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ERRATUM: "FERMI LARGE AREA TELESCOPE STUDY OF COSMIC-RAYS AND THE INTERSTELLAR MEDIUM IN NEARBY MOLECULAR CLOUDS" (2012, ApJ, 755, 22)

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Online-only material: color figures

In the published version of the paper, errors were made in calculating the exposure time due to an analysis mistake. While they do not affect gas emissivities of the R CrA and Cepheus & Polaris flare regions significantly (the differences are within the systematic uncertainty), that of the Chamaeleon region is increased by ∼20%. Although we claimed a difference of ∼50% in gas emissivity among these molecular cloud regions in the original paper, it is decreased to ∼30% (comparable to the sum of the statistical and systematic uncertainties) in the revised analysis. Therefore, our conclusion of the original paper, that a small variation (∼20%) of the CR density in the solar neighborhood exists, is not supported by the data if we take these uncertainties into account. On the other hand, the obtained $X_{\rm CO}$ and $X_{\rm Av}$ values, and the masses of gas calculated from them are not changed significantly (the differences are within the statistical errors). Errors and corrections in the original paper are summarized below.

1. In the Abstract (lines 5–6) and Section 3 (lines 4–5 in the 3rd paragraph) in the original paper, the γ-ray emissivity above 250 MeV for the Chamaeleon region should be $(7.2 \pm 0.1_{\rm stat} \pm 1.0_{\rm sys}) \times 10^{-27}$ photons s^{-1} sr^{-1} H-atom^{-1}, not $(5.9 \pm 0.1_{\rm stat}\ ^{+0.9}_{-1.0{\rm sys}}) \times 10^{-27}$ photons s^{-1} sr^{-1} H-atom^{-1}.
2. In the Abstract (lines 8–10), "Whereas the energy dependences of the emissivities agree well with that predicted from direct CR observations at the Earth, the measured emissivities from 250 MeV to 10 GeV indicate a variation of the CR density by ∼20% in the neighborhood of the solar system, even if we consider the systematic uncertainties." should be changed to "The energy dependences of the emissivities agree well with that predicted from direct CR observations at the Earth. Although the measured emissivities from 250 MeV to 10 GeV differ by ∼30% among these molecular cloud regions, the difference is not significant if we take the systematic uncertainty into account."
3. Table 1 and Figure 13, which show gas emissivities and spectra for the Chamaeleon region in the original paper, should be changed to the Table 1 and Figure 1 as shown below.
4. Figure 16, which compares H I gas emissivities among several regions in the original paper, should be changed to Figure 2 as shown below.
5. The text from the line 13 to the last one in the first paragraph of Section 4.1, "The spectral shapes for the three regions..., indicating a difference of the CR density between the Chamaeleon and the others as shown in Figure 16." should be changed to the paragraph that follows.
   "The shaded area of each spectrum indicates the systematic uncertainty as described in Section 3. We note that the systematic uncertainty of the LAT effective area (5% at 100 MeV and 20% at 10 GeV; Rando et al. 2009) does not affect the relative value of emissivities. The effect of unresolved point sources is small; we have verified that the obtained emissivities are almost unaffected by decreasing the threshold for point sources from TS = 100 to TS = 50. We also confirmed that the residual excess of photons around ($l = 280^\circ$ to 288°, $b = -20^\circ$ to -12°; see the bottom panel of Figure 8) in the Chamaeleon region does not affect the local H I emissivity very much. Thus the total systematic uncertainty is reasonably expressed by the shaded area shown in

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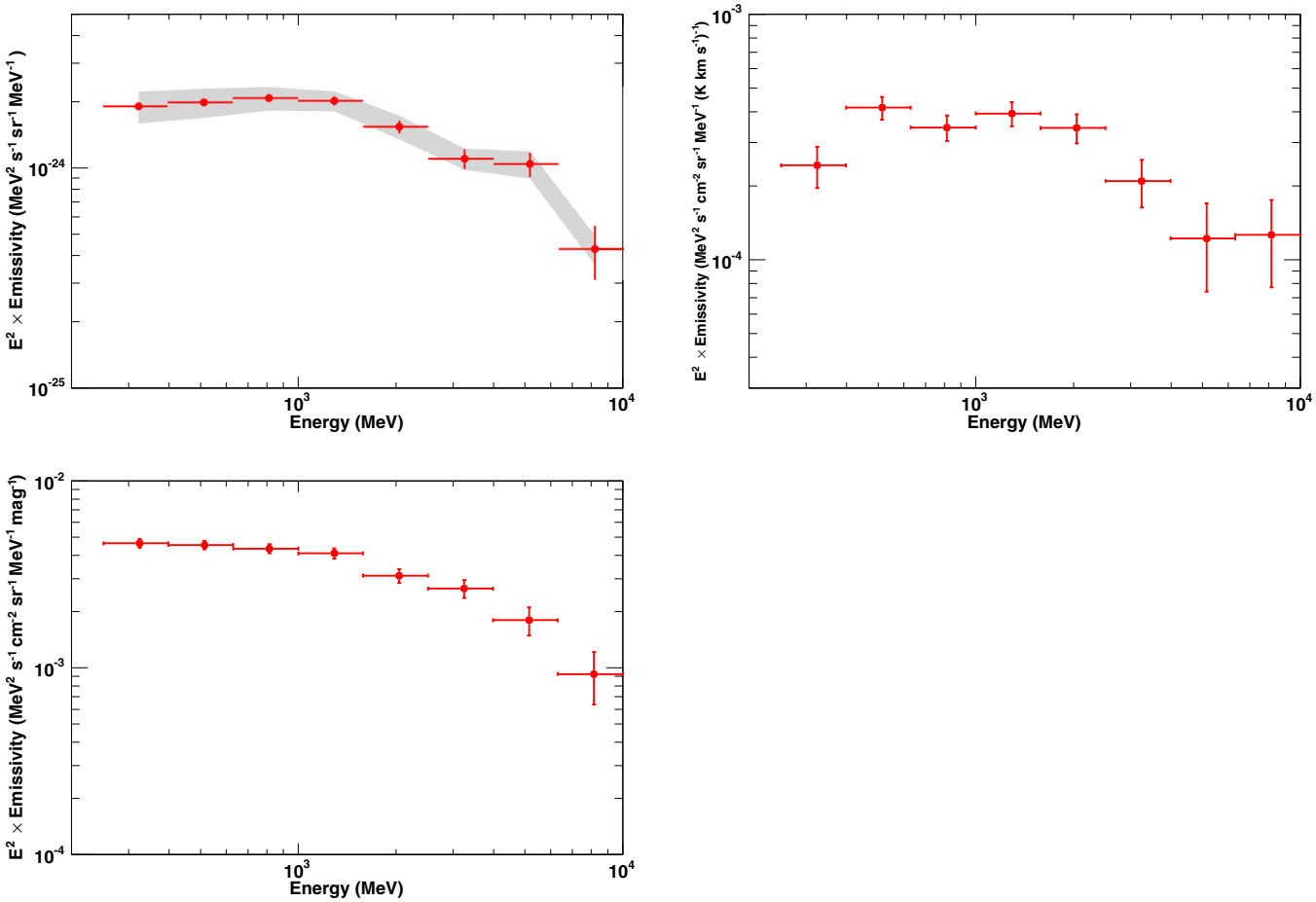

Figure 1. Emissivity spectrum of the local H I gas (top left), that per W_{CO} unit (top right), and that per unit Av_{res} magnitude (bottom left) of the Chamaeleon region. The shaded area shows systematic uncertainties for H I (see the text for details).

(A color version of this figure is available in the online journal.)

Table 1
Gas Emissivities in the Chamaeleon Region with Their Statistical Uncertainties
(Assuming $T_S = 125$ K for the H I Maps Preparation)

Energy (GeV)	$q_{H1,1}$	q_{CO}	q_{Av}
0.25–0.40	2.8 ± 0.1	0.35 ± 0.07	0.68 ± 0.04
0.40–0.63	1.83 ± 0.07	0.39 ± 0.04	0.42 ± 0.02
0.63–1.00	1.21 ± 0.05	0.20 ± 0.02	0.25 ± 0.01
1.00–1.58	0.74 ± 0.03	0.15 ± 0.02	0.15 ± 0.01
1.58–2.51	0.36 ± 0.02	0.08 ± 0.01	0.073 ± 0.006
2.51–3.98	0.16 ± 0.02	0.031 ± 0.006	0.039 ± 0.004
3.98–6.31	0.10 ± 0.01	0.011 ± 0.004	0.017 ± 0.003
6.31–10.00	0.025 ± 0.007	0.008 ± 0.003	0.006 ± 0.002
Total	7.2 ± 0.1	1.22 ± 0.09	1.64 ± 0.05

Notes. Units; $q_{H1,1}$ (10^{-27} s^{-1} sr^{-1}), q_{CO} (10^{-6} cm^{-2} s^{-1} sr^{-1} (K km s^{-1})$^{-1}$), q_{Av} (10^{-5} cm^{-2} s^{-1} sr^{-1} mag^{-1}).

Figure 2. The spectral shapes for the three regions agree well with the LIS models, indicating that the CR nuclei have similar spectral distribution in the vicinity of the solar system. On the other hand, the apparent difference of emissivities among the three regions (by ∼30%) is comparable to the uncertainty (statistical and systematic errors). Therefore the LAT data do not allow us to claim or exclude a possible small variation of the CR density in the solar neighborhood."

6. In Section 5 (lines 4–9 in the 2nd paragraph), "The emissivities, however, indicate a variation of the CR density by ∼20% within ∼300 pc around the solar system, even if we consider the systematic uncertainties. We consider possible origins of the variation are non-uniform supernova rate and anisotropy of CRs depending on the propagation conditions" should be changed to "Although the emissivities differ by ∼30% among these regions, the difference is not significant if we take the systematic uncertainty into account. If the variation really exists, possible origins of it might be non-uniform supernova rate and anisotropy of CRs, depending on the propagation conditions."

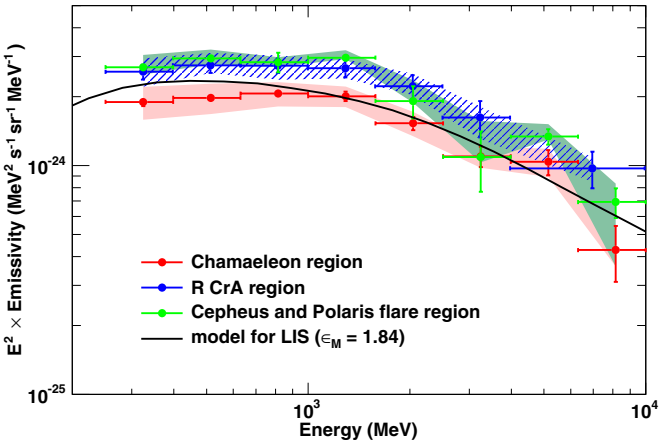

Figure 2. H I emissivity spectra of the Chamaeleon, R CrA, and Cepheus & Polaris flare regions compared with the model for the LIS with the nuclear enhancement factor of 1.84. The shaded areas for the Chamaeleon, R CrA, and Cepheus and Polaris flare spectra indicate the systematic uncertainty evaluated in Section 3.
(A color version of this figure is available in the online journal.)

REFERENCE

Rando, R., & the Fermi LAT Collaboration 2009, arXiv:0907.0626