

Erratum: The physical drivers of the atomic hydrogen–halo mass relation

by Garima Chauhan^{1,2★}, Claudia del P. Lagos^{1,2★}, Adam R. H. Stevens^{1,2}, Danail Obreschkow^{1,2}, Chris Power^{1,2} and Martin Meyer^{1,2}

¹International Centre for Radio Astronomy Research, The University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia

²ARC Centre of Excellence for All Sky Astrophysics in 3 Dimensions (ASTRO 3D), Australia

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This is an erratum to the paper by Chauhan et al. (2020) titled ‘The physical drivers of the atomic hydrogen–halo mass relation’, which we hereafter refer to as the original paper.

In section 5.1 of the original paper, we introduce polynomial fits for the median H I–halo mass scaling (HIHM) relation for the low-mass, transition and high-mass regions. Our initial equations (equations 20, 21 and 25) had to be revised by introducing normalising factors to make the execution of these equations simpler and to correct an error that was introduced. The corresponding corrected equations are as follows.

The median HIHM relation of SHARK is fitted with a polynomial function $f_{M_{\text{HI}}}(M_{\text{vir}}, z)$, with the fit done in bins of 0.1 dex of halo mass. We use different polynomial fits for different regions, which will be expanded upon later in this section. Our polynomial fit for the median (equation 20 in the original paper) can formally be written as

$$f_{M_{\text{HI}}}(M_{\text{vir}}, z) = \mathcal{H}_{\text{norm}} + \sum_{i=0}^n a_i(z) \left(\log_{10} \left(\frac{M_{\text{vir}}}{M_{\odot}} \right) - \mathcal{M}_{\text{norm}} \right)^i. \quad (1)$$

The value of n differs between halo mass regions: $n = 2, 5$, and 1 respectively for the low-mass, transition, and high-mass regions. These were determined by iterating with different dimensions and finding the minimum n that provides a reasonable fit. [$\mathcal{H}_{\text{norm}}$, $\mathcal{M}_{\text{norm}}$]

$= [(8, 9, 9.8), (10.5, 11.8, 13)]$ are the normalization values for low-mass, transition, and high-mass regions, respectively.

The revised equation (21) from the original paper is as follows:

$$\begin{aligned} a_0^{\text{low}} &= -0.477 + 0.142 z - 0.006 z^2, \\ a_1^{\text{low}} &= 1.920 - 0.592 z + 0.1999 z^2 - 0.0352 z^3, \\ a_2^{\text{low}} &= -0.348 + 0.321 z - 0.176 z^2 + 0.035 z^3, \end{aligned} \quad (2)$$

where a_{0-2}^{low} are the coefficients for the polynomial fit of equation (1) for the low-mass region, and z is redshift.

The revised equation (25) from the original paper is as follows:

$$\begin{aligned} a_0^{\text{high}} &= -0.371 + 1.197 z - 0.791 z^2 + 0.171 z^3, \\ a_1^{\text{high}} &= 1.409 - 0.583 z + 0.340 z^2 - 0.057 z^3. \end{aligned} \quad (3)$$

These equations were revised for simpler execution and to correct an equation of the numerical model presented in the original paper. These changes do not affect any significant results presented in the paper.

REFERENCE

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* E-mail: garima.chauhan@research.uwa.edu.au (GC); claudia.lagos@icrar.org (CdPL)

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