Seismic Quantities

Information that we need

$$\nu_{max} \propto g T_{eff}^{-1/2}$$

$$\Delta\nu \propto \rho^{-1/2}$$

- They also have dependency of T_{eff} and L

- The T_{eff} (JHK , UVBRI, Bp Rp), (dereddened)

$$\theta_{\rm eff} = b_0 + b_1 X + b_2 X^2 + b_3 X[{\rm Fe/H}] + b_4[{\rm Fe/H}] + b_5[{\rm Fe/H}]^2$$

where $\theta_{\rm eff} = 5040/T_{\rm eff}$, X represents the colour, and b_i $(i = 0, ..., 5)$ are the coefficients of the fit.

González Hernández, J. I. 2009. doi:10.1051/0004-6361/200810904.

Mucciarelli, A. 2020. doi:10.3847/2515-5172/ab8820.

- And for L

$$\log(L/L_\odot) = -0.4\left[V_0 - (m-M)_0 + BC - M_{\rm bol,\odot}\right]$$

Alonso, A., 1999. doi:10.1051/aas:1999521.

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right)^3 \left(\frac{\Delta\nu}{\Delta\nu_\odot}\right)^{-4} \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{3/2} \quad (1)$$

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\Delta\nu}{\Delta\nu_\odot}\right)^2 \left(\frac{L}{L_\odot}\right)^{3/2} \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{-6} \quad (2)$$

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right) \left(\frac{L}{L_\odot}\right) \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{-7/2} \quad (3)$$

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right)^{12/5} \left(\frac{\Delta\nu}{\Delta\nu_\odot}\right)^{-14/5} \left(\frac{L}{L_\odot}\right)^{3/10} \quad (4)$$

Howell, M., 2023. doi:10.48550/arXiv.2307.07158.

Seismic Quantities

Information that we can obtain

$$\nu_{max} \propto g T_{eff}^{-1/2}$$

$$\Delta\nu \propto \rho^{-1/2}$$

- In this study they look for Solar-like oscillations in a star's power spectrum (≤ 20 μHz)
- They characterized by two globalseismic quantities:

ν_{max} **the frequency of the maximum acoustic power**,

and

$\Delta\nu$ **the large frequency spacing between adjacent overtone oscillation modes.**

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right)^3 \left(\frac{\Delta\nu}{\Delta\nu_\odot}\right)^{-4} \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{3/2} \quad (1)$$

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\Delta\nu}{\Delta\nu_\odot}\right)^2 \left(\frac{L}{L_\odot}\right)^{3/2} \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{-6} \quad (2)$$

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right) \left(\frac{L}{L_\odot}\right) \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{-7/2} \quad (3)$$

$$\left(\frac{M}{M_\odot}\right) \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right)^{12/5} \left(\frac{\Delta\nu}{\Delta\nu_\odot}\right)^{-14/5} \left(\frac{L}{L_\odot}\right)^{3/10} \quad (4)$$

$$g/g_\odot \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right) \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{-1/2}$$

$$\left(\frac{R}{R_\odot}\right) \simeq \left(\frac{\nu_{\rm max}}{\nu_{\rm max,\odot}}\right) \left(\frac{\Delta\nu}{\Delta\nu_\odot}\right)^{-2} \left(\frac{T_{\rm eff}}{T_{\rm eff,\odot}}\right)^{1/2}$$

Howell, M., 2023. doi:10.48550/arXiv.2307.07158.