

# Interpreting f/i ratios in stellar spectra

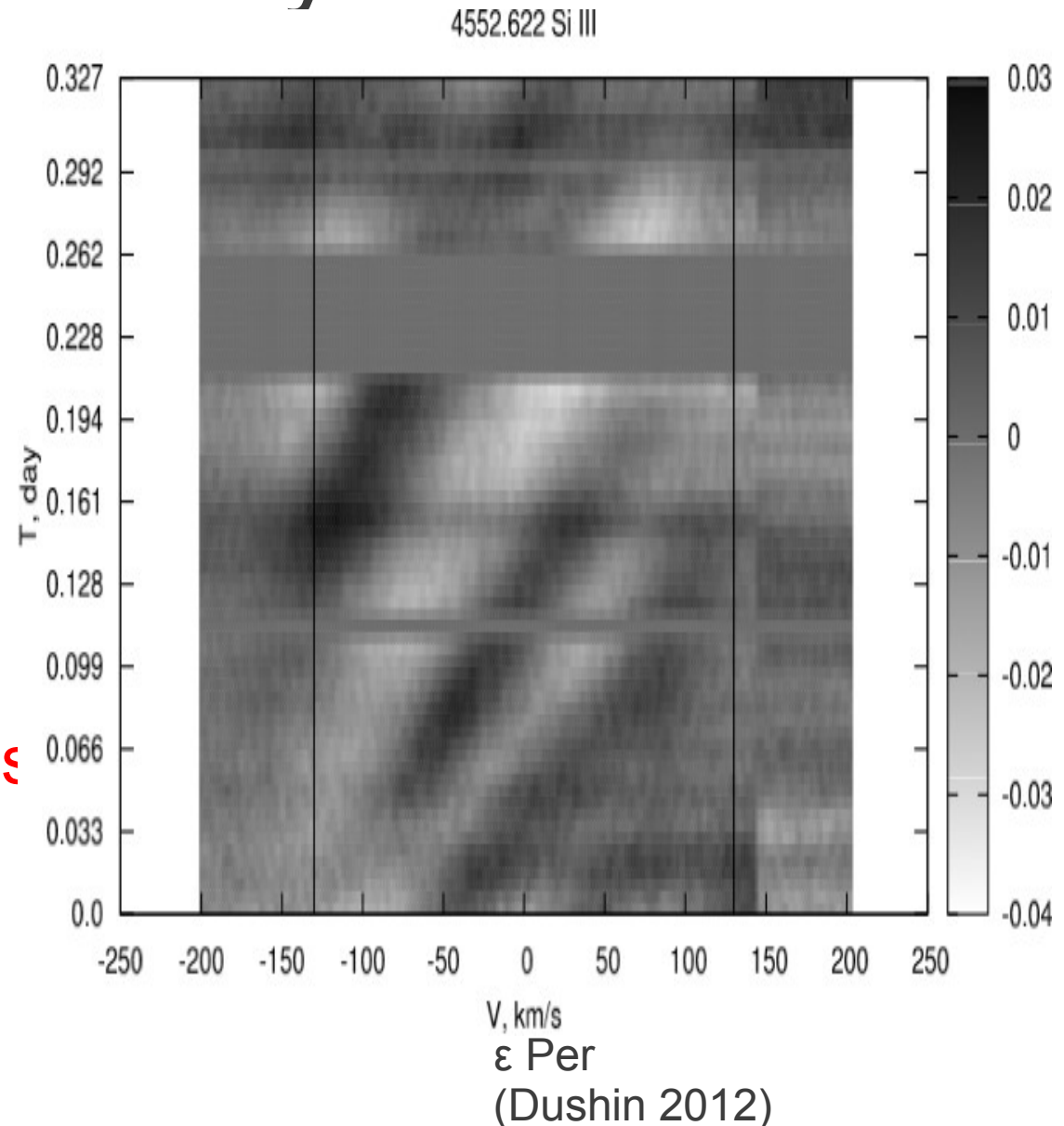
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# Intro

- My main work:
  - Measuring magnetic fields in OB stars
  - Searching for fast microvariability
  - X-ray modelling + plasma diagnostic

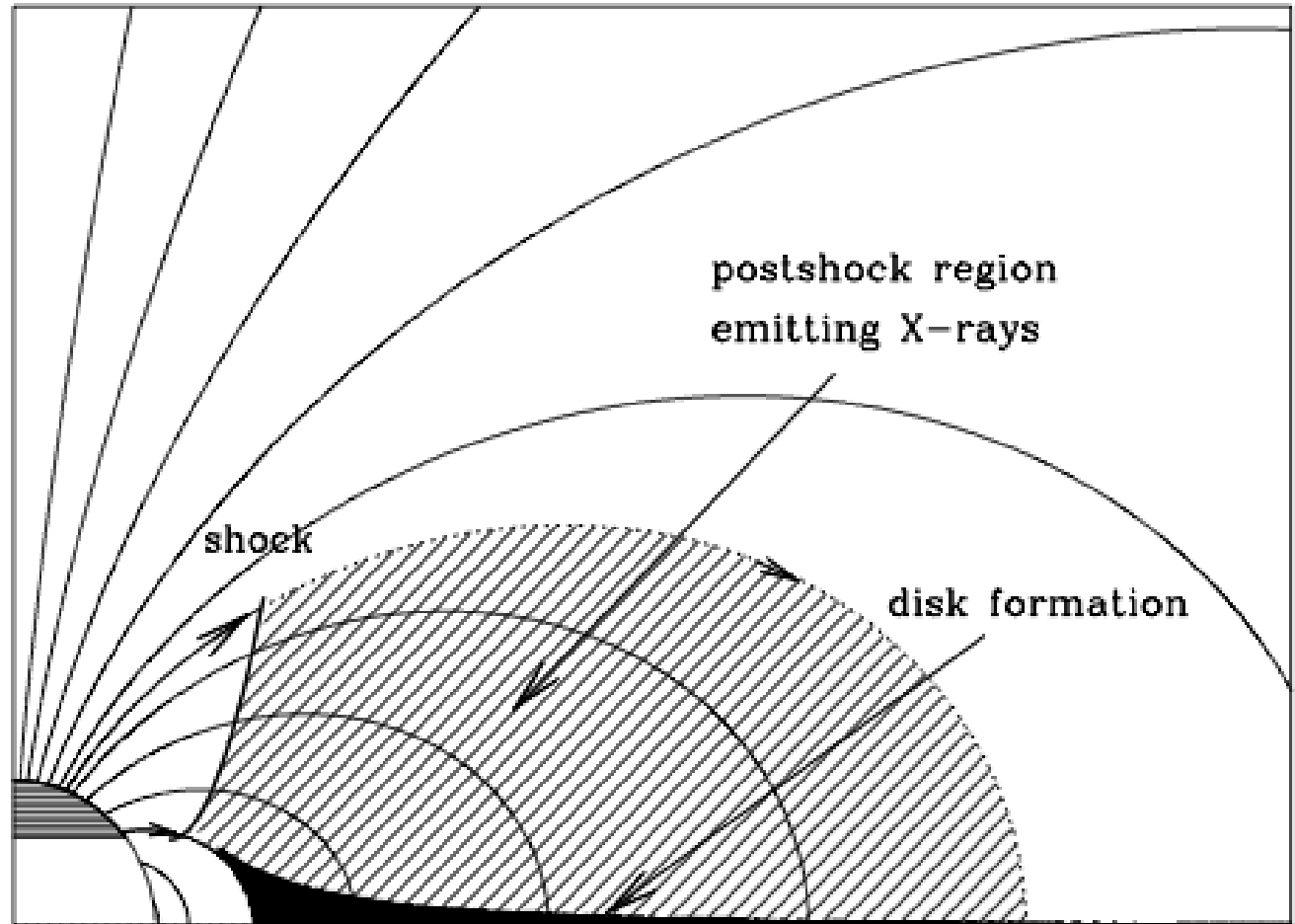
# Searching for MF and Fast profile Variability

- We found fast profile variations in  $\epsilon$  Per:  
3 — 12 day<sup>-1</sup>
- Found large (50 km/s) and small scale (10 km/s) structures in  $\epsilon$  Per
- And in  $\zeta$  Ori: 8-12 day<sup>-1</sup>
- **These stars have structures in their atmospheres**



# Magnetically confined wind model

- Cause hard X-ray
- $L_x = 10^{33} - 10^{35}$  erg/s
- $V_{\text{terminal}} = 1000 - 2000$  km/s
- $T_{\text{shock}} = 1e6 - 1e7$  K



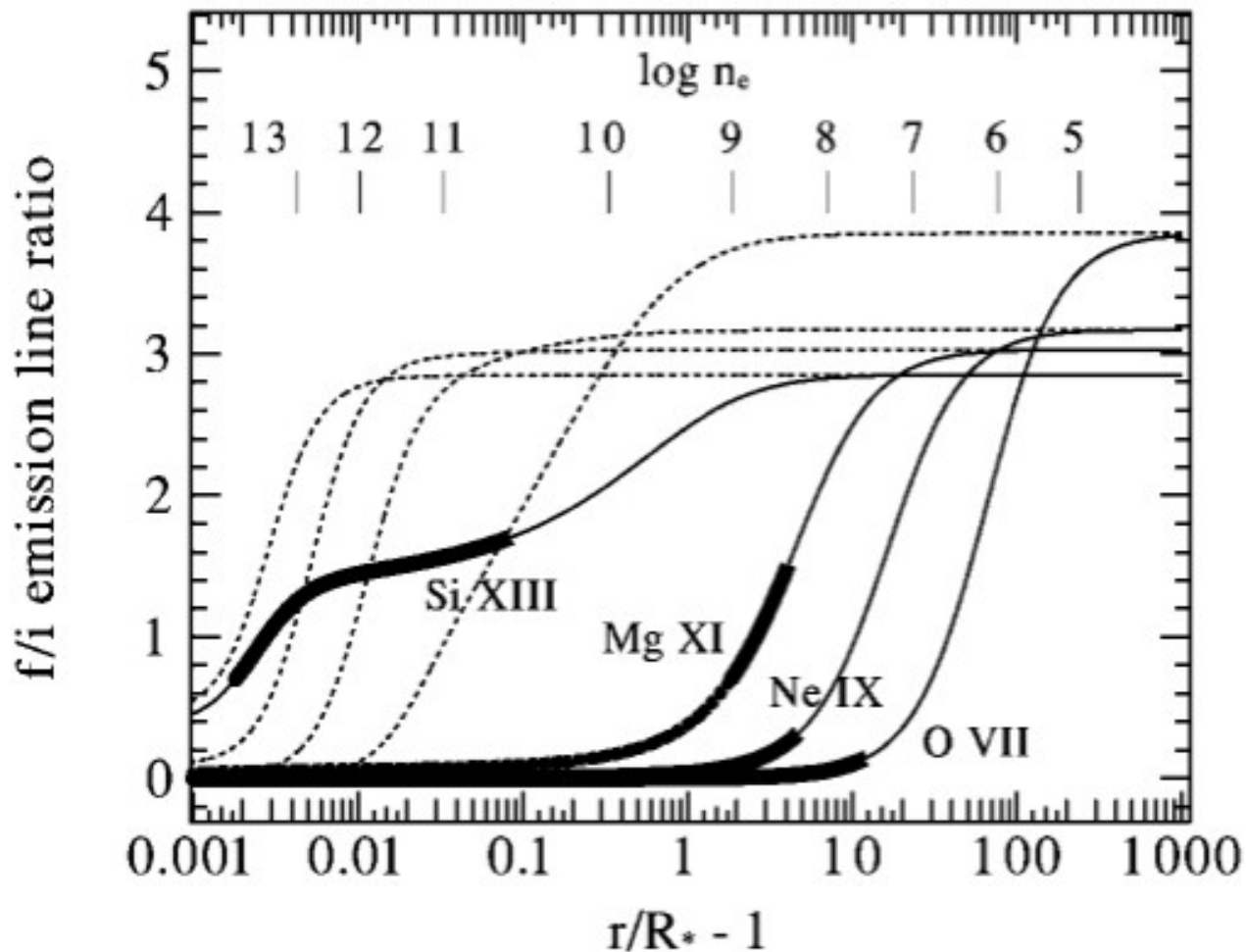
- Babel 1997

# He-like diagnostic of OB stars

- Discovered hi density plasma:  $10^{12} \text{ cm}^{-3}$   
(Waldron 2000, Kahn 2001)
- Explanations:
  - Dense cumps
  - Ionizing UV
  - Non-stationary porcesses

# UV photoexcitation and Clumps

- Works near the surface
- 
- Adds some constraints to line formation region



Waldron 2000  
 $\zeta$  Ori

# Non-stationary processes

$$\frac{dn_i}{dt} = n_e \left( n^+ \alpha_i + \sum_{j \neq i}^N n_j q_{ji} \right) + \sum_{j=i+1}^N n_j A_{ji} - n_i \left( \sum_{j=1}^{i-1} A_{ij} + n_e \sum_{j \neq i}^N q_{ij} \right)$$

$n_e$  -- electron density

$n_i$  -- atom on i-th level density

A -- A-values

q -- excitation/recombination ratio

## Conditions

- NEI
- Optically thin plasma
- electron excitation

# Changes to APEC

- New code: put plasma in different  $T_e$  conditions
- Added UV photoexcitation (using Trusty  $H_\nu$ )



# Results

- Fast variability found
- f/i ratio for OVII decreased to 5% – not enough
- Parameters
  - Need to find parameters, ok as POC
  - Add differential absorption