Energetic Ion Kennel-Petschek Limit
Possible Role of Oxygen EMIC waves

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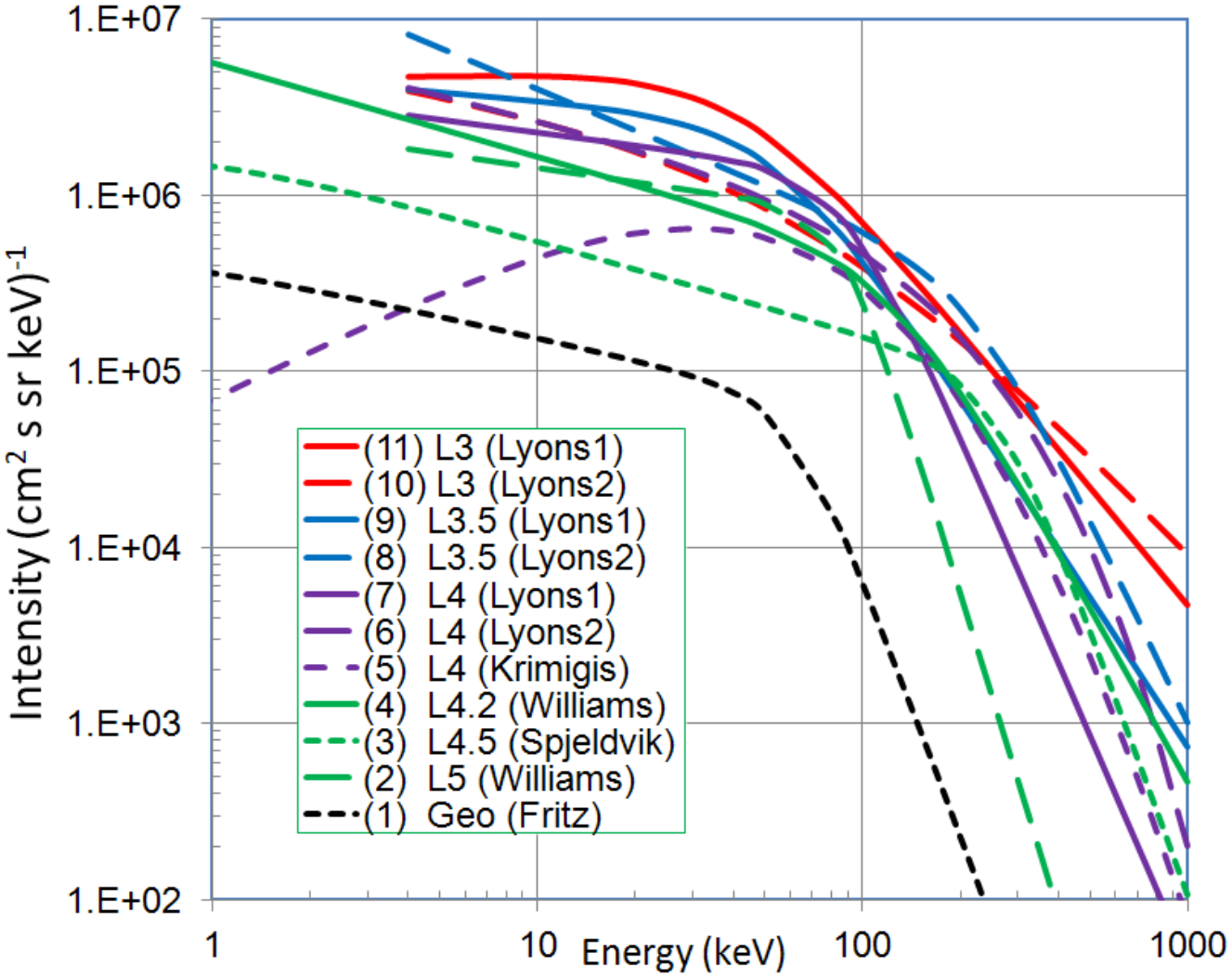
Most Intense RC Ion Spectra from the literature
Flat tops may be caused by EMIC wave sculpting



$$G \approx Exp\left(\frac{\gamma}{V_g} \cdot D \cdot R_p\right) \qquad G \cdot R \leq 1$$

$$I\left[\frac{1}{cm^2 \cdot s \cdot sr \cdot keV}\right] = C \cdot E_{keV} \cdot \frac{[kT \cdot (\gamma 1 + 1) + E_{keV}]^{(\gamma 1 + 1)}}{\left(1 + \left(\frac{E_{keV}}{E_2}\right)^{\gamma 2a}\right)^{\gamma 2b}} \cdot Sin^{2S}(\alpha)$$

$$\frac{C_m}{C_K} = L \cdot R_p \cdot \frac{\gamma[\omega_r(E_r)]}{3 \cdot V_g[\omega_r(E_r)]}$$

Low A+ for KP calculation drives waves to low frequencies and the Oxygen band

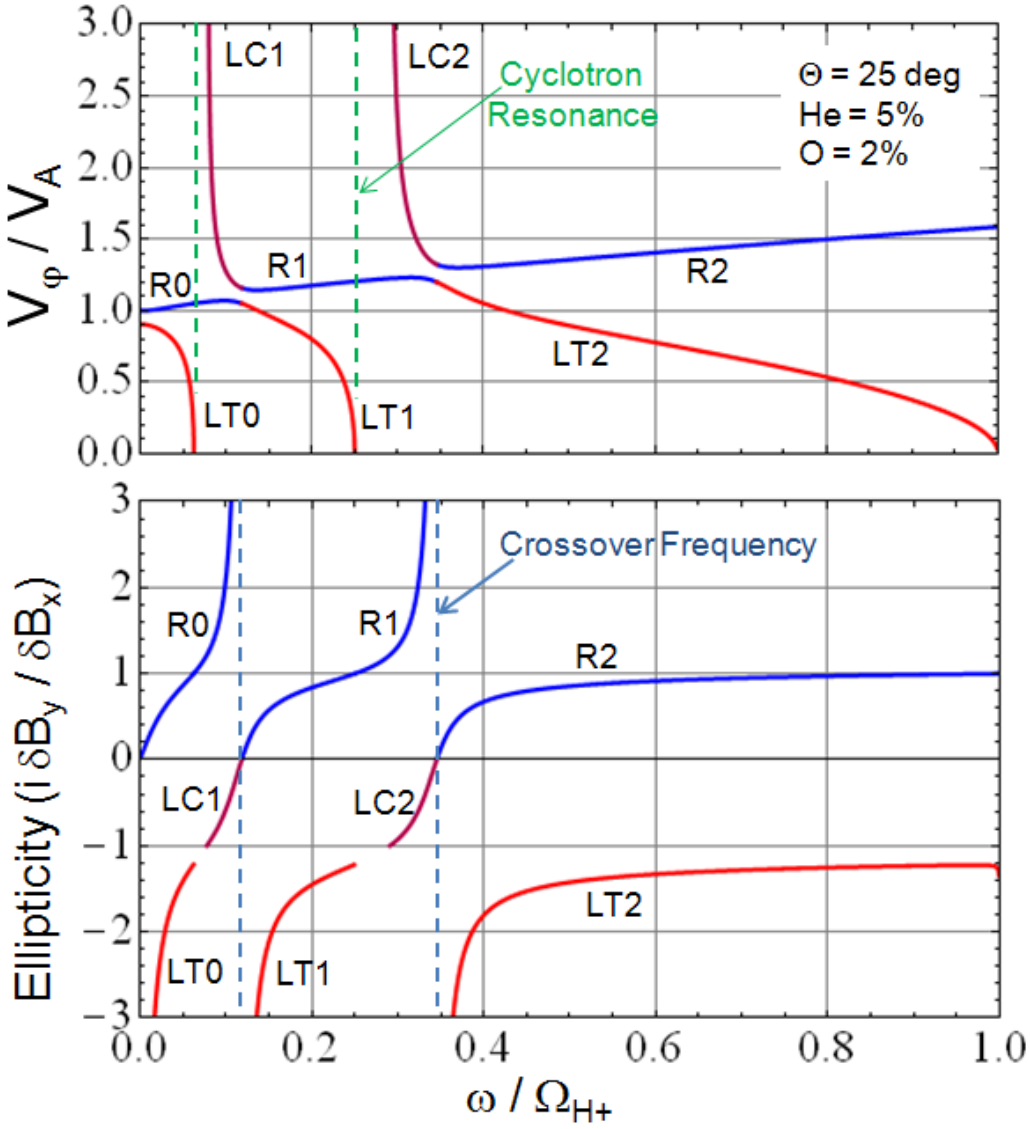
$$\gamma_s = \frac{\gamma_T}{V_g} = \frac{2\pi^2 e^2}{m_p c^2} \frac{V_\varphi}{\omega} \eta_{P_R} \left(A^+_{P_R} - \frac{1}{\frac{\Omega_p}{\omega} - 1}\right)$$

where

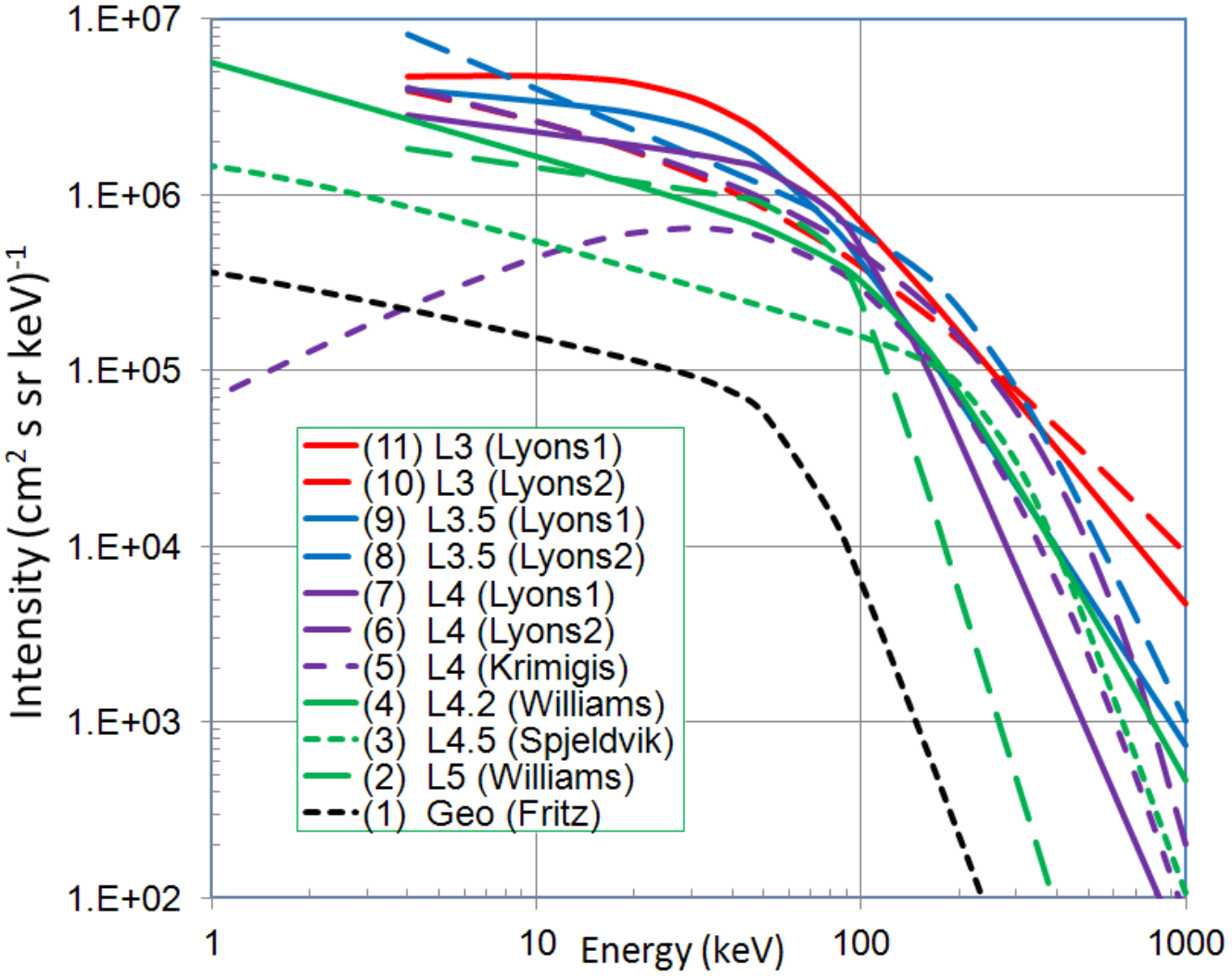
$$\eta_{P_R} = 2\pi m_p V_\varphi \left(\frac{\Omega_p}{\omega} - 1\right) \int_0^\infty P_\perp \mathrm{d}P_\perp \, f_p(P_\perp)\big|_{P_\parallel = P_R}$$

$$P_R = m_p V_\varphi \left(1 - \frac{\Omega_p}{\omega}\right)$$

EMIC Wave Dispersion

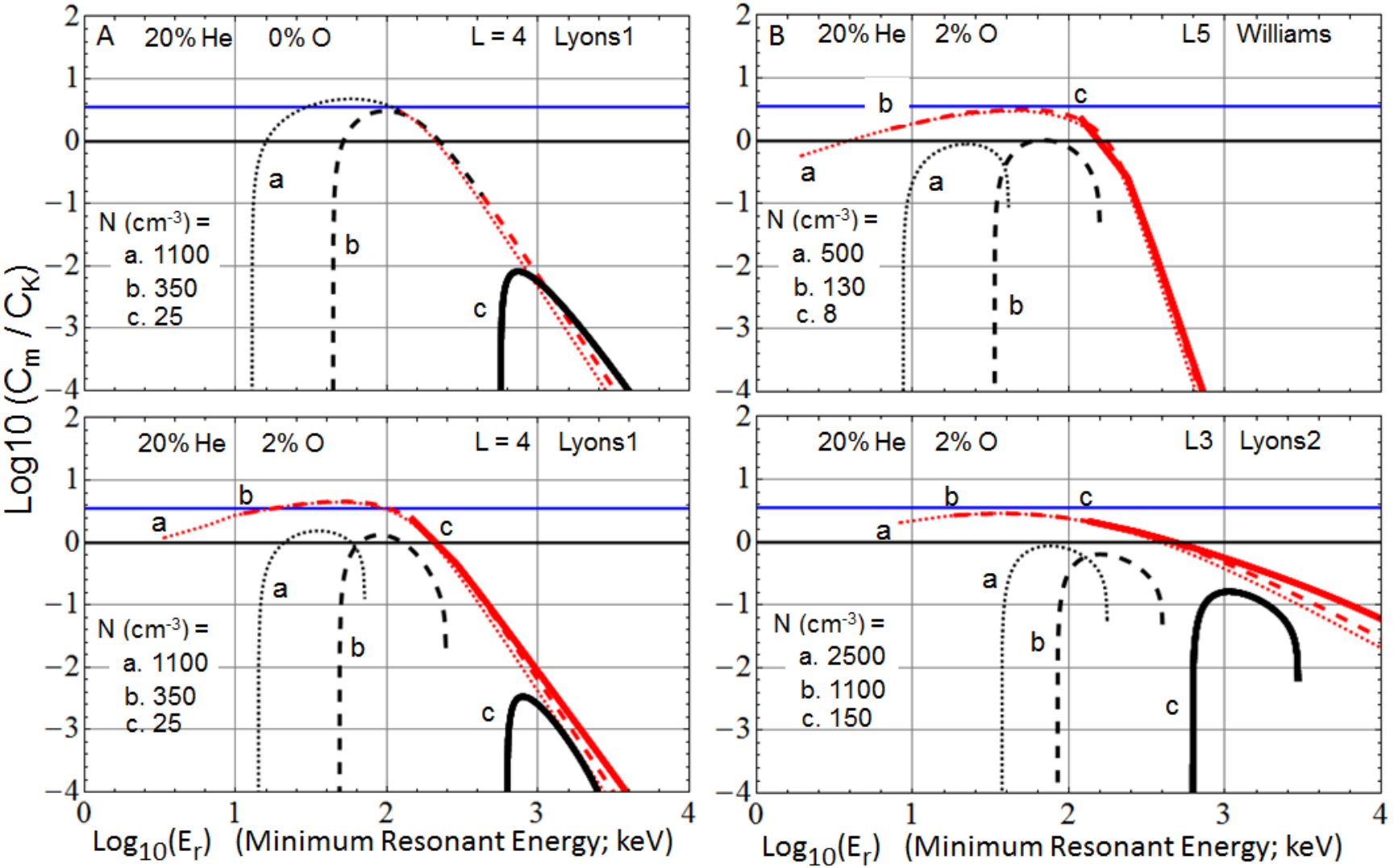


We fit observed spectra to analytic function to calculate differential intensities with respect to the Kennel-Petschek expectations



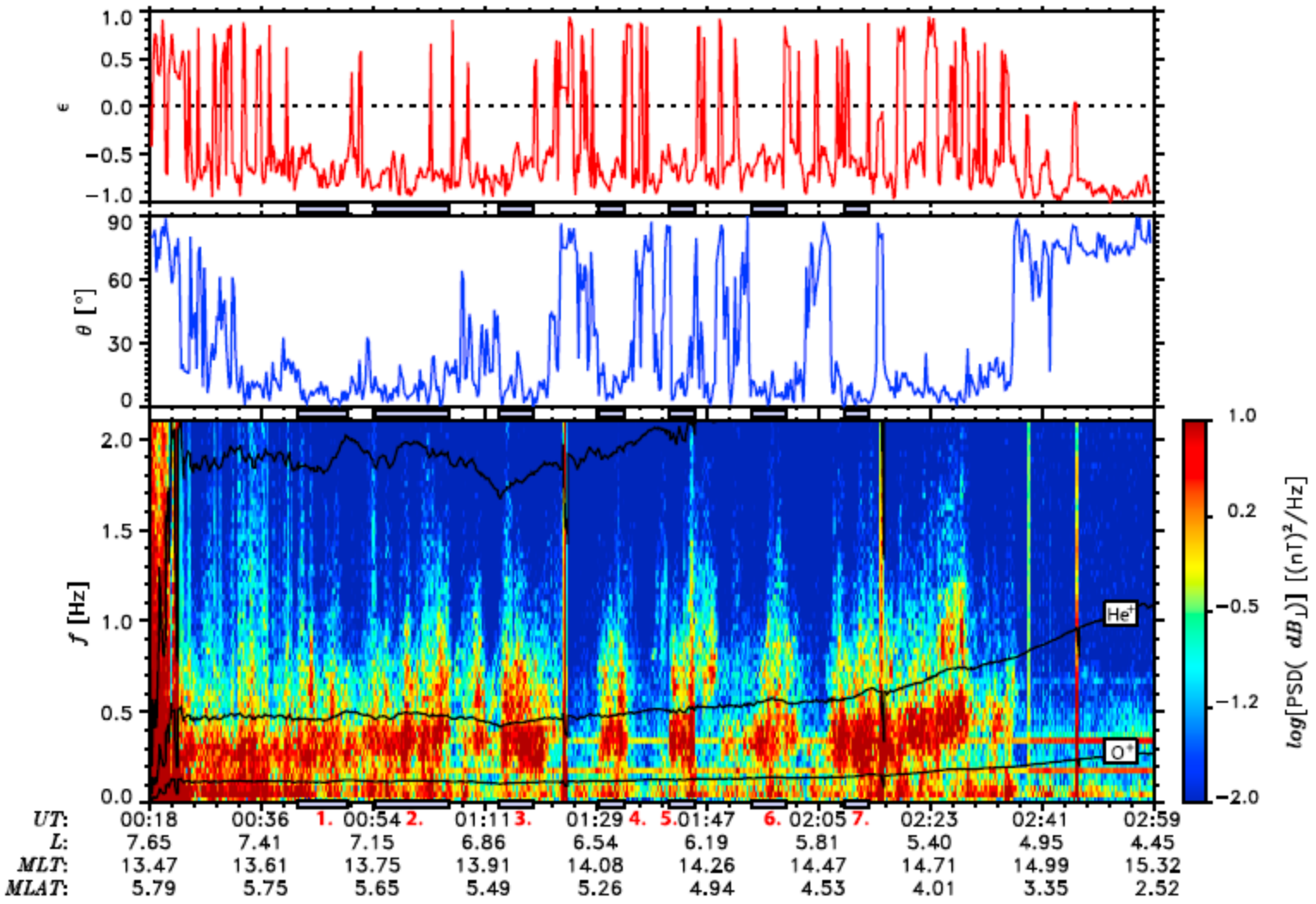
Kennel-Petschek Analysis

Red Traces correspond to Oxygen EMIC Waves



Ukhorskiy et al., 2010

Oxygen EMIC waves are hard to see given mix with other phenomena.



Williams and Lyons, 1974

The most intense spectra, subject to the KP limit, have flat anisotropies.