

L. S. Marochnik. *Some special aspects of the position of the Solar System in the Galaxy.* It is shown that the Solar System would have originated and would have evolved differently depending on the kind of density

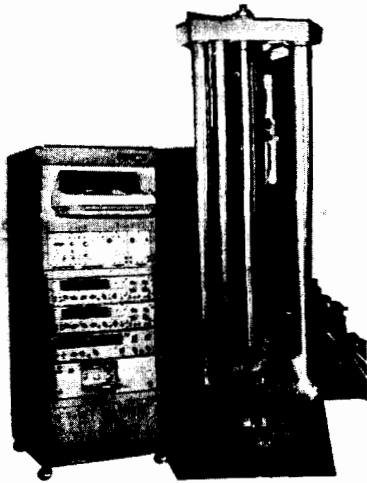


FIG. 1.

waves that were responsible for the spiral structure of the Galaxy. Observations indicate that the spiral struc-

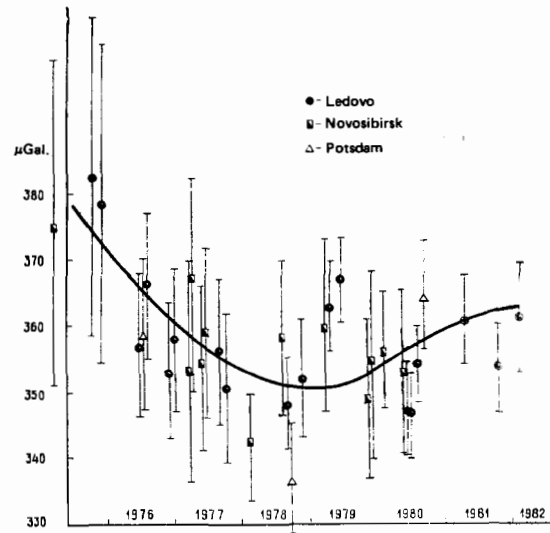


FIG. 2.

ture is most likely due to waves rotating at an angular velocity  $\Omega_p \approx 24$  km/sec-kpc. Here the position of the sun turns out to be exceptional: it is situated near the corotation circle (which is unique in each galaxy), on which the angular velocity of the Galaxy's differential rotation is equal to the angular velocity of the wave. On the Galactic scale, the sun is very close to corotation—the deviation from it is small, of the order of magnitude of  $\Delta R/r \approx 0.3$  (where  $\Delta R = R_c - R_\odot$ , and  $R_\odot$  and  $R_c$  are the distances of the sun and the corotation from the Galactic center).

It is shown that this specific position of the sun makes it possible to relate the three fundamental time scales of cosmogony,  $T_1 \approx 4.6 \cdot 10^9$  yr,  $T_2 \approx 10^8$  yr, and  $T_3 \approx 10^6$  yr (as established from the radioactivities of various nuclides) to the passage of the presolar cloud across the spiral arms. The scale  $I_1$  (the "lifetime" of the Solar

System) is the lifetime of the protosolar cloud in the space between the Galactic spiral arms; the scale  $T_2$  is the lifetime of the presolar cloud within the spiral arm, and the scale  $T_3$  is the characteristic time of the hydrodynamic processes of interaction of the cloud with the wave. The possibility of unforced explanation of the time scales of cosmogony on the basis of a single process, assuming that the sun is near corotation, may be an argument in favor of the proposition that proximity to corotation is necessary for formation of systems similar to the Solar System. If the specific location of the sun in the Galaxy is indeed no accident, but a necessary and (or) sufficient condition for formation of systems of the Solar System type (with the corresponding disposition of the planets, angular momentum, existence of life, etc.), the corotation circles of our Galaxy and other galaxies are the places near which it is worth while to look for beings like ourselves.