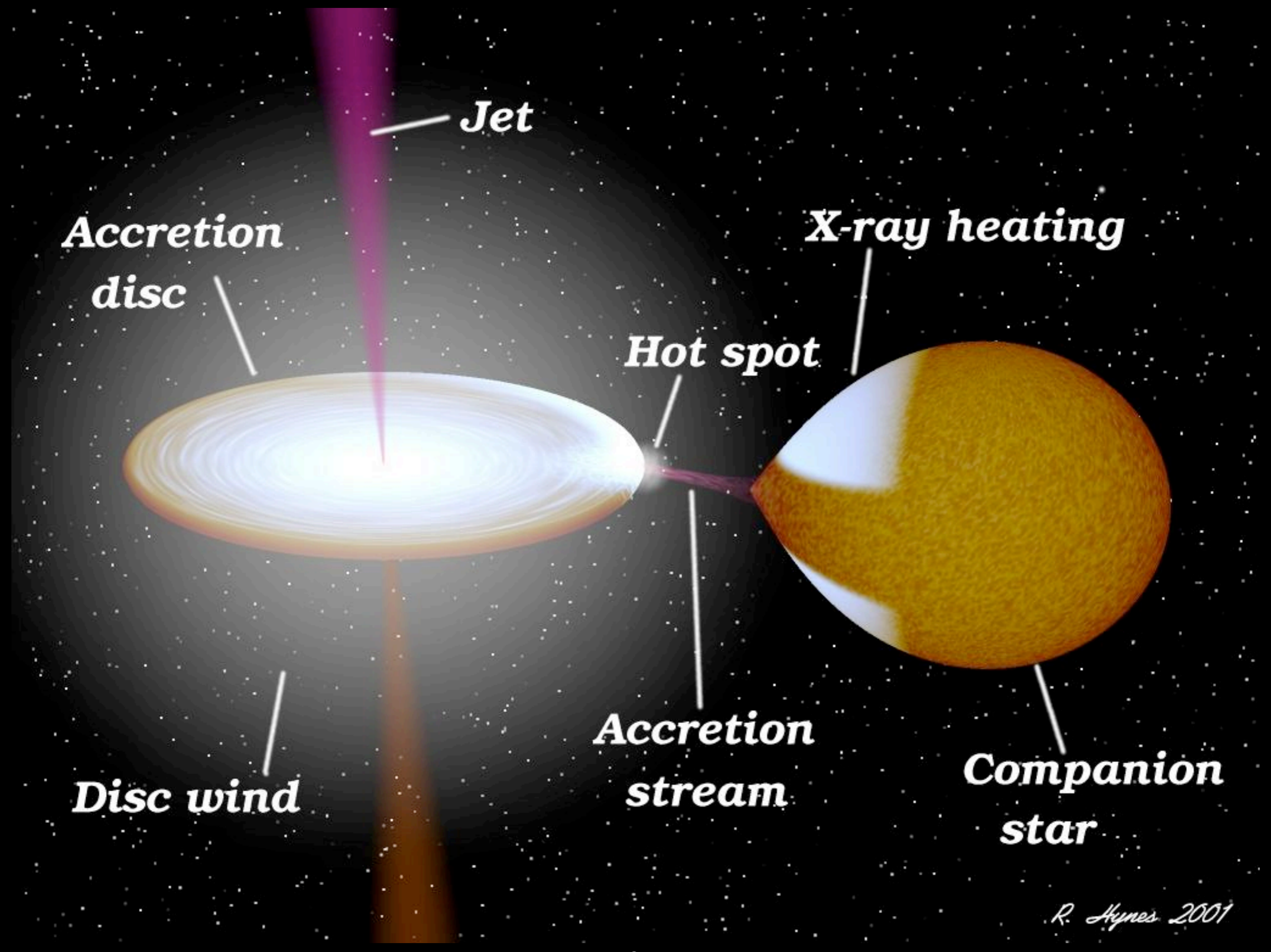


# Thermonuclear instabilities and oscillations



**Accretion  
disc**

**Jet**

**X-ray heating**

**Hot spot**

**Accretion  
stream**

**Companion  
star**

**Disc wind**

*R. Hynes 2001*

EINSTEIN OBSERVATORY  
X-RAY BURST FROM THE GLOBULAR CLUSTER TERZAN 2

BEFORE



DURING



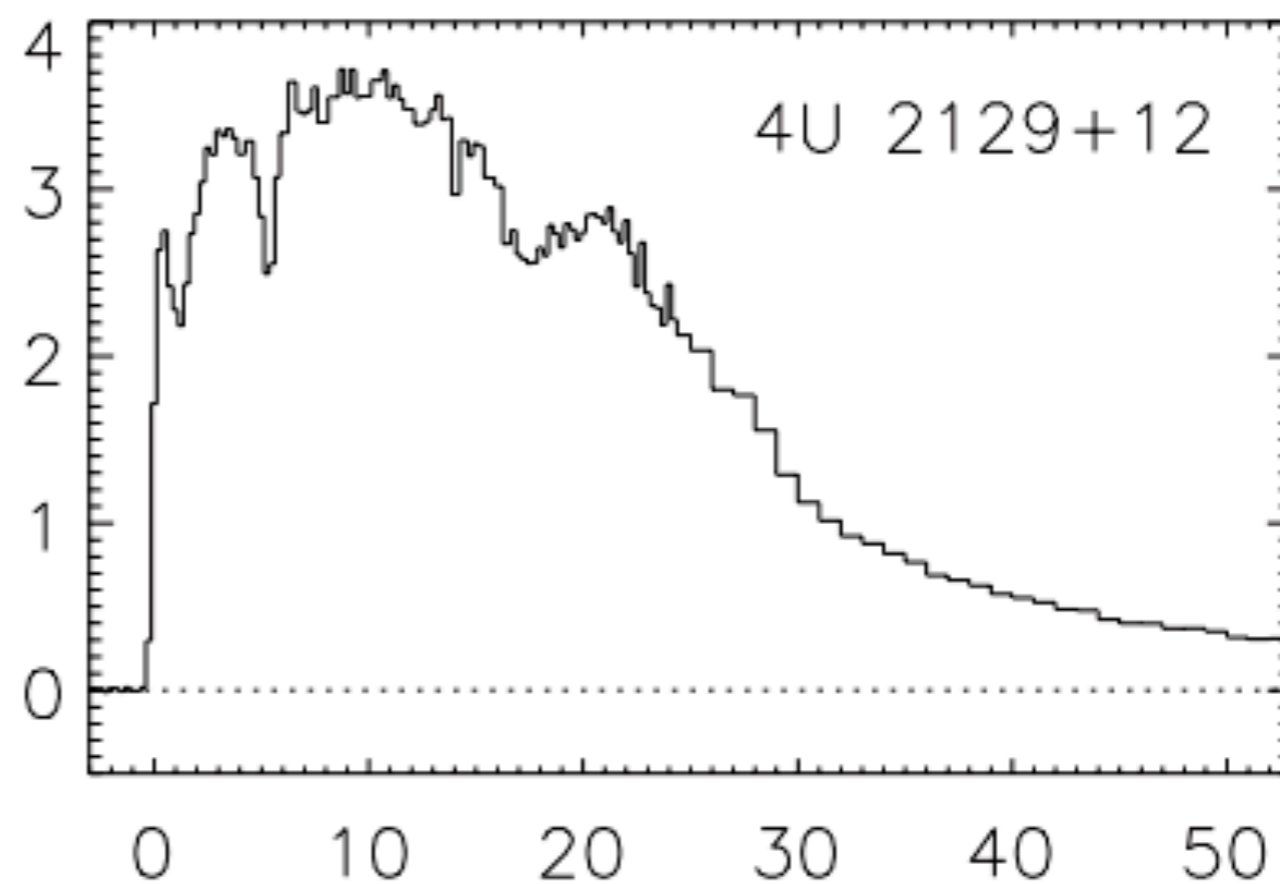
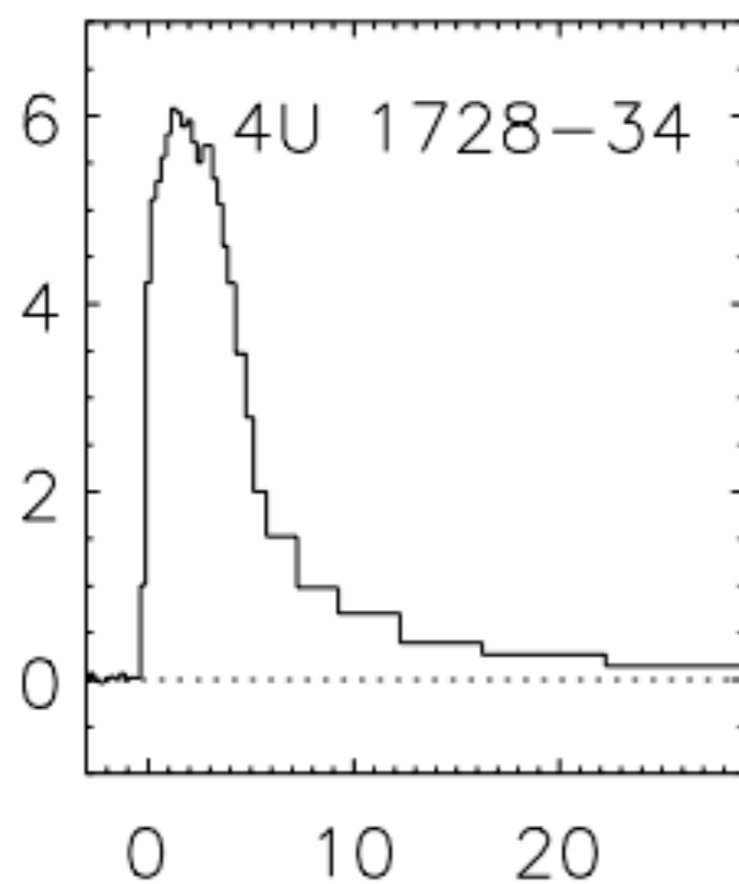
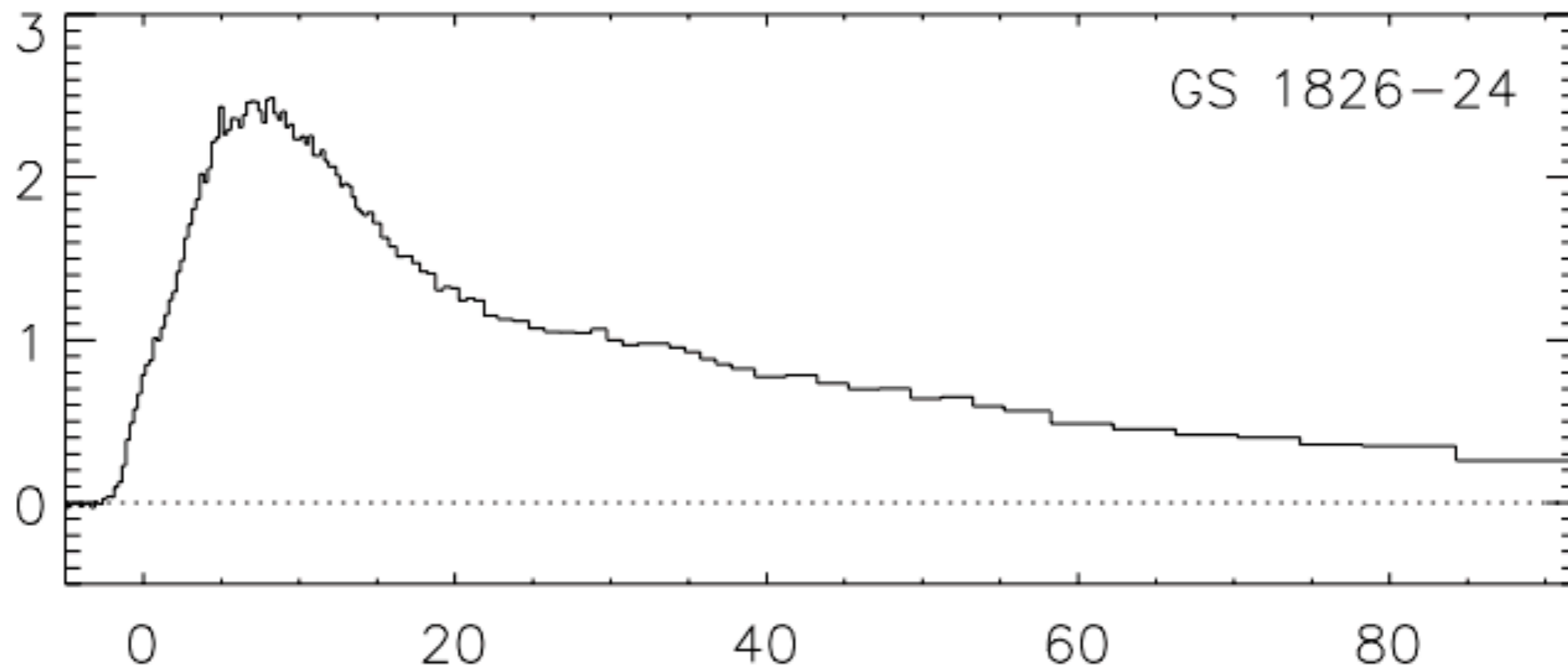
AFTER



TOTAL OBSERVATION



X-ray intensity ( $10^3$  counts  $s^{-1}$  PCU $^{-1}$ )



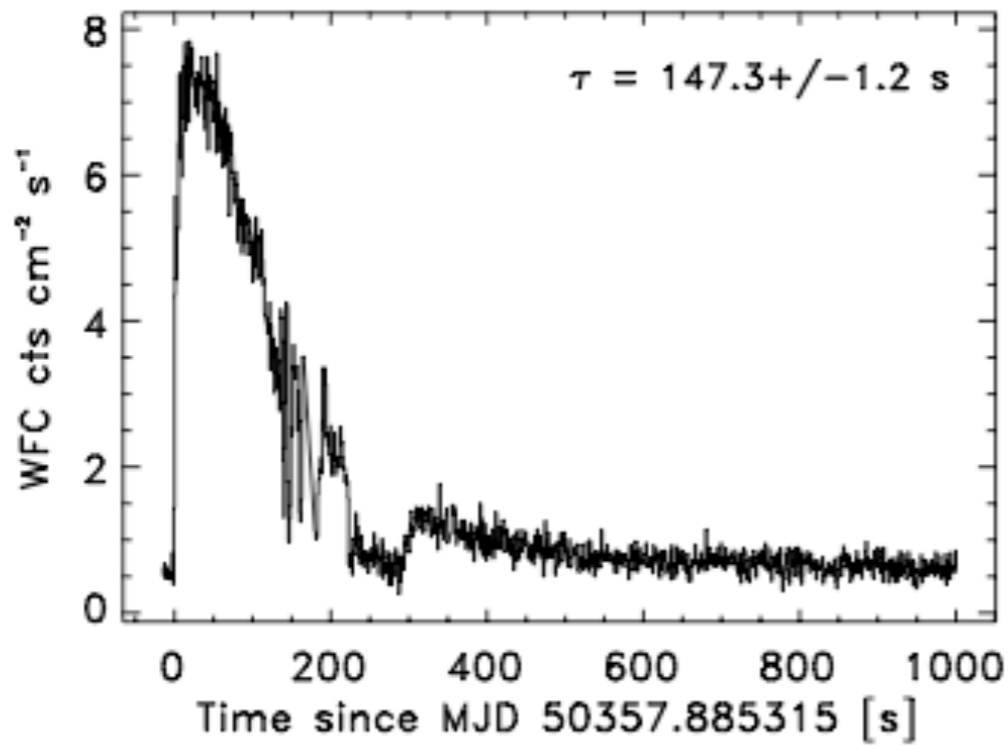
Time relative to the burst start (s)

# Theoretical picture

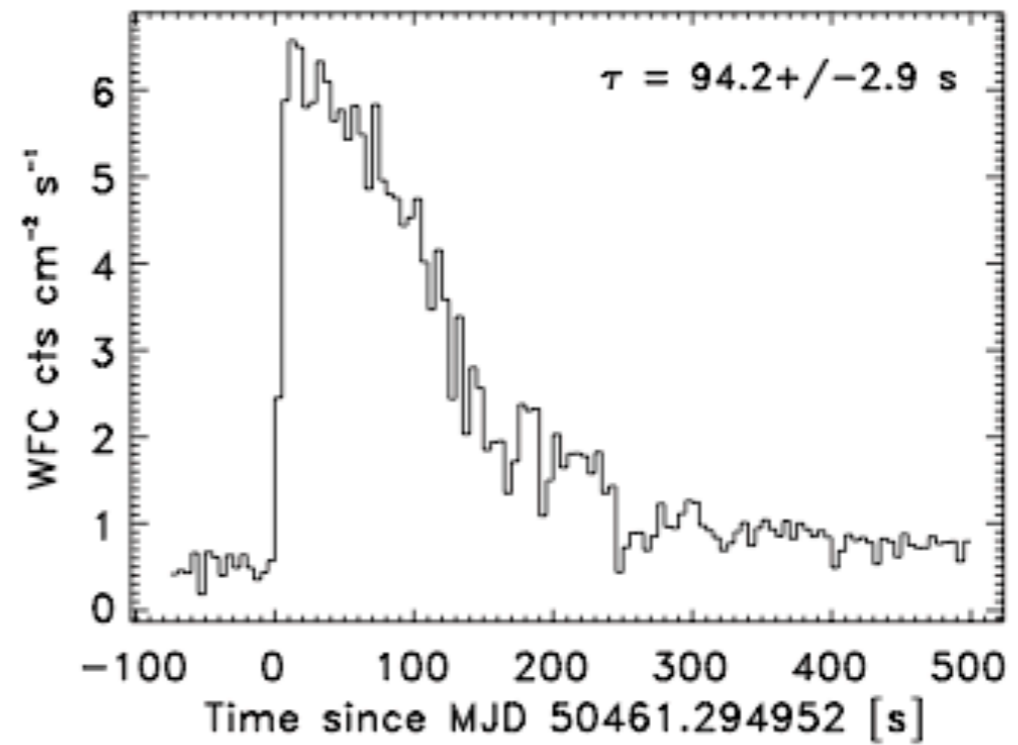
- The ingredients for thermonuclear burning
  - Nuclear energy generation rate (H/He)
  - Radiative cooling rate
  - Accretion rate
- Stable vs unstable burning

# Long bursts

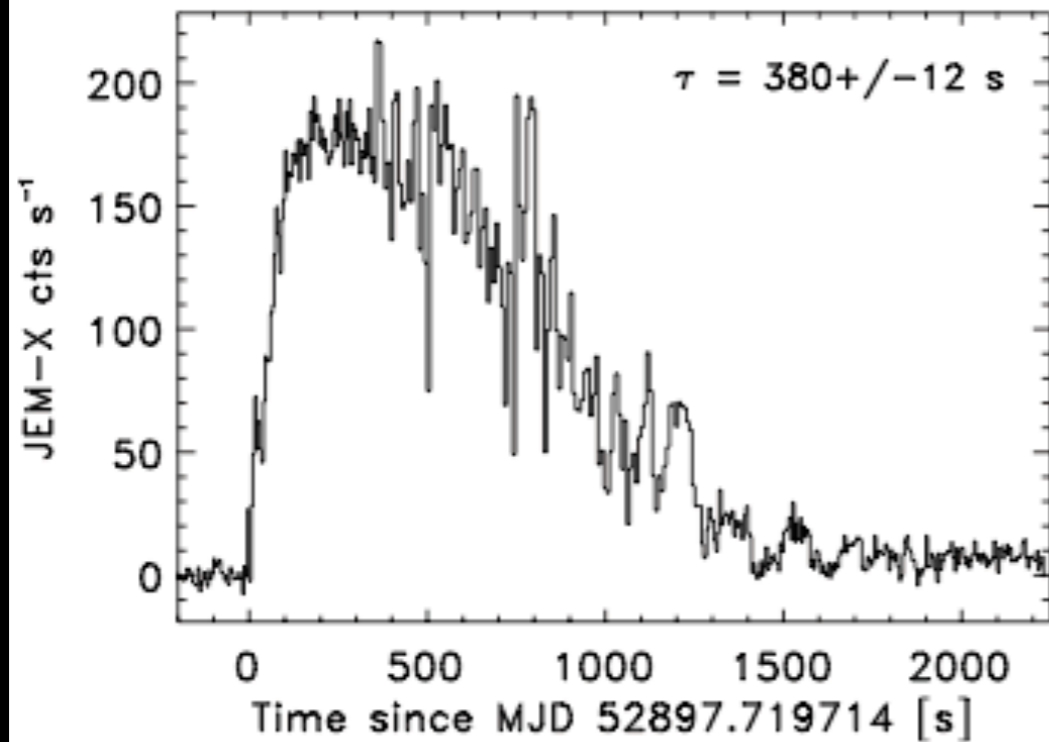
2S 0918-549



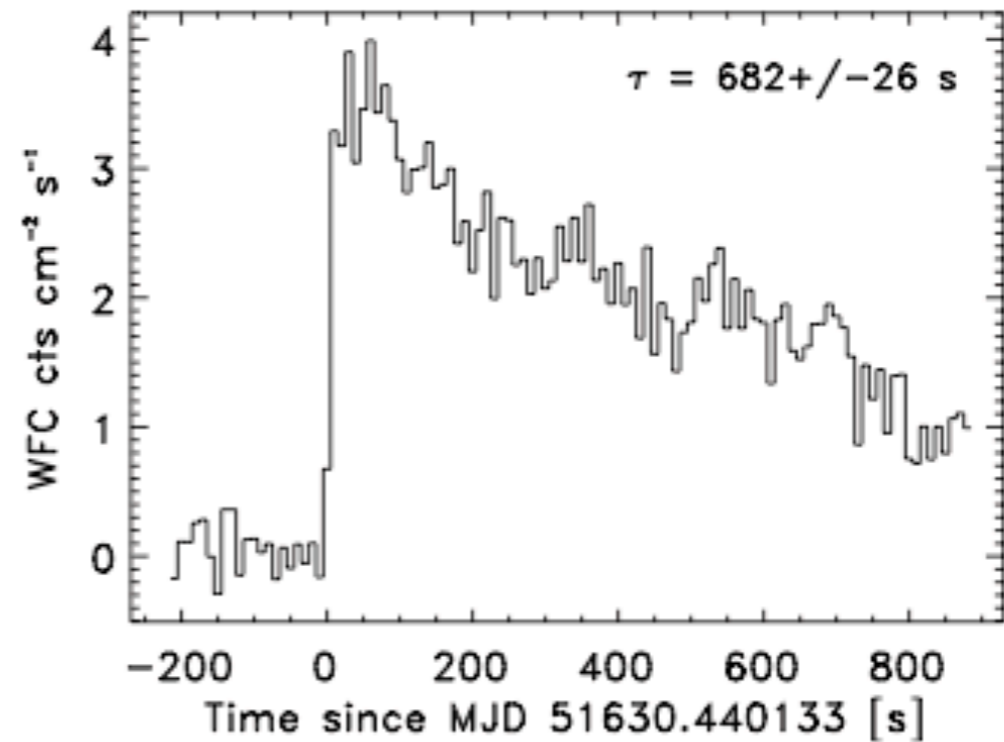
A1246-588



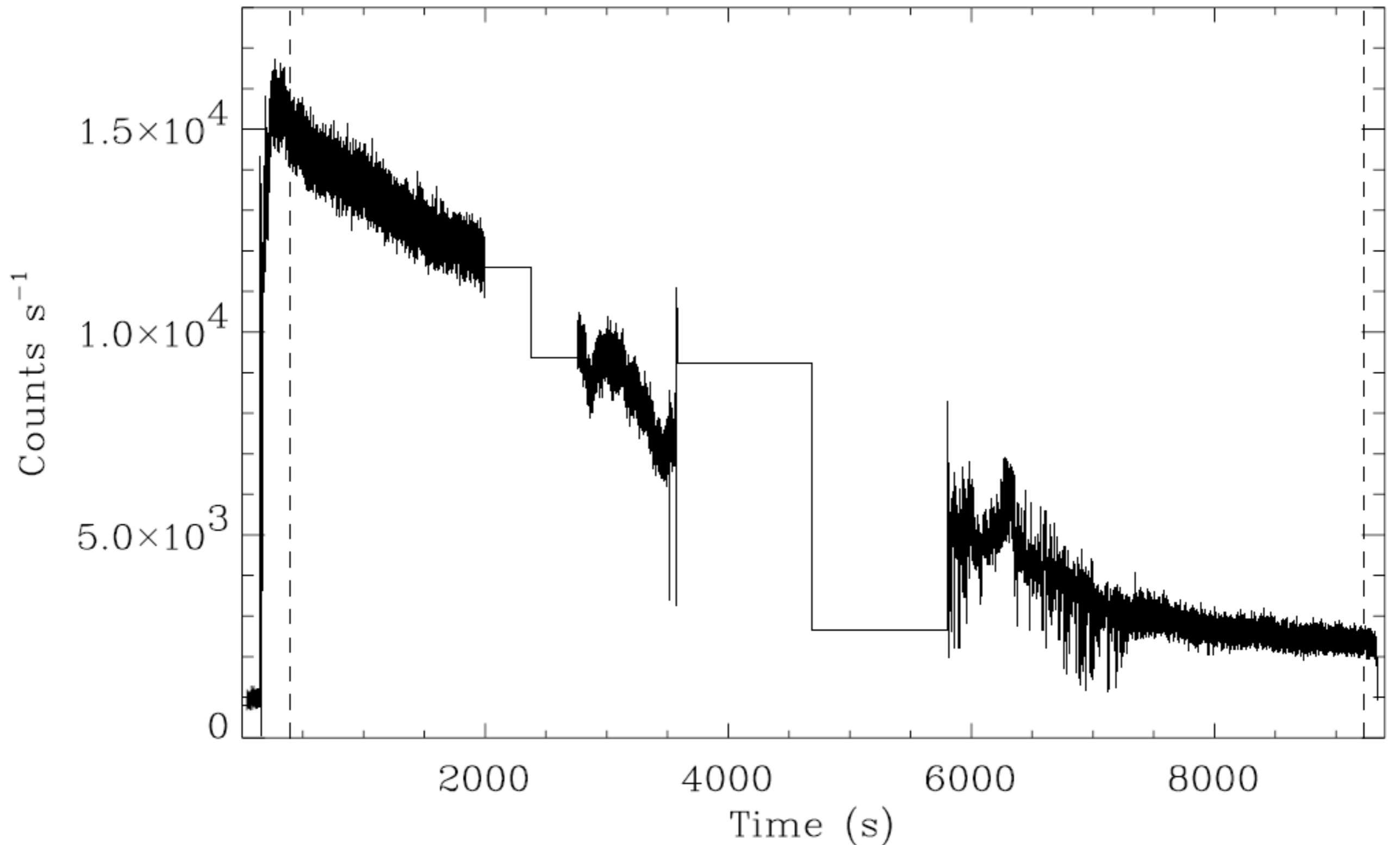
SLX 1735-269



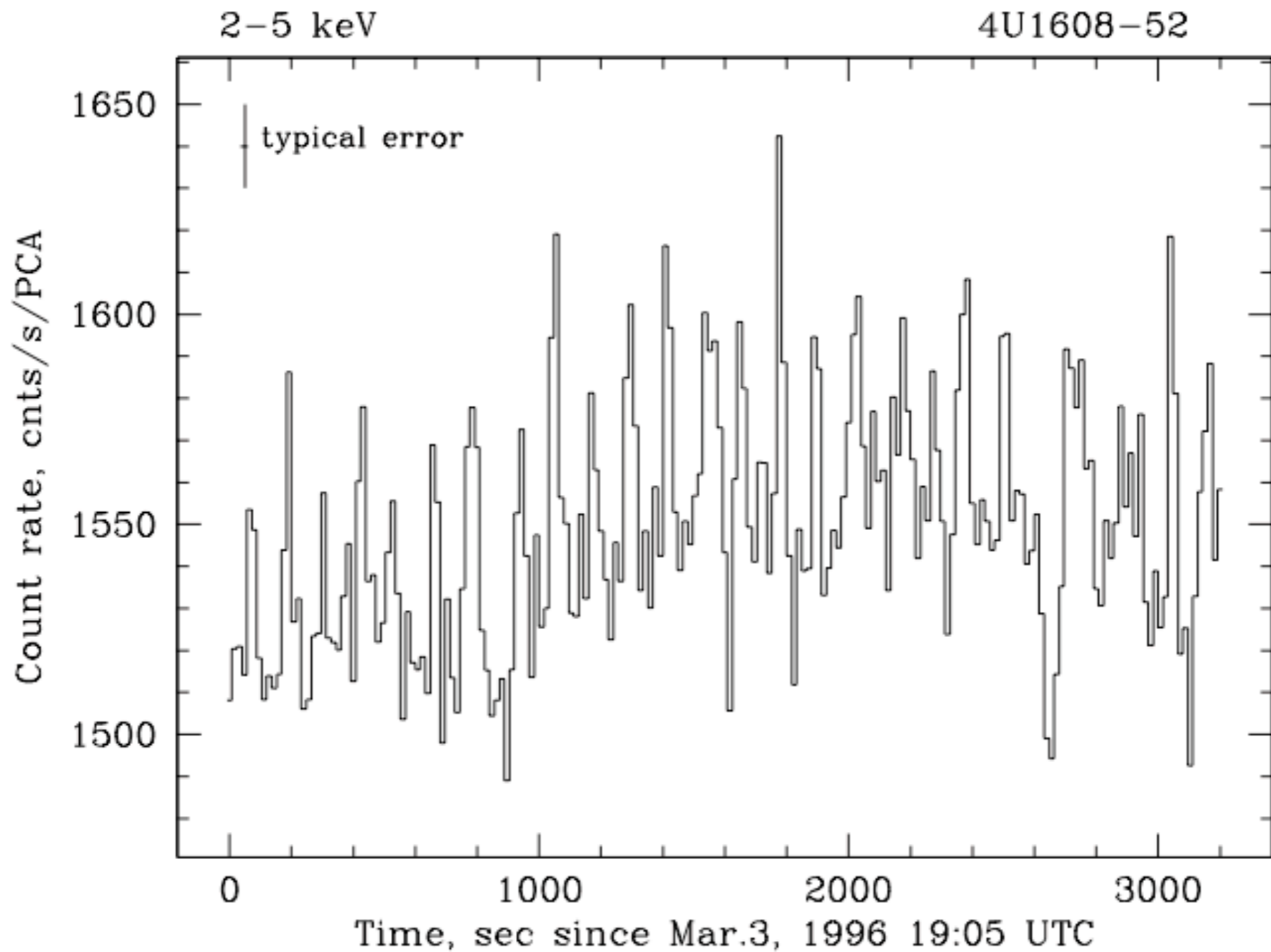
SLX 1737-282



# Superbursts

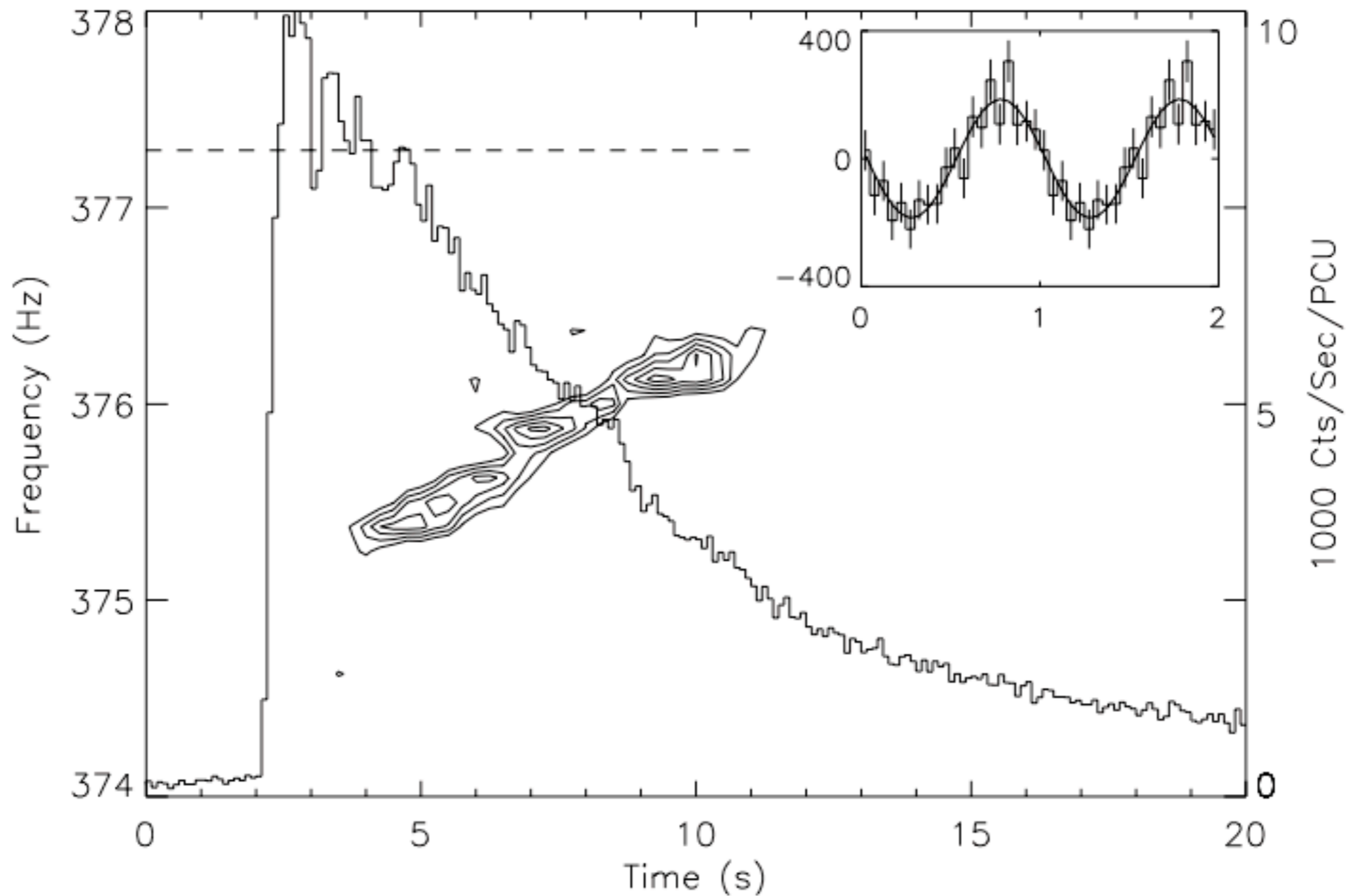


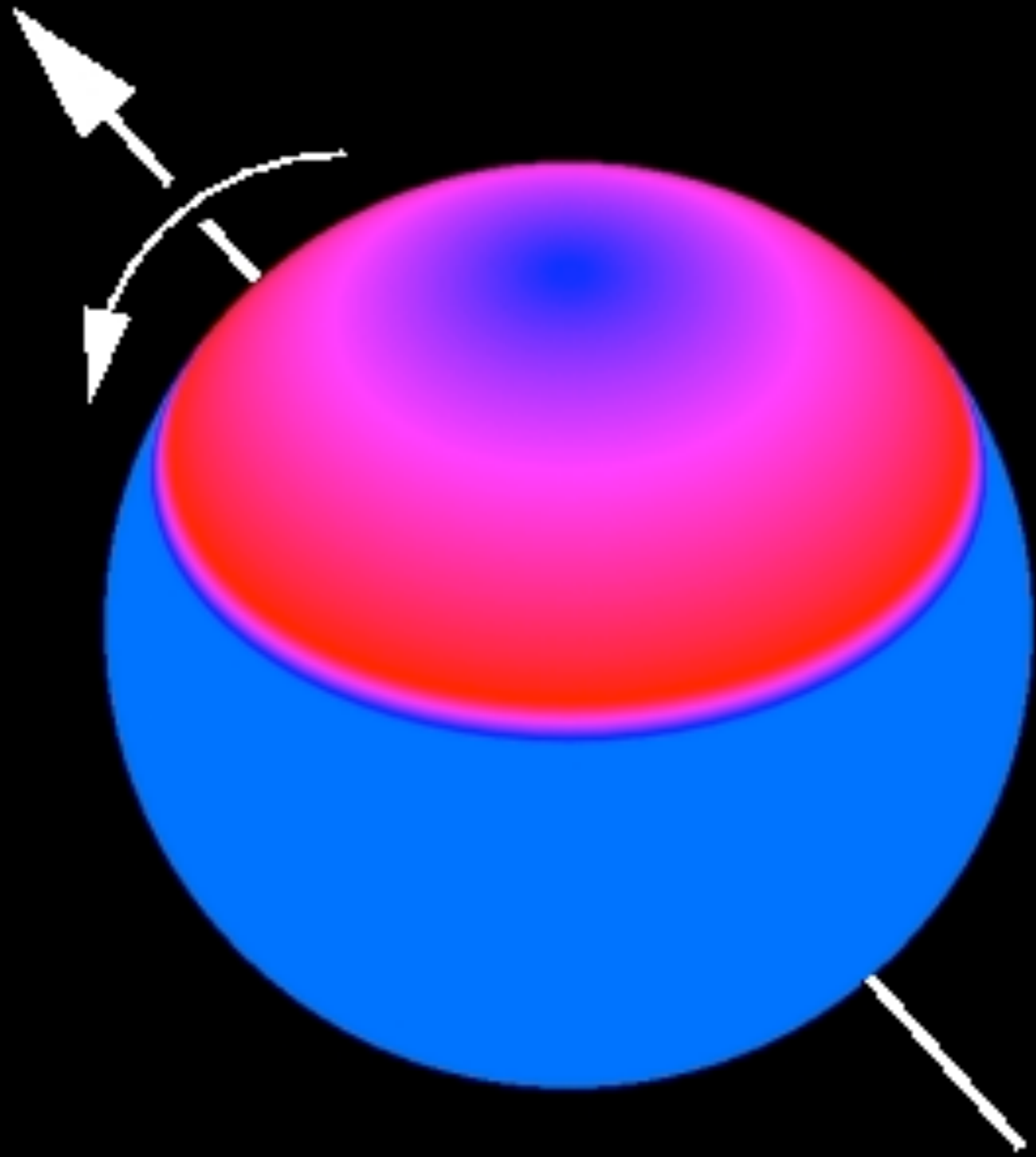
# Marginally stable burning



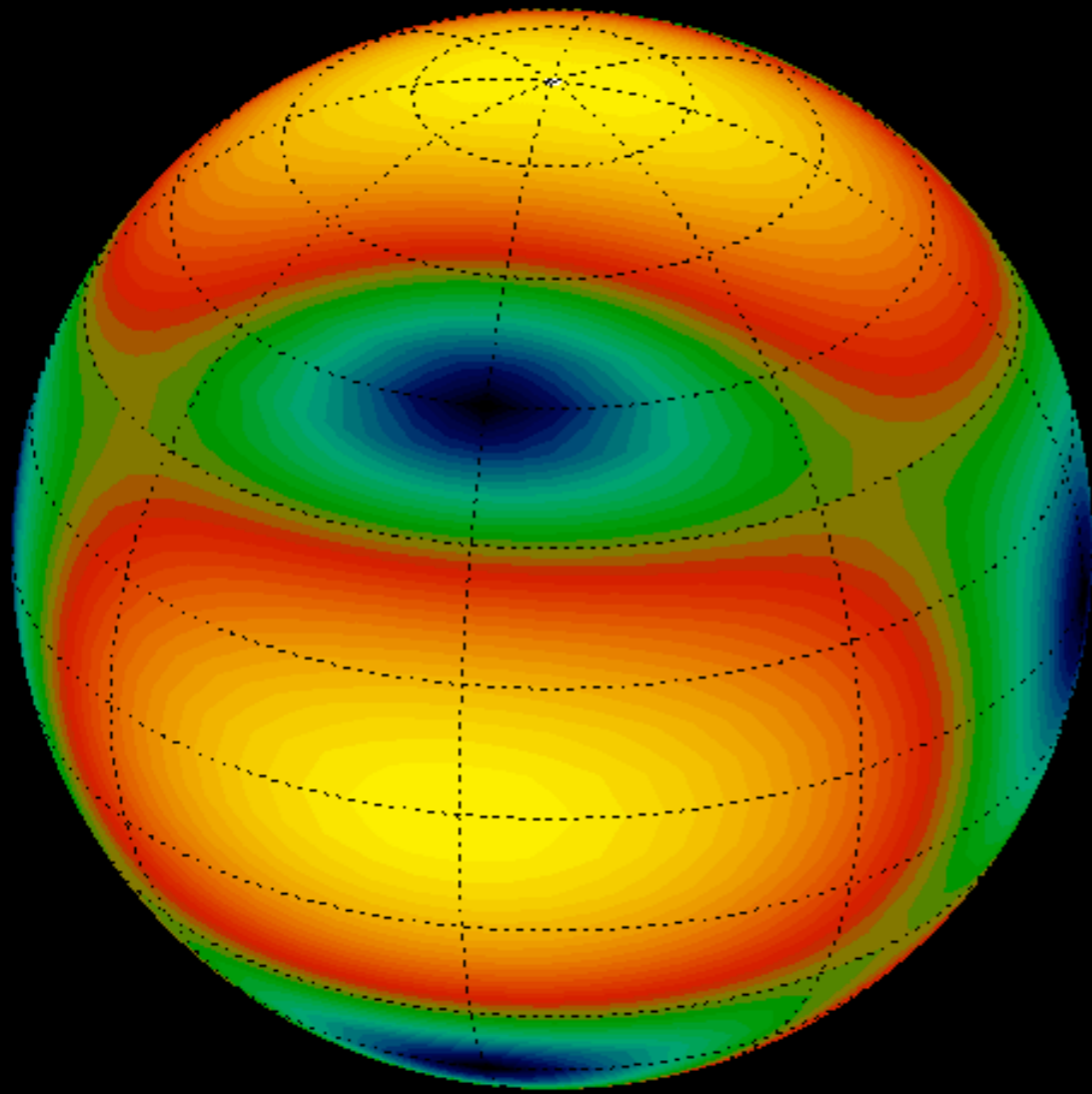


# Burst oscillations

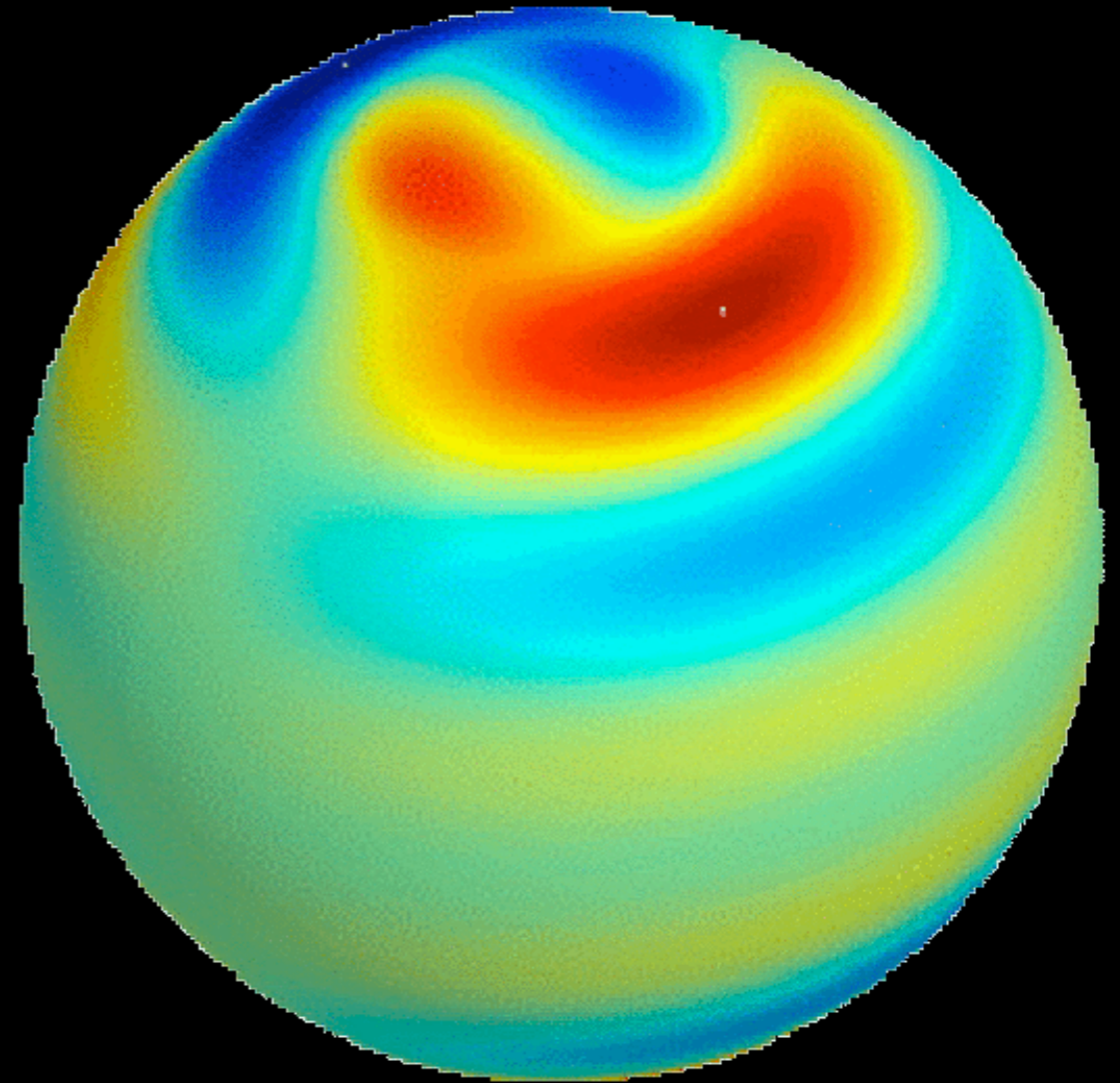




# Surface mode models

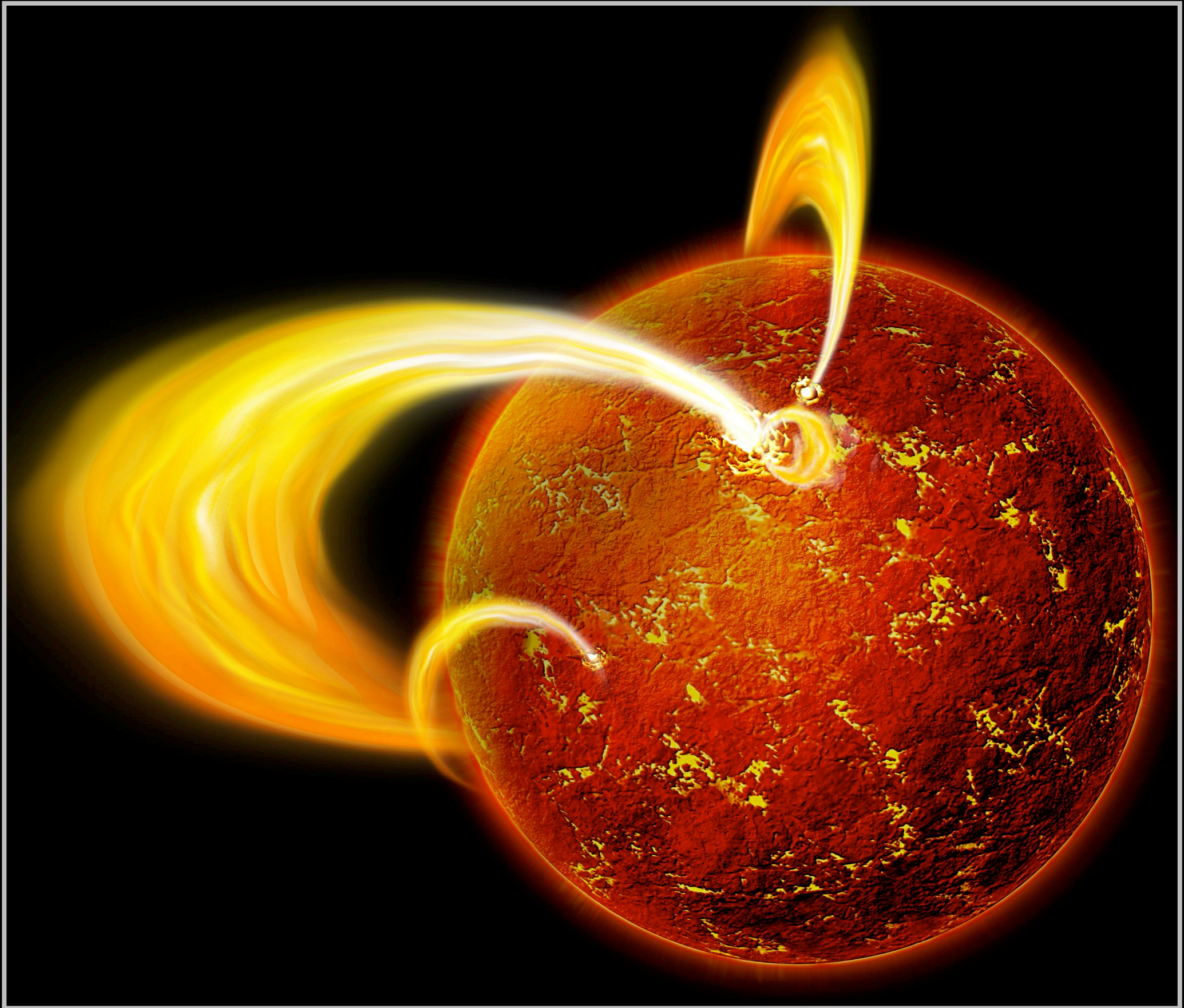


Buoyant r-modes?

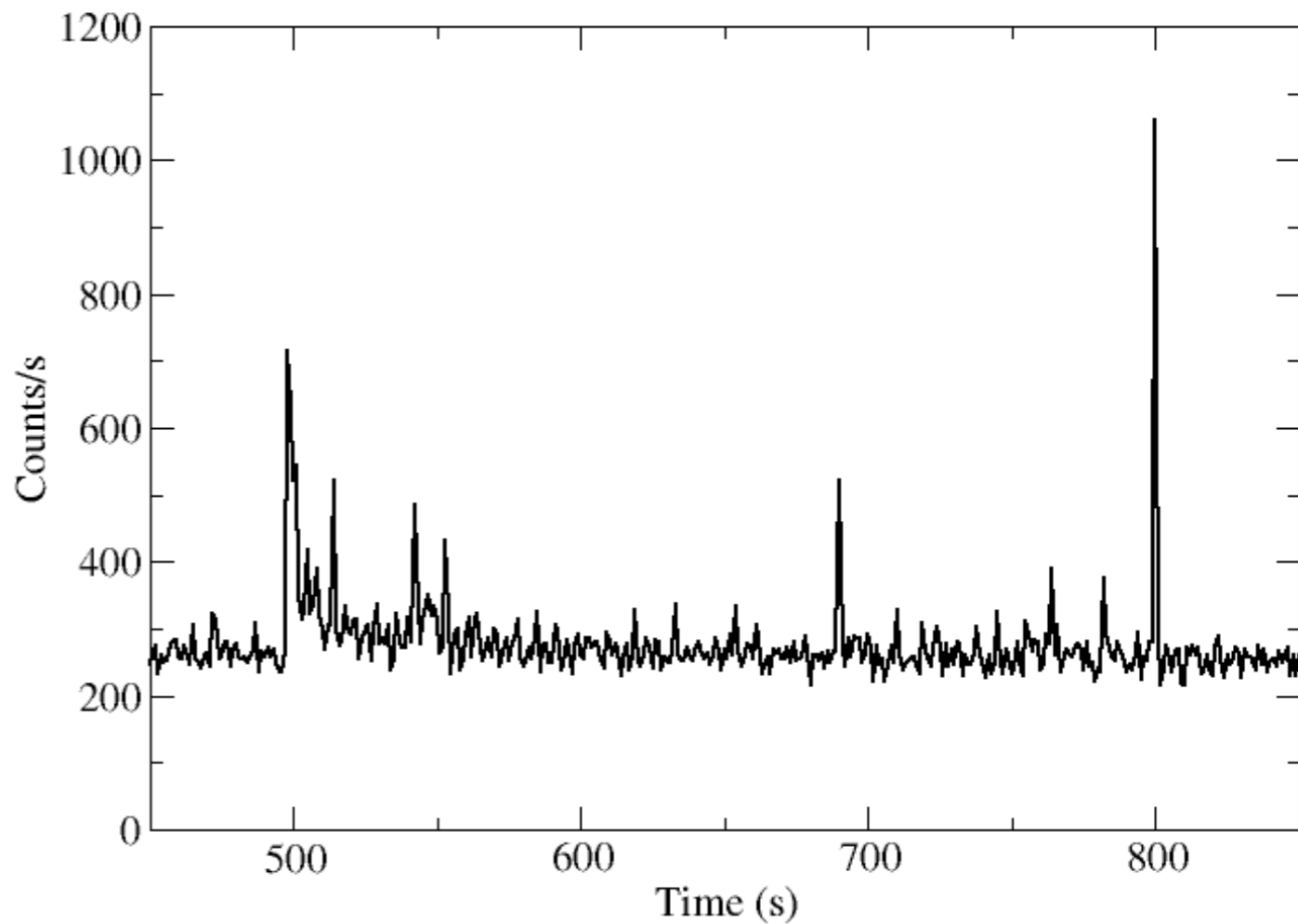
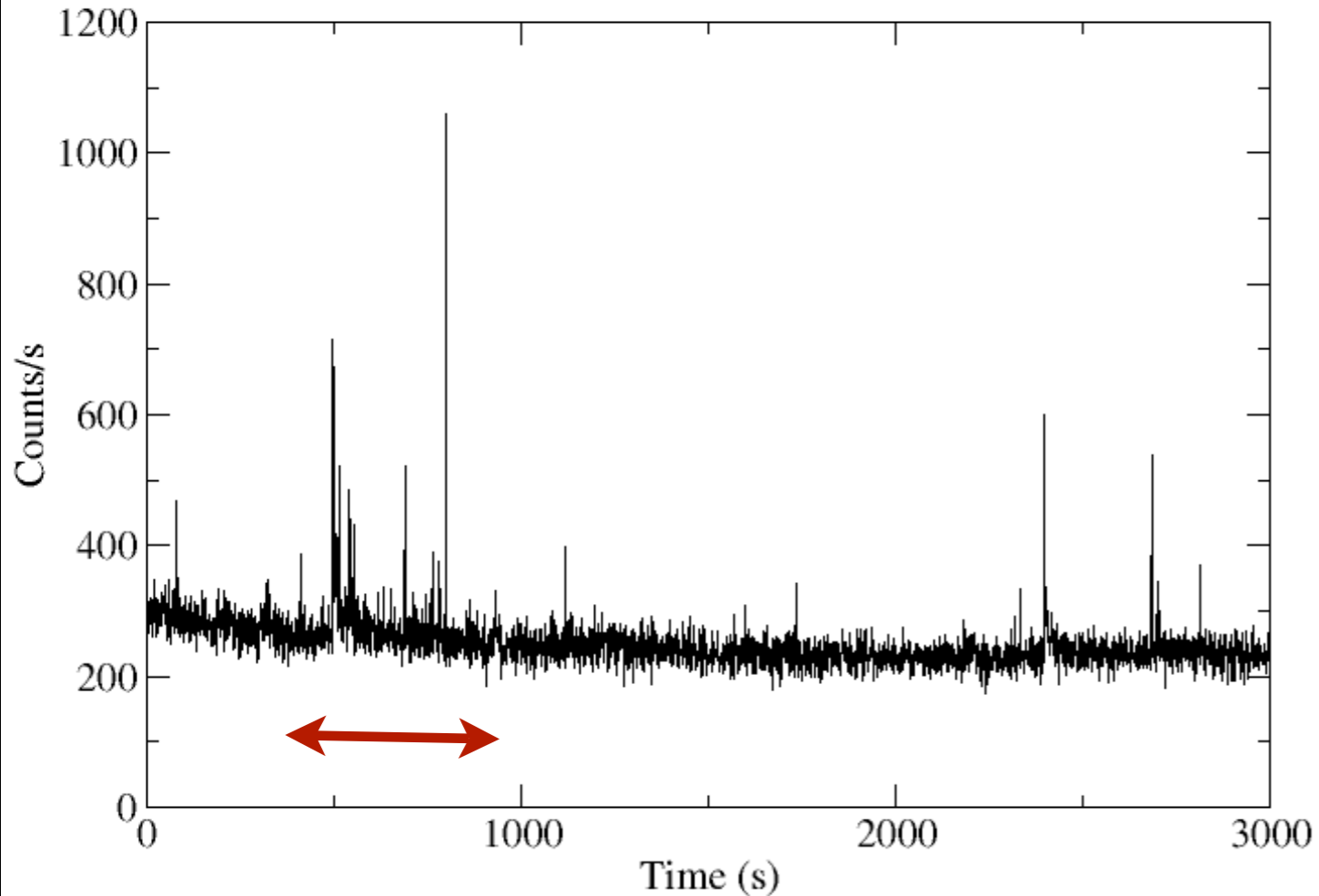


Shearing modes?

# Magneto-elastic instabilities and oscillations



# X-ray/Gamma-ray observations



# Magnetar flares

