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DO WE LIVE IN A SPIRAL NEBULA?[1]

IN May, 1925, my colleague, Dr. Joseph H. Moore, and I determined anew the elements of the motion of the solar system, upon the basis of the radial velocities of 2,034 stars, as observed at the Lick Observatory and at the Chile Station of the Lick Observatory. The apparent solar motion was found to be toward a point in the heavens having right ascensions 268°.9 and declination +27°.2, with speed 19.0 km per second. These results are in good agreement with those obtained by me from 1,193 observed radial velocities, in 1911, as follows: right ascension 268°.5, declination + 25°.1, and speed 19.5 km per second.

The direction in which we found the solar system to be moving makes an angle of 22° with the plane of the Milky Way. Moving with a speed of 19 km per second, the solar system travels 600,000,000 km per year, or four times the mean distance of the earth from the sun. We are doubtless showing high respect for the values of understatement when we say that our sun is at least many hundreds of millions of years in age. Clearly our solar system in its early youth did not have its present position in the stellar system, and its old age will find it in still other surroundings. We can not speak with confidence concerning the path upon which we are traveling, whether it is a great closed curve—an elongated ellipse, for example—which will suggest our return a few hundred millions of years hence to our present point of observation, or whether it is a path so curved that it does not return unto itself. If the stars were distributed in a system having spherical symmetry the center of the system should be the effective center of gravitational attraction and, neglecting minor perturbations, our sun should describe an ellipse about that center. But we know that our stellar system is not spherical either as to form, or as to the grouping of its component stars, and therefore the path followed by our sun probably differs somewhat from an ellipse. It is of interest to note that if our stellar system were spherical in form and the stellar materials were uniformly distributed through it, the revolutionary periods of the individual stars would all be equal, no matter what their distances from the center, no matter what their observed speeds at any instant, might be. A knowledge of the density of distribution of the star materials would at once tell us the com-

[1] Address of the retiring president of the American Astronomical Society, read at Rochester, New York, January 2, 1926.