

Faraday rotation constraints on large scale Halo model

ICRC 2021 - Berlin

July, 12 - 23, 2021

Thomas Fitoussi
Gustavo Medina-Tanco
Juan-Carlos D'Olivo



Simple model of Galactic magnetic field

$$\mathbf{B} = \mathbf{B}_D(1 - T(z, z_0)) + \mathbf{B}_H T(z, z_0), \quad (1)$$

- ▶ Disk model

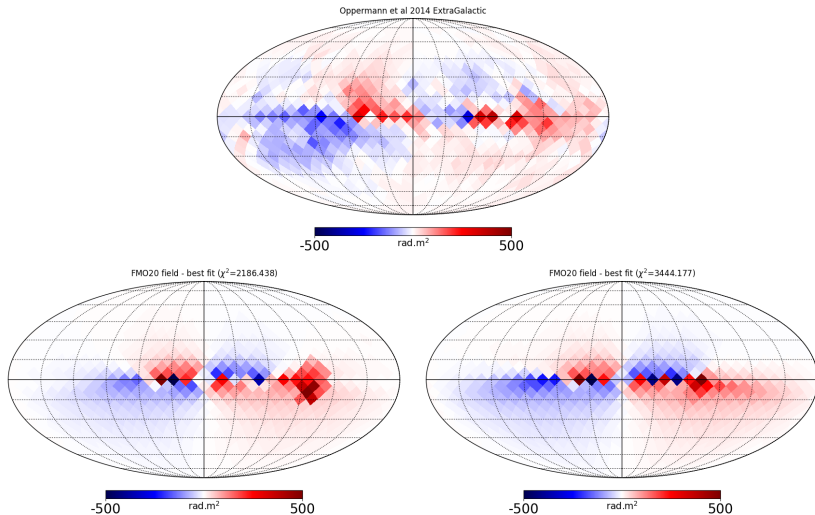
$$\mathbf{B}_D = (\sin p \hat{\mathbf{u}}_r + \cos p \hat{\mathbf{u}}_\varphi) \cos\left(\varphi - b \ln \frac{r}{r_\odot} + \Phi\right) B(r, \varphi) \quad (2)$$

$$B(r, \varphi) = \frac{B_0^D}{\cos \Phi} \begin{cases} r_\odot / r_c, & r < r_c \\ r_\odot / r, & r \geq r_c \end{cases} \quad (3)$$

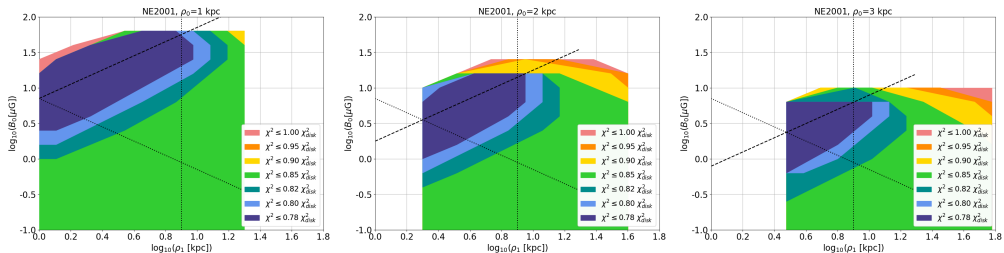
- ▶ extended halo model with a "Parker"-like field

$$\mathbf{B}_H = \begin{cases} 0, & \rho < \rho_0 \\ \frac{|z|}{z}, B_0^H \left(\frac{\rho_0}{\rho}\right)^2 \left(\hat{\mathbf{u}}_r - \frac{\rho}{R_1} \sin \theta \hat{\mathbf{u}}_\varphi\right), & \rho \geq \rho_0 \end{cases} \quad (4)$$

Fitting with extragalactic Faraday rotation map



Stressing the limits on the halo



$$B_H^0(best) = 7 \left(\frac{\rho_0}{1 \text{ kpc}} \right)^{-1} \left(\frac{\rho_1}{\rho_0} \right) \mu\text{G} \quad (5)$$

"Best fit"

