Astrophysics > Cosmology and Extragalactic Astrophysics

Testing the WMAP cosmology via Planck radio catalogues

J.R. Whitbourn, T. Shanks, U. Sawangwit

(Submitted on 13 Jul 2011 (v1), last revised 15 Jul 2011 (this version, v2))

The prime evidence underpinning the standard LCDM cosmological model is the CMB power spectrum as observed by WMAP and other microwave experiments. But Sawangwit and Shanks have recently shown that the WMAP CMB power spectrum is highly sensitive to the beam profile of the WMAP telescope. Here, we use the source catalogue from the Planck Early Data Release to test further the WMAP beam profiles. We confirm that stacked beam profiles at Q, V and particularly at W appear wider than expected when compared to the Jupiter beam normalised either directly to the radio source profiles or using Planck fluxes. The same result is also found based on NVSS and WMAP CMB-free source catalogues. Further, the WMAP source fluxes demonstrate a non-linear relation with Planck fluxes, as previously found between WMAP and ground-based fluxes. Importantly, we find that applying this non-linear relation to the Jupiter beam profile results in an excellent fit to the observed radio source profiles. Also, stacked SZ decrements of ~160 galaxy clusters observed by Planck appear to be underestimated in the WMAP data by a factor of ~2 in the Q, V and W bands. The strength of this discrepancy at Q means that it cannot be fully explained by the beam profile problem and thus the WMAP SZ discrepancy remains unexplained. Beam profile systematics can have significant effects on both the amplitude and position of the first acoustic peak. In particular, a wider beam can move the position of the first peak to significantly larger wavenumbers with potentially important implications for cosmology.

Comments: v2; Corrected typos. 15 pages, 10 figures submitted to MNRAS
Subjects: **Cosmology and Extragalactic Astrophysics (astro-ph.CO)**
Cite as: **arXiv:1107.2654 [astro-ph.CO]**
(or **arXiv:1107.2654v2 [astro-ph.CO]** for this version)

Submission history

From: Tom Shanks [view email]
[v1] Wed, 13 Jul 2011 20:00:21 GMT (171kb)
[v2] Fri, 15 Jul 2011 10:24:09 GMT (171kb)

Which authors of this paper are endorsers?