determined by a spiral function, shown in Fig. 1. There are two arms starting from opposite sides of the galactic centre, which become equidistant at larger distances from the centre. The distances of the inner windings from the galactic centre are 4 kpc, 7 kpc and 10 kpc along a straight line towards the position of the Sun. In the "galacto magnetic coordinates" used here, the position of the Sun is $R_{\odot}=10$ kpc, $\varphi_{\odot}=6\cdot5°$ and $z_{\odot}=-85$ pc. At the same time, the spiral function forms the "backbone" of the magnetic field structure. The magnetic field in the galactic arms is of quasi-longitudinal structure, that is, the lines of force run in approximately opposite directions on both sides of the equatorial plane. The projection of the field vector on the equatorial plane is constructed with the help of a unit vector $\mathbf{a}_0=\mathbf{R}_0 \cos\varepsilon+[\mathbf{z}_0\ \mathbf{R}_0]\sin\varepsilon$ where $\varepsilon=\text{arc tan}\ [\varphi(R)+b\ R^2/(k^2+R^2)]$; $\mathbf{a}_0$ is obtained by rotation of the tangent vector to the spiral function around the galactic centre. Thus the field is proposed to be of the form $\mathbf{H}=\mathbf{a}_0 H_{a_0}+\mathbf{z}_0 H_{z_0}$. H_{a_0} is symmetric with respect to R and antisymmetric with respect to z; it has its maxima along the line of the spiral function. H_{a_0} vanishes rapidly outside the region of the galactic disk and has to be adjusted to its observed dimensions. H_{a_0} has also to be adjusted to the observed mean field strength, which is about 10^{-5} gauss (ref. 8). These properties of H_{a_0} are achieved by the following form: $H_{a_0}=cz\ \exp\ (-z^2/z_0^2)\ \exp\ (-R^2/R_1^2)\ [1-\exp\ (-R^2/R_2^2)]\ [1+a^2\cos^2\ (\varphi-\varphi(R))]$ with $a=2$, $c=5\times10^{-5}$ gauss kpc^{-1}, $R_1=10$ kpc, $R_2=2$ kpc, $z_0=0\cdot175$ kpc. As an illustration, lines $H_{a_0}=$ const. are shown in Fig. 2. H_{z_0} is obtained from H_{a_0} with the help of div $\mathbf{H}=0$ and appropriate boundary conditions.

Cut-off rigidities $\rho_s(\mathbf{\Omega})$ are presented in the form of cut-off energies for extragalactic protons in Fig. 3, where $s=100$ kpc and $r=20$ kpc. One may consider two conclusions: (a) min. $E_{100}(\mathbf{\Omega})=2\times10^{16}$ eV and max. $E_{100}(\mathbf{\Omega})=6\times10^{17}$ eV, as found from this diagram, are not far from the empirical values mentioned before. The approximation made by neglecting the fluctuations $\mathbf{H}'$ of the field is not expected to have a great influence on this result. Of course, there is a further approximation because of the calculation of $E_{100}(\mathbf{\Omega})$ instead of $E_{\infty}(\mathbf{\Omega})$, the latter values being somewhat lower than the former. Furthermore, there are still the uncertainties connected with the empirical values; (b) a notion of the structure of the Stoermer cones for extragalactic protons may be obtained from this diagram. The angular distribution of extragalactic particles is expected to be much more sensitive to irregularities of the field occurring in the vicinity of the Earth than the limits of magnetic rigidity, however. The fluctuations of the field will cause a smearing of the angular distribution of galactic as well as extragalactic particles. We feel therefore that the calculated result is consistent with the fact that so far no anisotropy of the total cosmic particle radiation has been found in this energy region.

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Correlation between Solar Activity and the Brightness of Jupiter's Great Red Spot

IT may be interesting to note in connexion with the letter of Graf, Smith and McDevitt[1] discussing the correlation of solar activity and brightness of Jupiter's great red spot that the brightness of the Jovian spot seems to have two maxima for each single maximum of the Zurich sunspot number. It has been pointed out, particularly by Gnevyshev[2], that a number of aspects of the solar cycle behave in a similar manner. Perhaps the most striking of these is the incidence of proton flares (see especially Fig. 6 of Gnevyshev[2]) which clearly has two maxima per solar cycle with one maximum preceding the sunspot maximum by a slight amount and the other occurring during the declining phase of solar activity. Because the proton flares are known to have very important terrestrial effects, and because proton flares have the same double maxima behaviour as does the visibility of the Jovian red spot, it seems reasonable to suggest that perhaps the emission of solar particles may be a more relevant aspect of solar activity to associate with Jupiter's spot than the ultraviolet radiation suggested by Graf *et al.*[1].

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Venus Map: a Detailed Look at the Feature β

RADAR studies of Venus have shown the existence of relatively permanent topographic prominences on its surface. These features rotate with the planet and return to radar view year after year. Because of the peculiar rotation period of Venus, the same features return very nearly to the same apparent position at the time of closest approach. The feature known as β is the "brightest" and hence most favourable to observe at these times. Several other features are brighter, but are on the other side of the disk and are not presented to view until the radar range is much larger.

β and the other features were first located by a technique which is sensitive to only one dimension, the technique of radar Doppler shift[1-3]. It has been established that their reflectivity at 12·5 cm is significantly stronger than that of the average regions of Venus. They also have the ability to depolarize microwaves, that is, if right circularly polarized waves are beamed toward Venus, the reflexions from the features contain a much larger percentage of right circularly polarized energy than the surrounding areas. This indicates that the features are relatively rough to the scale of a wavelength, 12·5 cm. It is not known whether the features are mountains or craters or fields of boulders or some other such rough formations.

To gain information about the actual size and nature of the region β, we have studied it with the two-dimensional technique using both radar range and Doppler shift[4]. This results in a two-dimensional radar map of the area. It is a unique map except for a north–south ambiguity, that is, there are usually two points, roughly symmetric about the equator, which have the same values of Doppler shift and range. The results of our earlier studies, taken over several conjunctions of Venus, demonstrate that the highly reflecting areas are in the northern hemisphere. The location of the mapped region