

COMMISSION 26: DOUBLE STARS (ETOILES DOUBLES)

Report of Meetings, 25 and 27 August 1976

PRESIDENT: S. L. Lippincott

SECRETARY: O. G. Franz

First Session

President Lippincott called for a moment of silence to honor the memory of Commission members and double star researchers lost by death since the 1973 meeting: G. van Biesbroeck, W. H. van den Bos, J. Hopmann, H. M. Jeffers, R. Jonckheere, G. F. G. Knipe, C. P. Olivier, and F. Zagar.

I. ADMINISTRATIVE MATTERS

At the recommendation of the President, the Commission endorsed as new members: H. Abt, E. H. Geyer, J. L. Hershey, K. D. Rakos, and A. Poveda. Deleted from membership were S. S. Kumar, R. E. Nather, and U. Güntzel-Lingner, because of inactivity in double star research. The Commission endorsed A. Batten, M. Fracastoro, R. S. Harrington, S. L. Lippincott, and C. E. Worley for the Organizing Committee, P. Muller for President, and O. G. Franz for Vice President.

The President invited discussion on a definition of the Commission's scientific objectives: "The Commission on Double Stars has for its objectives the organization and promotion of all research pertaining to stellar systems for which two or more components are astrometrically observable."

After Worley, Dunham, and Batten commented on the difficulty of finding a precise definition and on the need to exercise judgment on what is of interest and importance, the Commission adopted the proposed statement of scientific objectives.

Concerning proposed working rules, Worley questioned the outgoing president automatically becoming a member of the Organizing Committee. Batten and Fredrick defended such a procedure as common practice to provide continuity.

The Commission then adopted, by a vote of 7:0 with three abstentions, the following three of six articles of the "Proposed internal rules and regulations for the appointment of officers and Organizing Committee members of Commission 26, IAU":

The Board (President and Vice President and O.C.) comprises one member per six or fraction thereof members of the commission (ex.: 7 for 38). The appointment of a member normally covers two General Assemblies (two terms) of the Union. The Board is changed at each General Assembly according to the following rules:

- 1) The outgoing president shall be an ex-officio member of the O.C. in excess of the number defined above, for one term.
- 2) The vice president normally becomes president.
- 3) Among those to be replaced are: a) those who have completed the second term; b) those who wish to retire after one term; c) those who leave the commission or die during a term.

No action was taken on articles 4-6 dealing specifically with the designation

of Organizing Committee members and Candidates for vice president, pending further review by and proposals from Commission members.

II. INDEX CATALOG AND CATALOG OF OBSERVATIONS

Worley reviewed the status of the catalogs. At present the Index Catalog contains 70,295 entries, an increase of 6,058 since 1963; this gain does not yet include new lists by Couteau and Luyten. The Observation Catalog, at 1976.5, contained 301,995 entries, a growth of 93,123 since the catalog's transfer to the U. S. Naval Observatory. Among these new entries are 46,085 pre-1927 northern-hemisphere observations not previously contained in the catalog. Their inclusion is a project undertaken: 1. to make these measures available to astronomers not having access to the original publications; 2. to preserve the data, since few copies of the original publications exist and some are deteriorating, posing the danger that valuable data may be lost. An estimated 30,000 old observations remain to be processed, for an ultimate total of 76,000.

The use of the catalogs is expanding rapidly, from about 15 to a current 45 to 50 requests per year.

Access to documentation is a problem. When data were transmitted from E. Doolittle to the Lick Observatory, the original cards with handwritten entries were passed along. However, when responsibility for the catalogs was transferred to the U. S. Naval Observatory, these documents remained at the Lick Observatory and are not readily available for cross-checking, verifications, identification checks, elimination of duplications, etc.

Addressing this problem, the following resolution was unanimously adopted: "Commission 26 on Double Stars, recognizing the value and importance of documental material now located at the Lick Observatory and pertaining to the Double Star Index and Observation Catalogs, urges that these documents be provided or made readily accessible, in originals or copies, to U. S. Naval Observatory personnel responsible for the maintenance of these Catalogs."

III. TERMINOLOGY CONCERNING DYNAMICAL PARALLAXES

Dommanget reviewed the history of dynamical parallaxes. He proposed that the terms "orbital" and "non-orbital" dynamical parallaxes be used to distinguish a parallax based on known orbital elements from one computed on the basis of observed motion insufficient to define an orbit, to alert the user to the difference in accuracy of these two types of dynamical parallaxes (Dommanget, J. 1976, Ciel et Terre 92, No. 2).

Worley and Franz questioned the need to consider dynamical parallaxes, since they provide no independent information. At best they can serve to resolve ambiguities and to provide a check on the consistency of dynamical and physical characteristics of binaries, e.g., whether a given pair is or cannot be composed of main-sequence stars.

IV. LUNAR OCCULTATION OBSERVATIONS

D. S. Evans discussed the detection and measurement of close double stars from observation of the occultation of stars by the moon, warning particularly against over-interpretation of the recorded diffraction patterns. Illustrating the capabilities of the technique, he described observations with four telescopes at the University of Texas of the occultation of β Sco on 8 July 1976, which led to the positive identification of five component stars. Combination of these results with observations at other sites could yield true angular separations and position angles. While occultations thus provide distinct possibilities for the discovery and study of close pairs, one should not expect results on specific (spectroscopic) binaries. Dunham remarked that the July 1976 and September 1975 occultations of β Sco were indeed observed at other sites. He also called

attention to his list of double stars in the zodiacal zone, particularly of new discoveries. Dunham and G. Taylor hope to expand their predictions of the occultations of stars by minor planets; observations of such events should increase the accuracy and number of stellar-diameter determinations, yield diameters of asteroids, and lead to the discovery of more double stars.

V. CIRCULAIRE D'INFORMATION - P. MULLER

La Circulaire d'Information a pour origine une idée venue en même temps et indépendamment au Prof. W. Rabe et à moi-même; on trouvera dans la première le texte intégral de la proposition de W. Rabe dont l'essentiel concordait avec mon projet. La Circulaire a été diffusée à partir de 1954, et la Commission a pris à Dublin (1955) une résolution qui approuvait la formule adoptée et me confiait la charge de l'éditer jusqu'à nouvel ordre.

La liste d'envoi comprend d'abord les membres de la Commission; en outre, j'ai retenu un certain nombre d'astronomes non membres et d'établissements divers en raison de leur intérêt pour les étoiles doubles. Quelques omissions ont pu persister un certain temps avant d'être réparées et je prie les intéressés de m'excuser ici pour ces anomalies. Le Secrétariat de l'U.A.I. recevait 11 exemplaires, mais se contentera de 2 à partir de cette année. Au cours des années, j'ai reçu de nombreuses demandes soit d'astronomes, soit d'institutions qui désiraient ce service et je les ai ajoutés sur ma liste, sauf dans quelques cas où le demandeur se trompait évidemment sur la nature de la publication. La liste d'envoi compte actuellement (juillet 1976), 75 adresses, et la Circulaire paraît à dates fixes (mars, juillet et novembre), avec parfois un numéro bis pour des compléments.

Je tiens à souligner, comme je l'ai fait déjà en 1970 à Brighton, que la Circulaire est à mes yeux en document provisoire, où l'on trouve des données fournies avant publication, avec toutes les possibilités d'erreurs matérielles (liées surtout à la rapidité de la composition) et même de corrections d'auteur ultérieures que cela comporte; il convient donc de s'imposer la vérification de ces données lors de leur publication définitive qui doit toujours suivre. Je précise par ailleurs que la Circulaire a toujours été composée et diffusée par les soins de mon personnel et des services généraux de mon établissement.

A la Circulaire de mars dernier était joint un bref questionnaire destiné à recueillir les suggestions des usagers et à contrôler les adresses. Je remercie tous ceux qui ont répondu soit par cette voie, soit personnellement comme je le leur proposais également. Dans l'ensemble, la formule et le contenu paraissent approuvés, et le désir général est de voir la Circulaire continuer telle qu'elle est. Une seule suggestion précise m'a été faite (Belgrade), celle de publier des références bibliographiques notamment de séries d'observations. Il me semble, après réflexion, que dans l'esprit de la Circulaire la référence normale et certainement utile serait l'annonce de publications prochaines. J'invite donc les observateurs à bien vouloir, s'ils l'acceptent, m'informer au moment de la remise de leur manuscrit ou de la correction des épreuves, avec les indications utiles: instrument, époque et nombre des mesures, journal ou revue et date probable de la parution.

En bref, comme la Circulaire est d'abord l'oeuvre de ceux qui m'en fournissent la matière, bien plus que la mienne, je les remercie tous pour en avoir assuré le succès et j'espère pouvoir compter encore sur eux dans l'avenir.

Second Session

VI. THE STATE OF DOUBLE STAR ASTRONOMY IN SOUTH AFRICA - J. HERS

At the Lamont-Hussey Observatory, all double star observations ceased with the departure of F. Holden. The 27-inch refractor was later dismantled, and the objective shipped back to the U.S.A. Today only the dome remains.

The Republic Observatory's 26 $\frac{1}{2}$ -inch refractor remained in intermittent use for planetary photography until 1973; but in the absence of suitable observers, the double star program was never resumed and no observations have been made since 1971. In official quarters a very low priority was assigned to double stars, and no definite decision appears to have been taken on the ultimate future of the telescope. However, the likelihood of the telescope's being moved to another site appears very small. To house the 10-meter tube, a very large, expensive dome would be needed, and funds would be far better employed keeping the instrument in operation at the present site rather than to develop a new site. While it is true that the present site is now entirely surrounded by the city, this has relatively little effect on an instrument of such long focal length. The recent promulgation of smokeless zones has actually tended to improve conditions. As far as seeing associated with atmospheric turbulence is concerned, comparisons of recent observing reports with those of the 1920's show no noticeable change. An excellent instrument remains therefore available, waiting to be used. It was recently suggested that local amateurs might use it to observe visual double stars, but no one has yet come forward, and it seems unlikely that anything will happen. On the other hand, it is probable that facilities would not be refused to observers from elsewhere, as long as this did not involve extra expenditure. It would be of the greatest value to southern double star astronomy if the 26 $\frac{1}{2}$ -inch refractor could be put back into regular use as soon as possible.

VII. BRIEF SCIENTIFIC COMMUNICATIONS

a) Rakos reviewed the program of area scanner observations of visual double stars on the UBV and the Strömngren systems now in progress in Vienna. Several thousand observations of the combined light, magnitude differences, and relative positions of the components of about 250 pairs with separations of less than 1 arcsec to about 7 arcsec have been obtained in Vienna, Chile and Hawaii. Final data reduction is being completed.

b) Strand reported on new mass determinations for white dwarfs. Analysis of the orbital motion of Stein 2051 = G175-34 shows the red-dwarf component to have a 20-year perturbation. Of the two possible orbital solutions, the less plausible one indicates the presence of a "dark" companion of 0.02 solar masses. The computed masses of the visible red-dwarf and white dwarf components would be 0.22 and 0.48 solar masses, respectively. The second solution assumes the red-dwarf to be a close binary of $\rho \sim 0.7$ arcsec and $\Delta m = 0.5$ mag and yields 0.18 and 0.16 solar masses for the red-dwarf and its close companion, respectively. The mass of the white-dwarf component becomes 0.68 solar masses.

Also studied was the system G107-69, 70, whose fainter component was found to be a close binary. Some photographs obtained at the U. S. Naval Observatory showed the binary image sufficiently elongated to permit measures of the relative positions of its components, yielding a provisional orbit of $P = 16.6$ years and $a = 0.67$ arcsec. Photometry and spectrophotometry indicate both components to be nearly identical, late degenerate stars of 0.9 solar masses each, based on $\tau = 0.085$ arcsec. These investigations raised from three to six the number of known white-dwarf masses.

c) Franz reported on his discovery of the variability of the carbon-star component of ADS 14338. The observed, seemingly irregular brightness changes of at least 1.5 mag in B and V can be represented by a combination of two regular variations with periods of 87 and 364 days, suggesting that the carbon star is probably an unresolved binary with two variable components.