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Erratum: "Hot Extended Galaxy Halos around Local L^* Galaxies from Sunyaev–Zeldovich Measurements" (2022, ApJ, 928, 14)

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1. Revision of Sunyaev–Zeldovich Values

In the published article, the values for the Sunyaev–Zeldovich (SZ) surface brightness y were extracted from images with square pixels in the Fifth Fundamental Catalogue coordinate system, in FITS format. These images were extracted from an all-sky y map expressed in the HEALPix system, where the pixels are quadrilaterals whose shape varies around the sky. For the FITS cutout files, X-ray imaging tools were used to produce y values (using funcnts), but this caused incorrect results. We rectify this by using Python extraction tools (Healpy) within the HEALPix system. This led to an increase in the values of y and $Y(R_{\rm vir})$ by a constant factor but did not change the statistical significance of the results. Also, we have performed additional tests of the data and have examined other SZ maps produced since the published article, but here we confine our analysis to the SZ map from the published article.

The result from the published article, for 11/12 galaxies (without NGC 891), was $Y(R_{\rm vir}) = 0.0044 \pm 0.0012$ kpc^2, which was measured at $R_{\rm vir} = 250$ kpc. We now find that a somewhat more accurate approach is to measure $Y(0.5R_{\rm vir})$ and then correct the value to $R_{\rm vir}$ by using the truncated β model described in the paper ($r_{\rm core}/R_{\rm vir} = 0.05$, $r_{\rm cutoff}/R_{\rm vir} = 1.3$, $\beta = 0.6$); we find $Y(R_{\rm vir}) = 2.03\, Y(0.5R_{\rm vir})$. From our revised results, there is a small difference between values of $Y(0.5R_{\rm vir})$ depending upon when one uses the median, average, or weighted averages of y. The value of $Y(0.5R_{\rm vir})$ is 4% higher when using the unweighted averages of y and 4% lower when using the median values of y, which is less than the intrinsic uncertainty from the weighted average values. For all 12 galaxies, the value for $Y(0.5R_{\rm vir}) = 0.00460 \pm 0.0017$ kpc^2 when using the weighted averages of y. After the correction factor of 2.03, $Y(R_{\rm vir}) = 0.00934 \pm 0.00345$ kpc^2, which is nearly identical to the value measured directly from the averages at $R_{\rm vir}$. For the 11-galaxy stack (without NGC 891), $Y(R_{\rm vir}) = 0.00831 \pm 0.00307$, which is larger than the published result by a factor of 1.90 (this factor can also be applied to each value of y from the published article).

A revised mass can be inferred by adopting the same assumption as the published article, in which case, the gas mass at $R_{\rm vir}$ is $1.86 \pm 0.69 \times 10^{11}\, M_\odot$; the gas mass scales as $(3 \times 10^6\ {\rm K})/T$ for an isothermal halo. This corresponds to a baryon fraction for the hot gas of 0.60 ± 0.22 when using an expected total baryon mass of $3.1 \times 10^{11}\, M_\odot$. One can combine the hot gas baryons with those of the baryons in stars, cold gas and warm gas, approximately $0.7 \times 10^{11}\, M_\odot$, for a total baryon mass of $2.6 \pm 0.7 \times 10^{11}\, M_\odot$. With this total baryon mass, the baryon fraction is closer to unity, 0.84 ± 0.22, but there is still the possibility that a significant amount of baryons lies beyond the virial radius.

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