

THE GALACTIC CONSTANTS--AN INTERIM REPORT

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At the IAU General Assembly in Patras in August 1982, Commission 33 set up a Working Group on the Galactic Constants. The Working Group is charged with developing a critical review of the values of the main galactic constants, for publication before the General Assembly in 1985. It has not been specifically charged to come up with a proposal for a revised set of values, although it can do so if it wishes.

The members of the Working Group are W. B. Burton, J. Einasto, M. W. Feast, F. J. Kerr (Chairman), D. Lynden-Bell (Vice Chairman), M. Mayor, M. Schmidt, R. Wielen. In addition, a number of consultants have been invited to join in the activity; these are L. Blitz, S. V. M. Clube, K. C. Freeman, G. R. Knapp, C. A. Murray, J. P. Ostriker, B. J. Robinson, V. C. Rubin, and A. R. Sandage.

A meeting of the Working Group was held in Groningen on May 29, the day before Symposium 106 began. This was attended by 7 members of the Group, 4 consultants, and 3 visitors. The purposes of the meeting were to review the present status of the various galactic constants, and to plan the development of the Working Group's report.

After a consideration of recent work on R_0 , the Sun-center distance, it was clear that its value is probably lower than the presently accepted 10 kpc, but there is not yet a consensus of what it should be. Similarly, the circular velocity at the Sun, V_c , is probably lower than 250 km s^{-1} , but a value of 250 is still considered tenable by some. The Oort constants A and B are approaching agreed values, and two recent determinations approximate to $A = -B$, as is required for a flat rotation curve. Any system to be recommended should also follow the relation $V_c = (A - B) R_0$.

We also considered recent solar-motion solutions, and some local kinematical problems. The motions of young and older stars are clearly different, indicating that they are not in well-mixed orbits, a fact that affects any large-scale interpretation. Another major difficulty, especially in the study of galactic rotation, is that the Galaxy is

asymmetrical in the outer parts, but it is not clear whether the asymmetry is structural or kinematical.

Some time was spent on discussing the purpose of any defined system of constants, and who will use the system. The current system was set up as a useful standardizing tool, for the presentation of data and for dynamical calculations. Any system can be expected to be most useful in the area of "applied kinematics," for facilitating comparisons, rather than for fundamental studies.

After hearing summaries of the present scientific evidence, and discussing the purposes of a standardized system, the May 29 meeting considered three possible options: (i) we know enough now to recommend a new system; (ii) we know enough now to recommend an alternative system for people to use in parallel with the present system, (iii) we cannot make a recommendation yet--we must collect more information, and reconsider the question in 1985. The meeting preferred option (iii).

The Working Group will now concentrate on preparing a report (of about 10 pages), in time for circulation to Commission 33 members, and perhaps publication, before the next General Assembly. The report will be developed by F. J. Kerr and D. Lynden-Bell, with the aid of contributions from other members. The next meeting of the Working Group will be in New Delhi in November 1985, probably just before the General Assembly.

One of the main reasons for setting up the Working Group was to encourage new work on any aspect of the galactic-constants problem. We therefore issue an appeal for information on recent work that we do not yet know about, on plans for future work in this field, and on new results as they come along.

DISCUSSION

G. Lyngå: Sometimes one needs the distance from the Sun to the plane of symmetry of the disk. While you are collecting information, would you mind including this item and making a recommendation?

Kerr: So far we had not thought of that, but indeed that is a good quantity to add on. Thank you. Incidentally, an observational system of galactic coordinates has to go through the Sun, by definition. It is convenient in fact that the Sun is close enough to the mean plane, or it was 25 years ago, that this z distance could be neglected.

J.P. Ostriker: On making A , B , R_0 and V_c consistent, I think we want to preserve the virtues of arithmetic to better than the least-squares sense.

Kerr: That sounds like a wise remark.



(Above) Kerr pondering, and (below) Lynden-Bell chatting with Oort and Van der Laan, during the excursion. LZ





Chini giving his paper

CFD