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Erratum to: Search for annihilating dark matter in the Sun with 3 years of IceCube data

IceCube Collaboration

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In the analysis published in Ref. [1], constraints on the number of signal events n_s can be interpreted as constraints on the volumetric neutrino to muon conversion rate $\Lambda_{\nu\bar{\nu}\rightarrow\mu^+\mu^-}$,

Table 1 p values and 90% C.L. upper limits on the number of signal events within the two samples in ~532 days of livetime, corresponding to three years of operation of IceCube-DeepCore in its final configuration. The average effective volumes over the three years are also provided, as well as upper limits on the muon flux, annihilation rate, and the spin-dependent and spin-independent WIMP-proton scattering cross sections

m_χ (GeV)	Annih. channel	Dataset	p value %	$n_s^{90\%C.L.}$	V_{eff} (km ³)	$\bar{\Phi}_{\mu^+\mu^-}$ (km ⁻² year ⁻¹)	$\Phi_{\mu^+\mu^-}^{90\%C.L.}$ (km ⁻² year ⁻¹)	$\Gamma_{\chi\chi \rightarrow SM}^{90\%C.L.}$ (s ⁻¹)	$\sigma_{SD}^{90\%C.L.}$ (pb)	$\sigma_{SI}^{90\%C.L.}$ (pb)
20	$\tau^+\tau^-$	DC	>50	97.2	4.40e-04	3.49e+03	3.36e+03	9.19e+23	4.85e-04	4.06e-06
35	$b\bar{b}$	DC	>50	96.8	2.79e-04	4.01e+03	3.91e+03	7.39e+24	9.25e-03	4.77e-05
35	$\tau^+\tau^-$	DC	>50	59.1	1.26e-03	1.30e+03	1.25e+03	1.08e+23	1.35e-04	6.95e-07
50	$b\bar{b}$	DC	>50	87.3	4.71e-04	2.83e+03	2.79e+03	2.79e+24	6.39e-03	2.44e-05
50	$\tau^+\tau^-$	DC	48.4	48.9	2.31e-03	7.70e+02	8.03e+02	3.46e+22	7.90e-05	3.02e-07
100	$b\bar{b}$	DC	46.1	65.2	1.39e-03	1.19e+03	1.26e+03	4.09e+23	3.29e-03	7.38e-06
100	W^+W^-	DC	34.7	36.1	6.64e-03	3.06e+02	4.07e+02	1.18e+22	9.52e-05	2.13e-07
100	$\tau^+\tau^-$	DC	31.3	37.6	9.40e-03	2.30e+02	2.97e+02	3.60e+21	2.91e-05	6.48e-08
250	$b\bar{b}$	DC+IC	28.2	55.1	4.42e-03	5.22e+02	6.59e+02	5.96e+22	2.80e-03	3.50e-06
250	W^+W^-	DC+IC	39.8	64.7	7.38e-02	1.35e+02	1.62e+02	1.13e+21	5.30e-05	6.62e-08
250	$\tau^+\tau^-$	DC+IC	42.1	90.6	7.20e-02	1.83e+02	2.04e+02	5.99e+20	2.82e-05	3.52e-08
500	$b\bar{b}$	DC+IC	46.1	75.6	1.54e-02	3.68e+02	4.09e+02	1.66e+22	3.06e-03	2.82e-06
500	W^+W^-	IC	39.3	36.0	1.87e-01	4.04e+01	5.53e+01	2.04e+20	3.76e-05	3.49e-08
500	$\tau^+\tau^-$	IC	38.7	45.1	1.95e-01	4.71e+01	5.93e+01	7.96e+19	1.46e-05	1.35e-08
1000	$b\bar{b}$	IC	37.2	43.1	3.24e-02	1.30e+02	1.55e+02	3.56e+21	2.59e-03	2.00e-06
1000	W^+W^-	IC	48.9	24.6	2.67e-01	3.06e+01	3.31e+01	9.34e+19	6.80e-05	5.28e-08
1000	$\tau^+\tau^-$	IC	46.5	28.6	2.86e-01	3.30e+01	3.46e+01	2.84e+19	2.07e-05	1.60e-08
3000	$b\bar{b}$	IC	48.2	32.1	6.62e-02	7.29e+01	7.56e+01	1.04e+21	6.76e-03	4.65e-06
3000	W^+W^-	IC	49.6	23.1	2.86e-01	3.07e+01	3.13e+01	8.33e+19	5.42e-04	3.70e-07
3000	$\tau^+\tau^-$	IC	49.4	21.1	2.92e-01	2.85e+01	2.90e+01	1.85e+19	1.21e-04	8.25e-08
5000	$b\bar{b}$	IC	49.1	33.7	7.72e-02	7.11e+01	7.24e+01	8.74e+20	1.58e-02	1.06e-05
5000	W^+W^-	IC	49.8	22.4	3.09e-01	2.78e+01	2.84e+01	7.59e+19	1.37e-03	9.14e-07
5000	$\tau^+\tau^-$	IC	49.8	22.3	3.10e-01	2.86e+01	2.93e+01	1.82e+19	3.28e-04	2.19e-07
10000	$b\bar{b}$	IC	49.8	32.5	8.26e-02	6.74e+01	6.87e+01	7.31e+20	5.27e-02	3.46e-05
10000	W^+W^-	IC	>50	25.2	3.18e-01	3.08e+01	3.11e+01	8.26e+19	5.96e-03	3.88e-06
10000	$\tau^+\tau^-$	IC	>50	25.0	3.19e-01	3.18e+01	3.21e+01	1.94e+19	1.40e-03	9.11e-07

$$\Lambda_{\nu\bar{\nu}\rightarrow\mu^+\mu^-}^{90\%C.L.} = \frac{n_s^{90\%C.L.}}{\sum_j T_{\text{live}}^j V_{\text{eff}}^j}, \quad (1)$$

where T_{live} and V_{eff} are the livetime and effective volume of the data sample of index j . These can then be interpreted as constraints on the muon flux $\Phi_{\mu^+\mu^-}$, dark matter (DM) annihilation rate in the Sun $\Gamma_{\chi\chi\rightarrow\text{SM}}$, as well as the spin-dependent (SD) and spin-independent (SI) scattering cross sections σ_{SD} and σ_{SI} using `WimpSim` [2].

In Table 4 of Ref. [1], the labels and units of columns 7 and 8 suggest that the muon flux $\Phi_{\mu^+\mu^-}$ (in units $\text{km}^{-2} \text{year}^{-1}$) is being presented. However for the first 12 rows, corresponding to points in which the DeepCore (DC) dataset was included, the volumetric neutrino to muon conversion rate $\Lambda_{\nu\bar{\nu}\rightarrow\mu^+\mu^-}$ (in units $\text{km}^{-3} \text{year}^{-1}$) were erroneously reported instead. The corrected table (Table 1) is presented hereby. All other columns remain unchanged. All quantities that go into the right hand side of Eq. 1 are presented in the table, as well as median sensitivities and 90% C.L. upper limits on the muon flux $\Phi_{\mu^+\mu^-}$ derived using `WimpSim` [2].

The final results and conclusions presented in Ref. [1] in terms of constraints on the SD and SI scattering cross sections σ_{SD} and σ_{SI} as well as the DM annihilation rate in the Sun $\Gamma_{\chi\chi\rightarrow\text{SM}}$, remain unchanged.

In Section 4.2 of Ref. [1], the maximum zenith angle of the Sun is erroneously mentioned as 104° . The correct maximum zenith angle of the Sun is 114° at the South Pole.

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