

Data for neutrino fluxes at production

The data for neutrino fluxes from DM annihilations in the Earth and in the Sun, computed in

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 “Spectra of neutrinos from dark matter annihilation”
 hep-ph/0506298v4

can be downloaded from any of the following locations:

- www.to.infn.it/~fornengo/DMnu.html
- www.cern.ch/astrumia/DMnu.html
- www.marcocirelli.net/DMnu.html

The neutrino fluxes at production are given in two forms:

1. as raw numerical tables of the fluxes;
2. as tables of fit parameters.

1. Numerical tables of the fluxes

The file `DMnuProdFluxes.zip` contains the following data files:

<code>earth_numu.dat</code>	fluxes of $\nu_\mu=\bar{\nu}_\mu=\nu_e=\bar{\nu}_e$ from annihilations in Earth
<code>earth_nutau.dat</code>	fluxes of $\nu_\tau=\bar{\nu}_\tau$ from annihilations in Earth
<code>sun_numu.dat</code>	fluxes of $\nu_\mu=\bar{\nu}_\mu=\nu_e=\bar{\nu}_e$ from annihilations in Sun
<code>sun_nutau.dat</code>	fluxes of $\nu_\tau=\bar{\nu}_\tau$ from annihilations in Sun

Each file is a table of the following format:

$$m_{\text{DM}} \quad x \quad b \quad \tau \quad c \quad q \quad t \quad Z \quad W \quad Z(\text{no prompt}) \quad W(\text{no prompt})$$

where m_{DM} is the mass of the annihilating DM particle, $x = E_\nu/m_{\text{DM}}$ is the rescaled neutrino energy and the other columns give the neutrino fluxes normalized per single DM annihilation for the annihilation channels $b\bar{b}$, $\tau\bar{\tau}$, $c\bar{c}$, light quarks ($u\bar{u} \equiv d\bar{d} \cong s\bar{s}$), ZZ , W^+W^- . The last two column give the neutrinos fluxes from the ZZ and W^+W^- channels having subtracted the “prompt” neutrinos (see the text of the paper). The values of m_{DM} provided

are the following. For the case of the Earth (14 values):

$$m_{\text{DM}} = \{10, 30, 50, 70, 90, 100, 150, 200, 250, 300, 500, 700, 900, 1000\} \text{ GeV.}$$

For the case of the Sun (12 values):

$$m_{\text{DM}} = \{10, 30, 50, 70, 90, 100, 200, 300, 500, 700, 900, 1000\} \text{ GeV.}$$

2. Tables of fit parameters

The file `DMnuProdParameters.zip` contains the following data files:

`parameters_fit_numu_earth.dat`

fit parameters for $\nu_\mu = \bar{\nu}_\mu = \nu_e = \bar{\nu}_e$ from annihilations in the Earth

`parameters_fit_nutau_earth.dat`

fit parameters for $\nu_\tau = \bar{\nu}_\tau$ from annihilations in the Earth

`parameters_fit_numu_sun.dat`

fit parameters for $\nu_\mu = \bar{\nu}_\mu = \nu_e = \bar{\nu}_e$ from annihilations in the Sun

`parameters_fit_nutau_sun.dat`

fit parameters for $\nu_\tau = \bar{\nu}_\tau$ from annihilations in the Sun

Each file provides the fitting parameters a_i , b and c_i to be used in the expression for the neutrino flux

$$\frac{dN}{dx} = g(x) = a_0(1 + a_1w + a_2w^2 + a_3w^3 + a_4w^4 + a_5w^5)(1-x)^b + c_0x^{c_1}(1-x)^{c_2}$$

$$x = E_\nu/m_{\text{DM}}, \quad w = \log_{10}x,$$

which corresponds to eq. (7) in the paper. The parameters are given as a table in the format

$$m_{\text{DM}} \quad a_0 \quad a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5 \quad b \quad c_0 \quad c_1 \quad c_2$$

(where m_{DM} is the mass of the annihilating DM particle) for each of the following annihilation channels

$$\{ b\bar{b}, \tau\bar{\tau}, c\bar{c}, \text{light quarks } (u\bar{u} \equiv d\bar{d} \cong s\bar{s}), \text{gluons} \}.$$

The values of m_{DM} provided are the following. For the case of the Earth (14 values):

$$m_{\text{DM}} = \{10, 30, 50, 70, 90, 100, 150, 200, 250, 300, 500, 700, 900, 1000\} \text{ GeV.}$$

For the case of the Sun (11 values):

$$m_{\text{DM}} = \{10, 30, 50, 70, 90, 100, 300, 500, 700, 900, 1000\} \text{ GeV}.$$

These data correspond to the data provided in Table 1 and Table 2 of the paper. See further discussion there.

Differences with Release 2

A numerical bug in the implementation of the boost for top quark decays has been fixed (modifications are quite small; they affect the $t\bar{t}$ channels in Figures 2, 5 \rightarrow 12, as well as in Tables 3 and 4 in the paper).

The present Release 3 corresponds to **v4** of the paper in the arXiv.

Differences between Release 2 and Release 1

An erroneous double counting of the prompt neutrino yield in W -boson decays has been fixed (modifications affect the W^+W^- and $t\bar{t}$ channels in Figures 2, 5 \rightarrow 12, as well as in Tables 3 and 4 in the paper) and a few parameters have been updated (modifications are generally small or null).

Release 2 corresponds to **v3** of the paper in the arXiv. Previous versions on the arXiv and the journal version on Nuclear Physics B had used Release 1.