

## 30. COMMISSION DES VITESSES RADIALES STELLAIRES

### 30a. SOUS-COMMISSION DES VITESSES RADIALES FONDAMENTALES

#### Report of joint Meeting, 17 August 1961

PRESIDENT 30: Ch. Fehrenbach.

PRESIDENT 30a: J. F. Heard.

SECRETARY: D. S. Evans.

Agenda: Commission 30.

1. Composition of Commission 30
2. Organizing Committee
3. Joint Discussions
4. Re-issue of the Mount Wilson Catalogue
5. Discussion of *Draft Report*
6. Correspondence
7. Remarks by Dr. Martynov

Discussion opened by Dr Evans and Professor Heard.

1. A list of names of additional members was read out by the President, Professor Ch. Fehrenbach.

2. The composition of the Organizing Committee, as follows:  
President: Ch. Fehrenbach; Vice-President: R. M. Petrie; Secretary: D. S. Evans; Members: F. K. Edmondson, J. F. Heard and A. D. Thackeray, was agreed to by the Commission.

3. A joint discussion on 'Stellar Motions and Stellar Dynamics' was announced for Friday 18 August at 14<sup>h</sup> 00<sup>m</sup>.

4. It was noted that the Mount Wilson *General Catalogue of Radial Velocities* was out of print and stated that a reprint could be made by the Carnegie Institution if this was desirable. During the discussion it was noted that Tonantzintla has the data in the form of IBM punched cards and that there is also a card catalogue at La Plata. It was agreed that notes of errors in the Mount Wilson Catalogue and bibliographic notes of work published since its appearance should be sent to the Secretary of the Commission. These could be published on a few additional sheets to be distributed with the new prints of the catalogue so as to avoid the expense entailed in any attempt to revise the general Catalogue. An attempt would be made to distribute these sheets to all holders of copies of the first printing of the Catalogue.

5. Presenting the *Draft Report* the President remarked that there were 15 Observatories engaged in radial velocity work of which 6 or 7 undertook work of this class as a major proportion of their scientific efforts. This excluded the Observatories mainly engaged in extra-galactic velocity work. At Haute Provence a new 40-cm objective prism had been produced in place of one for which the glass was not of the highest quality. This gave velocities over the field with probable errors of 5–8 km/s down to limiting magnitude about 12, with an exposure of 2<sup>h</sup> 40<sup>m</sup>. Longer exposure times gave good access to stars in the Magellanic Clouds, and the new prism had been sent to the station erected under ESO auspices at Zeekoegat about 50 miles south of Beaufort West in South Africa. Results were now coming forward, and particular

acknowledgment should be made of the value of the work of Thackeray and his associates in providing velocity calibrations in this area.

Other important projects now in prospect included the objective prism at Abastumani Observatory by Dr Kharadze and the suggestion for the use of an objective grating by Dr Dewhirst.

At many places projection methods were now being used for the measurement of spectra, and automatic methods were being developed. One development is the registration by cathode ray tube which was especially useful for early-type stars with broad lines and for very late-type spectra of great complexity (Dr Gollnow and Dr Bouigue).

6. A letter was read from Dr van Herk, who reported a project with Dr Oort on RR Lyrae stars and sent a list of 94 such stars in both hemispheres of which 59 were brighter than magnitude 12.5. A discussion ensued in which the difficulties of the work were pointed out. The objective prism is not the correct instrument to use for individual stars. Prestor's spectra of RR Lyrae stars on a dispersion of  $80 \text{ \AA/mm}$  might be useful for radial-velocity studies. Blaauw remarked that a high accuracy for the velocities was not essential but that the cycles must be followed through and single plates were insufficient. Evans remarked that, as in Kinman's work on 22 southern RR Lyrae stars, it was desirable to have photometric observations concurrent with the radial velocity work.

7. Dr Martynov reported the publication of Volume I (0<sup>h</sup> to 6<sup>h</sup>) of a bibliography of Spectroscopic Binary Stars and distributed copies. This work, undertaken mainly at the Engelhardt (Kazan) Observatory was by Korytnikov, Lavrov and Martynov and would be designated as the KLM Catalogue. The first volume contains 592 stars. Volume II was in press, and Volumes III and IV are in type and will probably be out within 12 months.

About 2 000 pairs would be included covering work published up to 1 January 1960. The President congratulated Dr Martynov on this work and thanked him for distributing copies.

The President asked Dr Petrie to report on a colloquium on radial velocities of visual binaries. Dr Petrie said there would be a full report in *P.A.S.P.* There were many visual binaries which could be observed successfully. The lower limit of separation depended on the observatory and was usually about 2 to 3". There were questions of the velocity range. Radial velocity observations could often provide useful pieces of information such as establishing the true physical connection in some cases as well as the provision of calibrations of wavelengths and absolute magnitudes.

#### Sub-Commission 30a

Professor Heard then took the chair for what he described as the last meeting of Sub-Commission 30a as such. This would now become a Committee of Commission 30.

The *Draft Report* contained some comments by Evans on the accuracy of radial-velocity measures. Evans then spoke as follows:

"Radial Velocities are published with formal probable errors of a few tenths of a kilometre per second but the real accuracy is nowhere as good as this. Increased accuracy is needed for the identification of moving groups and the useful investigation of orbital motions in visual binaries. Investigation of Cape measures of standard stars by Wayman showed that the real errors could be found by postulating an additional random error equivalent to half a micron on the plate at all dispersions. Effects such as this would render nugatory attempts to improve accuracy by measuring more lines. Kinman's studies of the effects of atmospheric dispersion showed that this could be dangerous at low dispersions with wide slits and high zenith distance.

There was some evidence of this in southern stars observed at low altitudes from the North. The Cape controlled results by observing standard stars, one or more of which was observed every night and having all measurers measure all these spectra. Adopting, effectively, Mount Wilson Catalogue values for the velocities of these stars, the results were used to correct programme stars to the Mount Wilson Catalogue system. Over a period of ten years the corrections for two measurers had the following average values:

Measurers	Mean Systematic corrections	
	Dispersion 29 Å/mm	Dispersion 49 Å/mm
Evans	+ 0.3 ± 0.2	- 1.5 ± 0.2
Menzies	+ 0.6 ± 0.2	- 1.0 ± 0.3

“It was thought that the personal differences were just significant and that the differences between dispersions were definitely significant. The wave-length standards were those produced by Victoria. Petrie had not claimed universal validity for his system of standards and it was interesting, but unexplained, why these differences with dispersion should have appeared in transferring them to another spectroscope.

“About 700 programme velocities, mainly of late-type stars thought to be non-variable, had now been produced by the Cape (using Radcliffe equipment) of which 122 appeared in the Mount Wilson Catalogue. These provided a wider basis for comparison. Dividing them according to quality and type, the following table results in the sense MWC — Cape.

Quality	A Stars	Solar Stars
<i>a</i>	- 1.2 ( 4)	- 0.2 ± 0.2 (39)
<i>b</i>	- 0.7 ± 0.9 (13)	- 0.3 ± 0.3 (32)
<i>c</i>	- 0.3 ( 2)	- 1.3 ± 1.0 (18)
<i>d</i>	+ 0.7 ( 4)	+ 3.3 ± 2.2 ( 5)
Weighted mean	- 1.0 ± 0.9 (23)	- 0.2 ± 0.2 (94)

“Bracketed figures show the total numbers of stars involved. There is no tendency for lower quality stars to drift off in one direction, as was thought to be the case at one time. The difference between the A stars and the solar stars might just be significant.

“Segregation of the 71 solar-type stars of *a* and *b* quality into groups according to luminosity class produced the following results:

Class	I	III III - IV	IV IV - V	V
No. of stars	3	19	14	35
Mean, MWC—Cape	+ 0.6 ± 0.2	0.0 ± 0.2	+ 0.3 ± 0.4	- 0.7 ± 0.3

“The difference of measured velocity with luminosity class is known as the Feast effect, first identified by him in a much more pronounced form in a galactic cluster. There seems to be a small but definite effect as between dwarfs and brighter stars for these solar-type field stars near the Sun. Finally segregating these stars into dwarfs and others, a plot of residual against declination shows an apparent reduction with increasing declination. This is unlikely to be real and suggests rather the commission of similar errors.”

A co-operative programme of observation of IAU standards from north and south was suggested and Drs Petrie and Heard supported the proposal.

Dr Heard reported measures of standard velocity stars made at the David Dunlap Observatory on 33 and 66 Å/mm, the latter being split into two groups before and after 1960. The mean errors of single observations are distributed normally, but systematic corrections are necessary to bring them to the IAU standards. If we switch to Petrie's wave-lengths on the higher dispersion we find a mean correction of opposite sign. In our case there seems to be a run of the corrections with spectral type, and some signs of a run with hour angle; we have not particularly noted a run with declination.

Jones reported a similar Feast effect at Herstmonceux for Mount Wilson coude plates of the Hyades; and Edmonson reported a phenomenon of a zero correction alternating between two values. Gollnow said there were no such errors at Mount Stromlo, but the seeing was often poor. A general exchange of experiences by speakers including Deutsch, McLaughlin Thackeray, and Gollnow followed.