HI filaments are cold and associated with dark molecular gas

HI4PI-based estimates of the local diffuse CO–dark H$_2$ distribution

*(Corrigendum)*

P. M. W. Kalberla$^1$, J. Kerp$^1$, and U. Haud$^2$

1 Argelander-Institut für Astronomie, Auf dem Hügel 71, 53121 Bonn, Germany
e-mail: pkalberla@astro.uni-bonn.de
2 Tartu Observatory, University of Tartu, 61602 Tõravere, Tartumaa, Estonia
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All calculations in Kalberla et al. (2020a) were done in terms of hydrogen nucleon column densities, $N_H$. However, when producing the output FITS maps for H$_2$ column densities, $N_{H_2}=N_H/2$, was neglected. In Fig. 11 the range of the displayed values $15.1 < \log(N_{H_2}/\text{cm}^{-2}) < 21.8$ is incorrect, whereas $14.8 < \log(N_{H_2}/\text{cm}^{-2}) < 21.5$ is correct. The online FITS datasets NH2_v90.fit, NH2t_v90.fit, and NH2_v08.fit (Kalberla et al. 2020b) are also affected. None of the conclusions of the paper are affected by the conversion error.

We thank Rafail Skalidis for pointing out discrepancies in derived $N_{H_2}$ column density distributions (Skalidis et al. 2024, Sect. 4.2.3). Using their Eq. (8) with a correct scaling, the differences $\Delta(\log N_{H_2}) \sim -0.5$, demonstrated in their Fig. 8, reduce to $\Delta(\log N_{H_2}) \sim -0.2$. These remaining differences are explainable by different $X_{CO}$ conversion factors, which are used in both papers. With $X_{CO} = 2 \times 10^{20} \text{ cm}^{-2} (\text{K km s}^{-1})^{-1}$, as used by Skalidis et al. (2024), the differences reduce further, leading to a perfect consistent Gaussian distribution with a mean $\Delta(\log N_{H_2}) = -0.13$ and a dispersion of 0.23 (Fig. 1).

References
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* Corrected FITS files are available at the CDS via anonymous ftp to cdsarc.cds.urnistra.fr (130.79.128.5) or via https://cdsarc.cds.urnistra.fr/viz-bin/cat/J/A+A/639/A26

Fig. 1. Distribution of differences $\Delta(\log N_{H_2})$ according to Skalidis et al. (2024, Eq. (8)) for three cases: blue, initial $N_{H_2}$ data from Kalberla et al. (2020a) with a scale error; green, scale error corrected; and red, scale error corrected and using $X_{CO} = 2 \times 10^{20} \text{ cm}^{-2} (\text{K km s}^{-1})^{-1}$. 