Estimations of fluxes of neutrinos produced in Solar corona flares

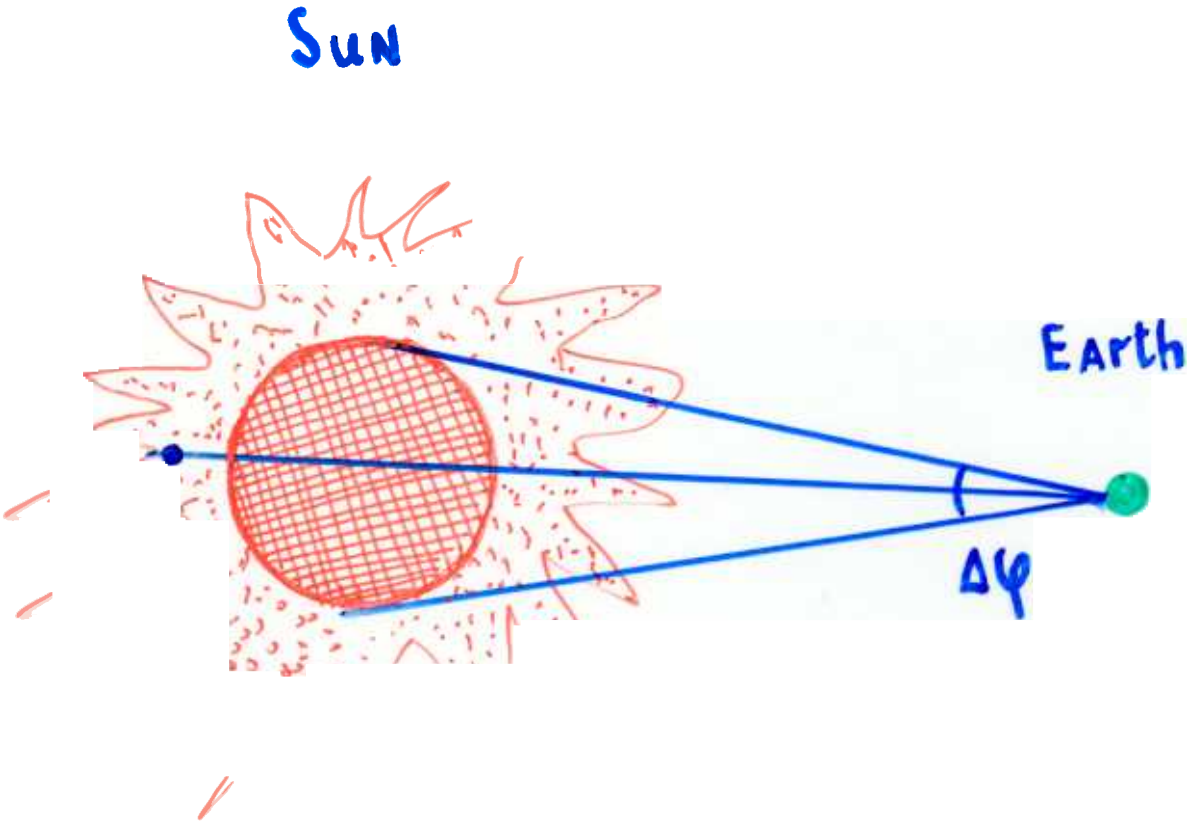
O.G Ryazhskaya, L.V. Volkova, G.T. Zatsepin
INR RAS

Introduction

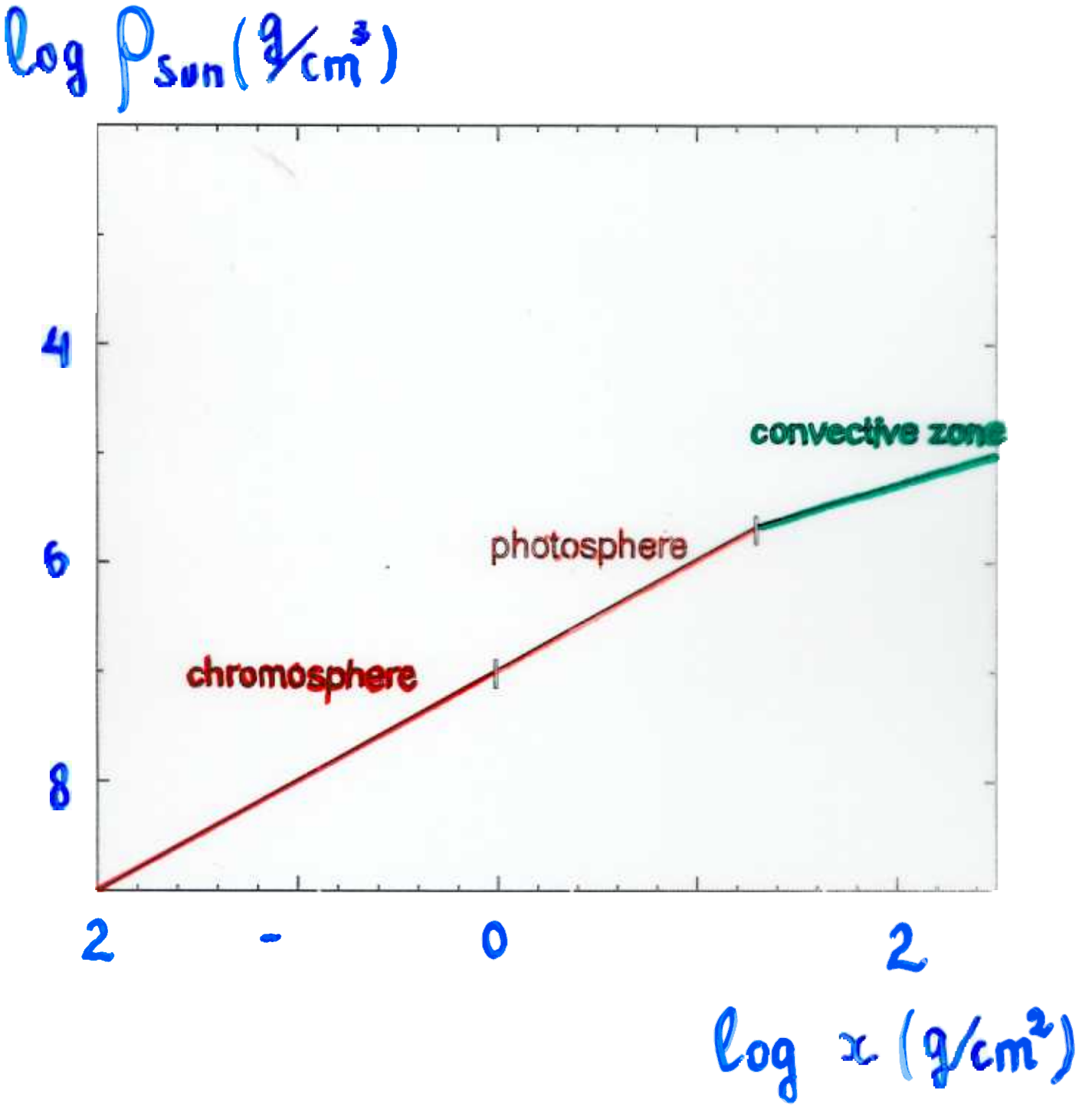
Do correlations exist between variations of solar neutrino fluxes and solar flares?

AUPO

A scheme



$pp \rightarrow \pi_1 \rightarrow \nu \mu \rightarrow e, \nu, \bar{\nu}$


log ρsun (g/cm³)
4
6
8
convective zone
photosphere
chromosphere
2
-
0
2
log x (g/cm²)

TAUPO

On a flare

$$P_p(E_p)\,dE_p \quad A E_p^{(\gamma+1)}$$

γ 5

$N_p(\geq \text{Gev}) \sim 10^{33} \frac{p}{\text{flare}}$ Febr 23, 956

$N_p(\geq 1\text{Gev}) \sim 2\,10^{29} \frac{p}{\text{flare}}$ averaged (x5)

$N_p(\geq 1\text{Gev})\ 2\,10^{39} \frac{p}{\text{flare}}$ max

acceleration is isotropical

4 the middle period of time during which a flare lasts is ~20 min

TA PO

Calculations

$$\nu_{\odot}^{flare}(E_\nu, \gamma\ A=1)$$

$$E_\nu = 0^{4} \div 10\ Gev$$

$$= -5$$

Analitical solution of propagation equations

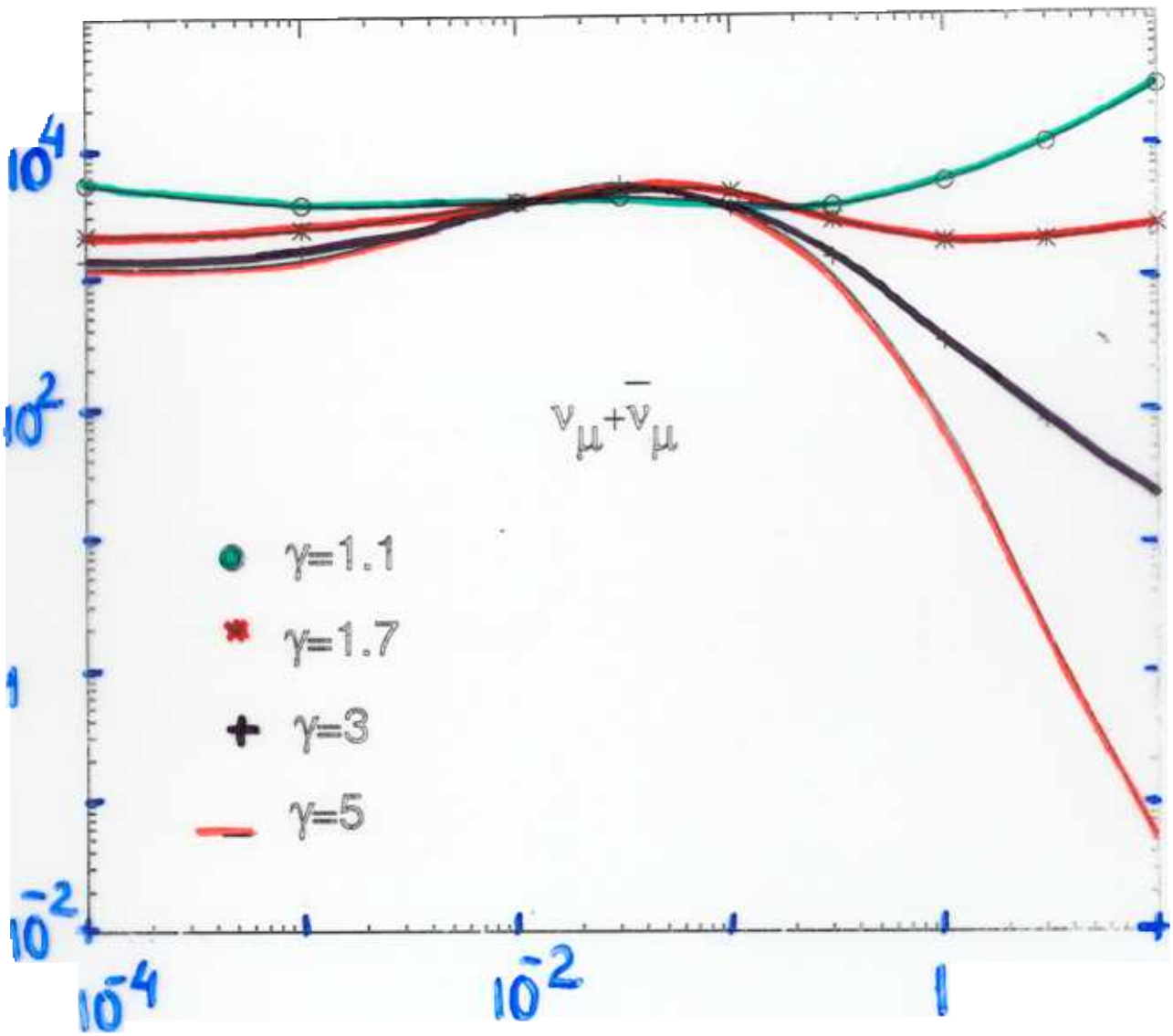
Table

$$= \frac{P_{\nu_{\odot}}^{flare}}{P_{\nu}^{atm}}(E_\nu\ \gamma\ A\ 1, \Delta\varphi)$$

Table

figure

$\alpha = P_{\nu_0}^{flare} / P_{\nu}^{atm}$ $\Delta\varphi$



E_ν Gev

In conclusion

An installation can register from ν_{atm}

$$3000 \ \frac{\text{event}}{\text{year}}$$

20 min 0.1 event (in 2π)

flare Febr. 23, 1956 ~ 17 events (in $\Delta\varphi$)