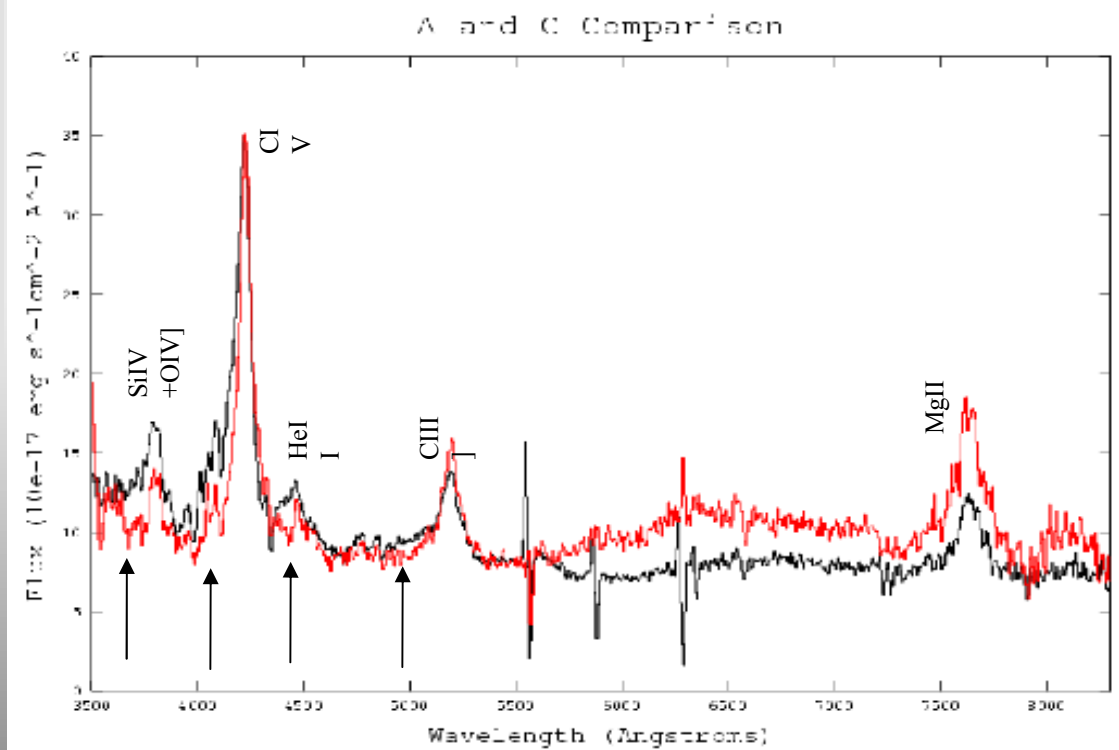


**B component** scaled  
to **comp. A**  
continuum

Enhancement of blue-  
wing in high-  
ionization lines again  
present!



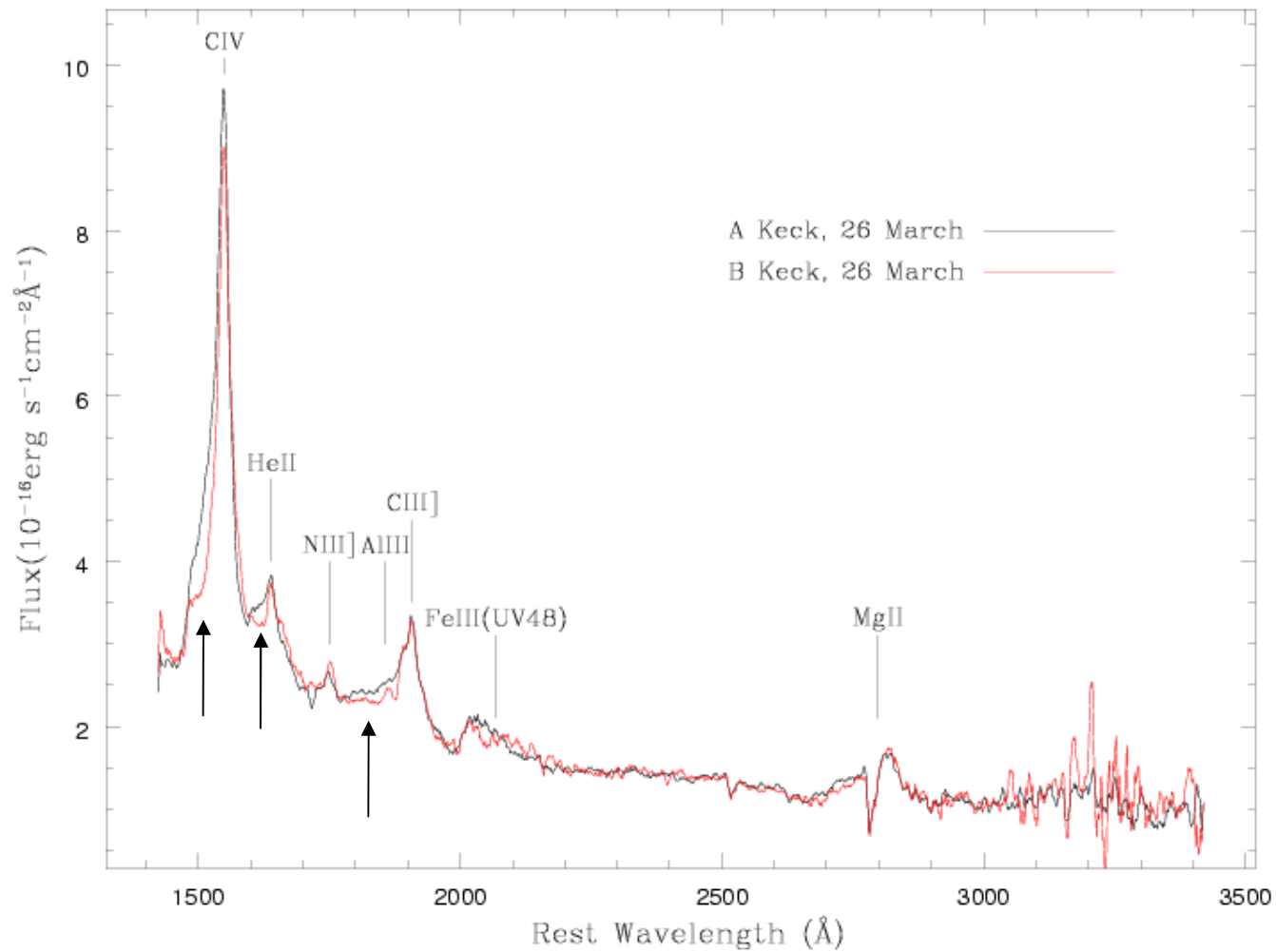
# A & C comparison (Jan 2004)



C component scaled  
to comp. A  
continuum

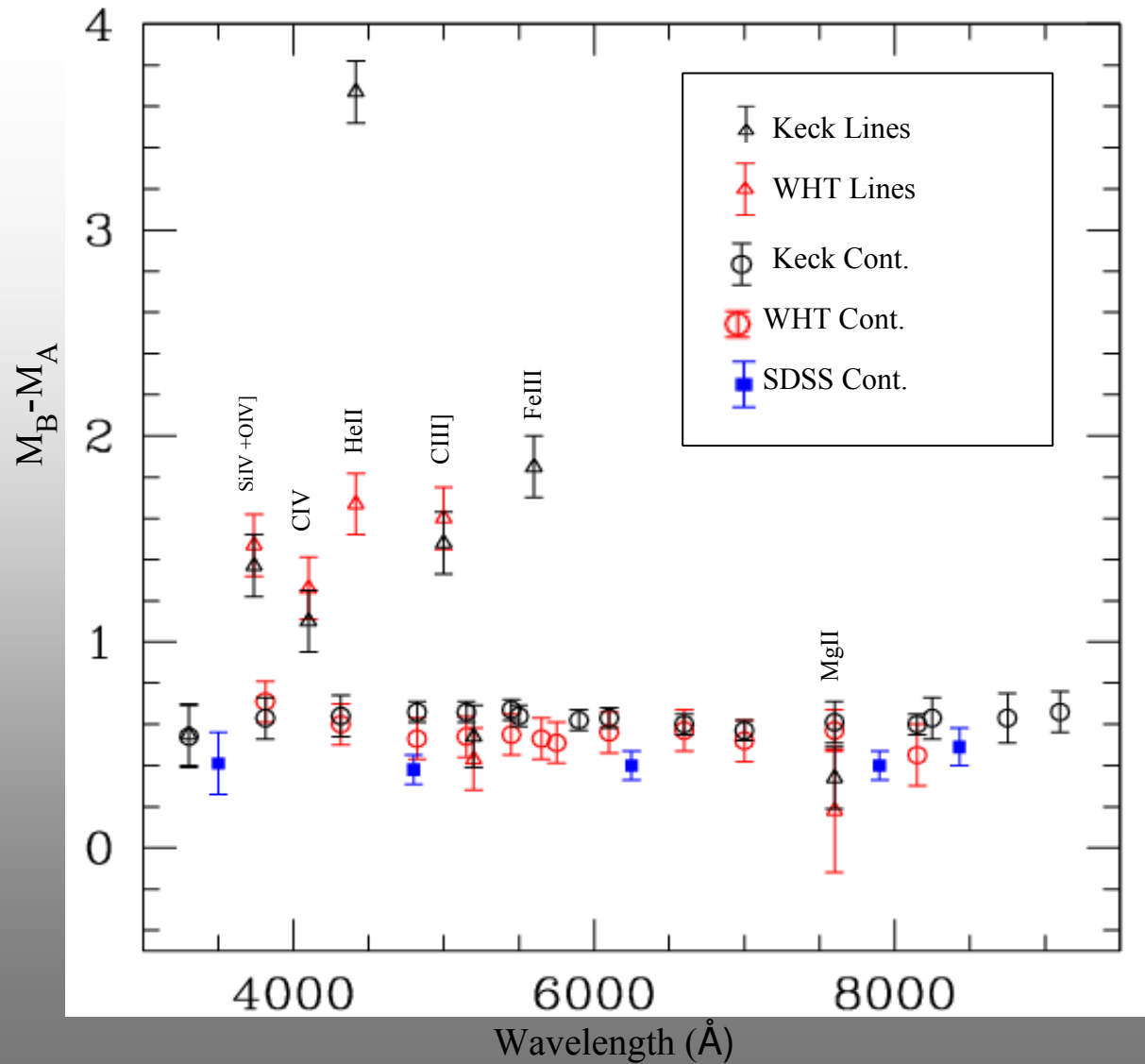
# March 2004 Spectra Keck+LRIS

(Richards - private communication)



# Magnitude differences

May 2003 (Keck) – Jan 2004 (WHT)



## Summary and Conclusions

- Recurrence in the enhancement of the high-ionization lines [March 2003 (Keck) – Jan 2004 (WHT)]
  - » Difficult to understand under microlensing hypothesis
- Stable continuum
  - no continuum microlensing
- No intrinsic variability
- Other possibilities ?

End

# Magnitude differences

Keck 23 May 2003 – WHT 19 Jan 2004

