

## Neon-Rich Donors in Ultracompact Binaries

Adrienne M. Juett

Massachusetts Institute of Technology

Collaborators:

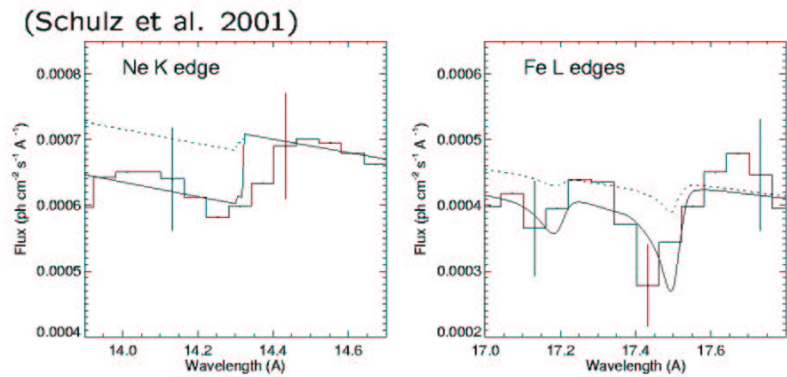
Depto Chakrabarty

Duncan Galloway

Dimitrios Psaltis

Norbert Schulz

## 4U 1626–67 Absorption Edges



Damped Lyman  $\alpha$ :  $N_{\text{H}} = 5 \times 10^{20} \text{ cm}^{-2}$

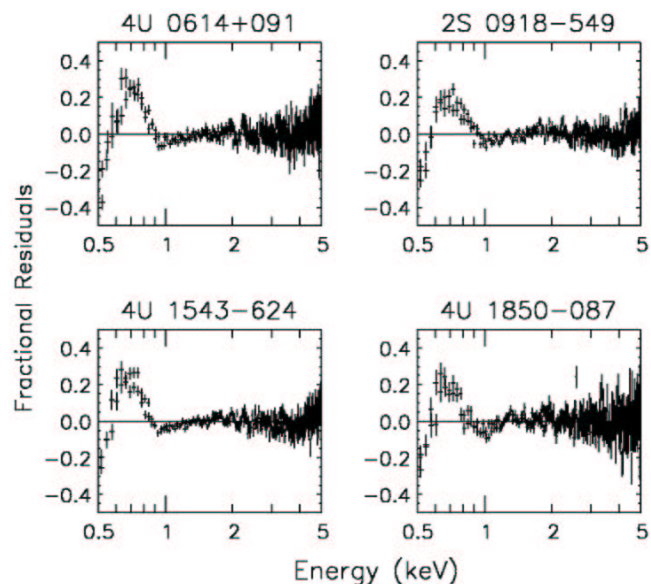
Ne edge:  $N_{\text{H}} = 3.7 \times 10^{21} \text{ cm}^{-2}$

O edge:  $N_{\text{H}} = 3.3 \times 10^{21} \text{ cm}^{-2}$

Local material has Ne/O ratio = 0.22

– much larger than expected

ASCA spectra of UC binaries

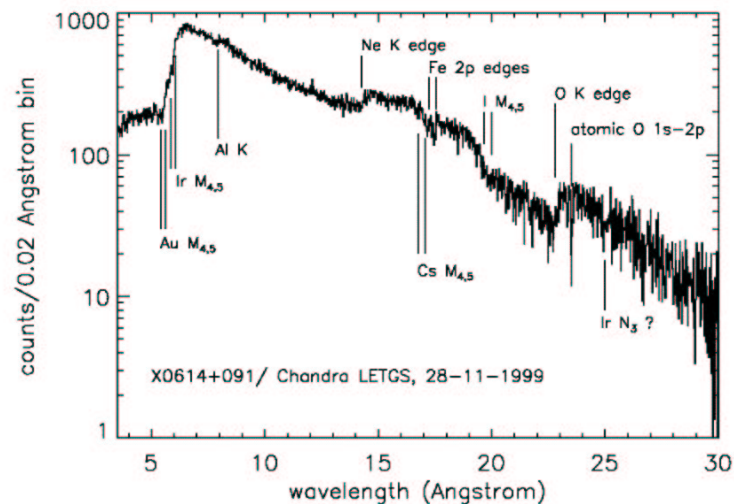


Residuals from absorbed PL + BB model

Feature at 0.7 keV attributed to unresolved Fe/O emission lines

Chandra spectrum of 4U 0614+091

(Paerels et al. 2001)

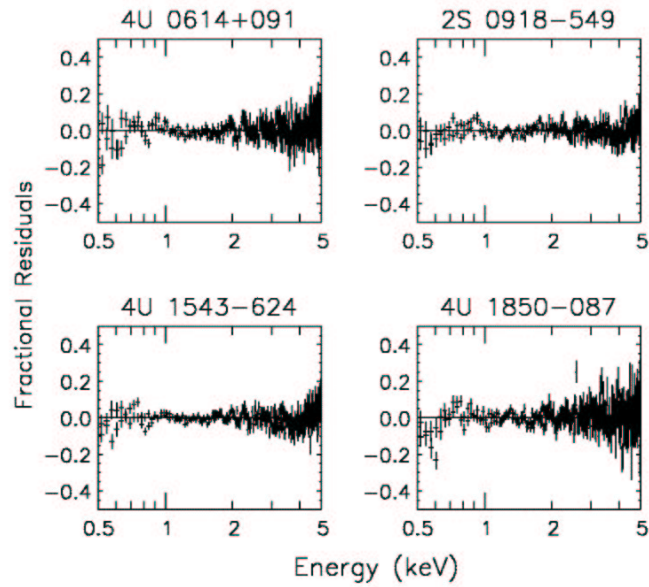


No emission lines

Ne/O ratio  $\approx 1.25$

(Ne/O in ISM = 0.18)

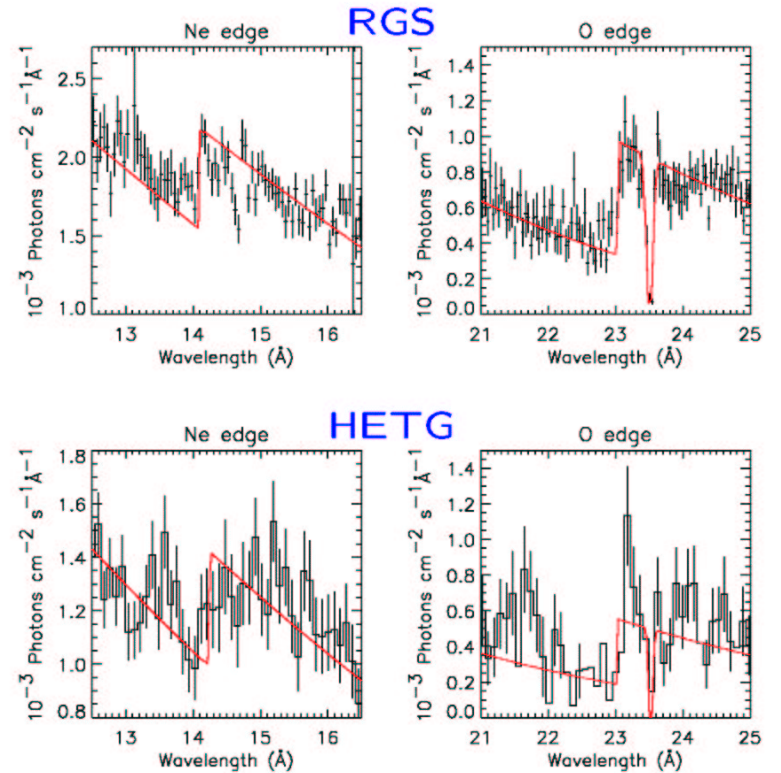
Alternative explanation  
for the 0.7 keV feature



Variable O and Ne absorption

Ne/O ratios 0.9–1.1  
(Ne/O in ISM = 0.18)

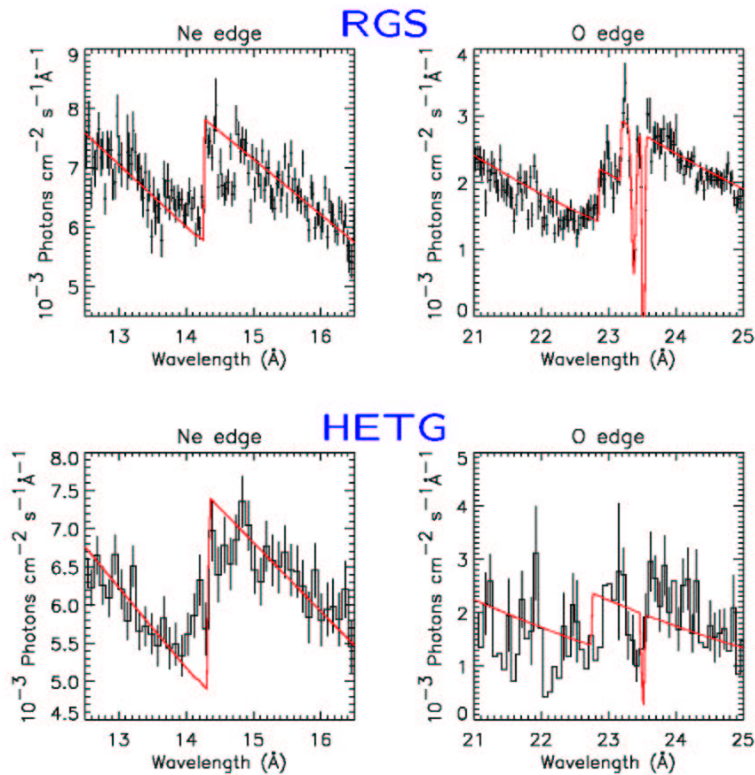
Grating Spectra of 2S 0918–549



XMM: Ne/O ratio  $0.50 \pm 0.04$

Chandra: Ne/O ratio  $0.52 \pm 0.12$

## Grating Spectra of 4U 1543–624



XMM: Ne/O ratio  $0.58 \pm 0.02$

Chandra: Ne/O ratio  $1.2 \pm 0.2$

## Caveats/Weak Points

- Is the material local?
- ISM Properties
  - Ne abundance not well known
  - Effect of dust grains
- Shape of Ne edge

## Summary

### 4U 1626–67

- Ne & O lines & absorption detected
- Point to C-O WD donor
- Optical/UV spectra back this up

### Other sources

- ASCA spectra explained by high Ne/O
- High-resolution spectral evidence ?
- Optical spectra similar to 4U 1626–67
- Suggestive but not conclusive