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An analytical model for the magnetic field in the thick shell of Galactic bubbles with uniform initial conditions *(Corrigendum)*

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We correct an implementation error in one of the six scenarios for the magnetic field in the thick shell of the Local Bubble presented in the original paper (Pelgrims et al. 2025). The erratum concerns the scenario named SCA. For this case, the inner shell of the Local Bubble is approximated as a sphere with a radius of 216.7 pc and centered on $(x_{\rm sph}, y_{\rm sph}, z_{\rm sph}) = (-24.8, -32.6, -23.3)$ pc given in the heliocentric Cartesian coordinate system. The shell is assumed to have a thickness of 35 pc, and the explosion center of the supernova is given by $(x_c^{\rm P20}, y_c^{\rm P20}, z_c^{\rm P20}) = (23, -34, -122)$ pc, also in heliocentric coordinate system.

In the numerical implementation of the SCA scenario presented in the original paper, the center of the sphere was inadvertently overwritten by the explosion center. Therefore, the sky maps of the Faraday rotation measure (RM) and synchrotron Stokes parameters Q and U, and the statistics related to the comparison with data that we presented, do not correspond to the intended scenario. What is presented in the original paper corresponds to a case where the shell of the bubble is spherical with a radius of 216.7 pc and a thickness of 35 pc, but where both the explosion center and the shell center have heliocentric Cartesian coordinates: $(x, y, z) = (23, -34, -122)$ pc.

The correct sky maps for the intended SCA scenario, obtained with an initial magnetic field amplitude of $B^0 = 3\ \mu$G, are shown in Fig. 1 and should replace the maps in the second row of Fig. 4 in the original paper. The updated Fig. 6, where the model maps are quantitatively compared to the data in orthographic projections, is shown in Fig. 2. The goodness of fit given in the second column of Table 3 should read as $\chi^2_{\rm RM}/{\rm ndf} = 0.82$, $\chi^2_Q/{\rm ndf} = 1.83$, $\chi^2_U/{\rm ndf} = 1.42$, and $\chi^2_{\rm tot}/{\rm ndf} = 1.36$. Therefore, the SCA scenario is no longer the one that provides the lowest value for the $\chi^2_{\rm tot}/{\rm ndf}$. Finally, we show in Fig. 3 how the reduced χ^2 of the different observables change as a function of the assumed strength of the initial magnetic field for the correct SCA scenario. This figure should replace the top-right panel in Fig. 7 of the original paper.

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References

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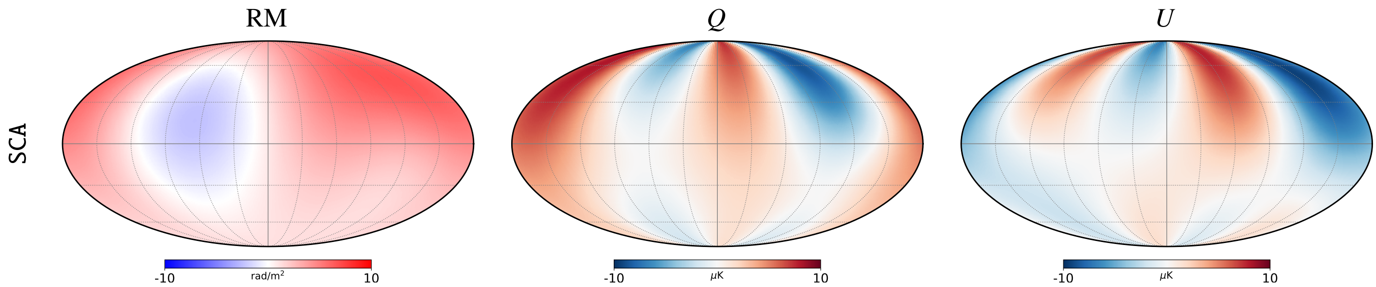

Fig. 1. Full-sky maps of the contributions from the shell of the Local Bubble to the RM, Q, and U signal (from left to right) as predicted for the (corrected) SCA scenario. Same convention as used in the original paper.

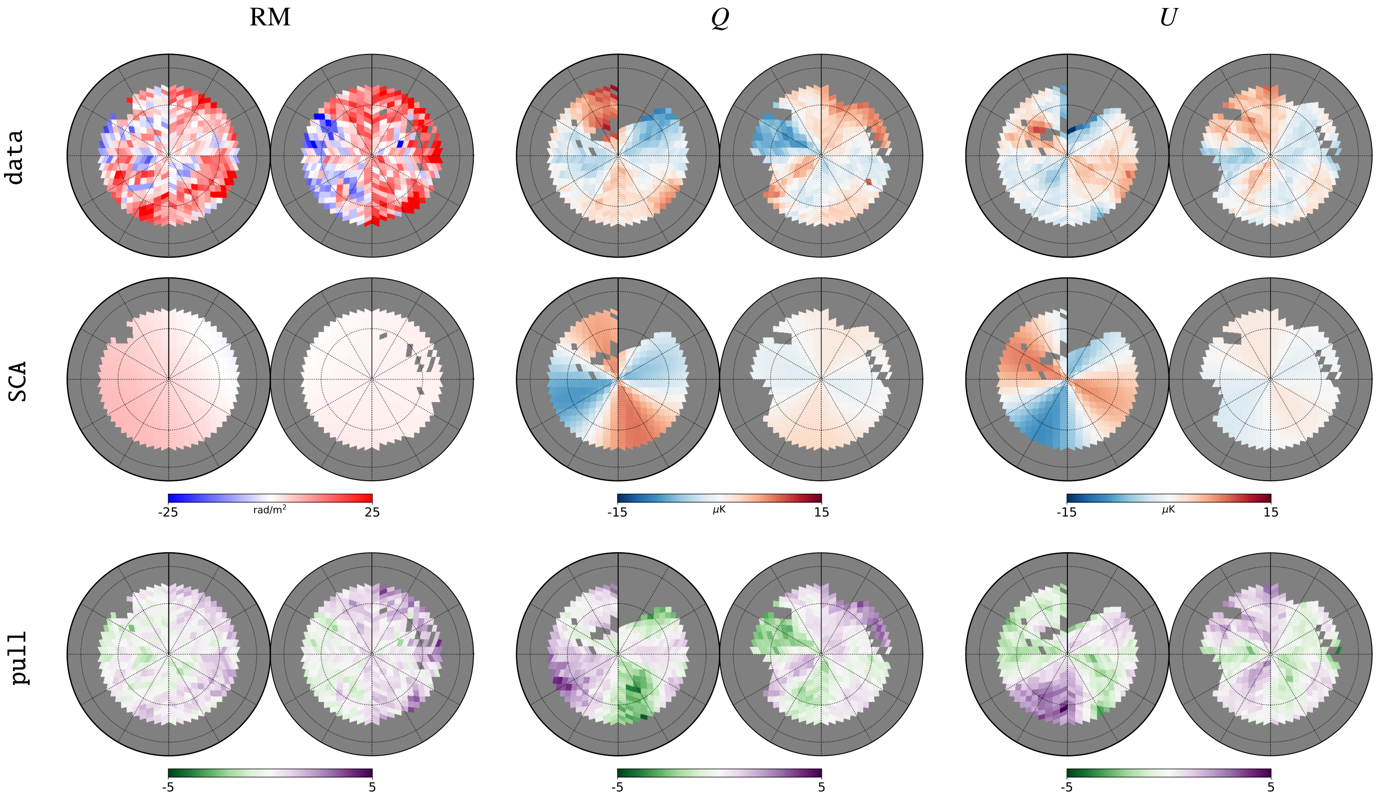

Fig. 2. Orthographic projection of the same data used in Unger & Farrar (2024) (top), the model predictions for the SCA scenario (middle), and pulls (bottom). The gray area is masked out. Same convention as used in the original paper.

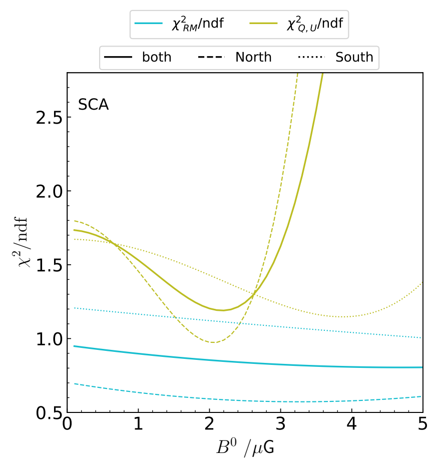

Fig. 3. Contribution to the reduced χ^2 of the different observables as a function of B^0, the strength of the initial magnetic field for the SCA scenario. The contributions from Q and U are combined. The contributions from the northern and southern hemispheres are also shown with dashed and dotted lines, respectively.