

## 35. COMMISSION DE LA CONSTITUTION INTERNE DES ETOILES

### Reports of Meetings, 23 and 26 August 1967

PRESIDENT: P. Ledoux.

VICE-PRESIDENT: C. Hayashi.

SECRETARIES: A. Masevič, M.H. Wrubel.

#### A. Administration Matters

Four meetings were held, part of the first meeting being devoted to administrative matters.

- a. The Draft Report was approved enthusiastically.
- b. The members indicated that they would be unhappy if the formation of a new commission on Cosmology and General Relativity would affect the discussion of stellar models based upon general relativity within Commission 35.
- c. The Commission expressed its regret that Professor Hayashi, Vice President of the Commission, could not attend the meeting because of health.

#### B. Scientific Sessions

##### 1. FIRST SCIENTIFIC SESSION

*Demarque* discussed the determination of ages of globular clusters by using the 'knee' of the curve which does not depend upon the uncertainties of convection theory. He also noted that one needs a large value of  $Z$  to produce the observed gap in NGC188. *Masevič* showed how different initial chemical compositions affect the evolution of stars of from four to thirty solar masses. *Kippenhahn* emphasized the uncertainties in the treatment of semi-convection. *Faulkner* noted that to get agreement with the horizontal branches of globular clusters one must use small masses. *Baker* discussed the determination of the parameters of RR Lyrae stars from their periods, colors, and the mass-luminosity relation.

##### 2. SECOND SCIENTIFIC SESSION

*Schwarzschild* commented on the production of neutrons when hydrogen is brought into the carbon-rich convection zone during the pulses caused by thermal instability. *Weigert* described thermal pulses during the evolution of a close binary.

*J. Cox* described non-linear computations of radial oscillations of models studied previously in linearized form by Baker and Kippenhahn.

*Christy* interpreted the observed progression of features in the velocity curves of Cepheids with periods of seven to fifteen days, in terms of a compressional wave that moves inward, is reflected, and returns to the surface where it is observed. *A. N. Cox* compared small amplitude oscillations in non-linear computations with the results of linear theory.

##### 3. THIRD SCIENTIFIC SESSION

*Roxburgh* described calculations for stars in uniform rapid rotation. *Hardorp* noted that calculations of line profiles based upon improved models give equatorial velocities for a given half-width that differ from previous results and therefore that quoted values of  $v \sin i$  are uncertain for rapidly rotating stars. *Ostriker* gave the results of calculations for differentially rotating white dwarfs.

*Fricke* discussed the secular stability of rotation.

## 4. FOURTH SCIENTIFIC SESSION

*Mestel* discussed the general interaction between magnetic fields and internal circulations and noted that large-scale circulation can prevent interior magnetic fields from leaking to the surface. *Skumanich* described non-radial oscillations of rotating polytropes. *Bisnovsky-Kogan* described mass loss under the action of high opacity in a stellar atmosphere. *Wrubel* gave a report of an informal conference held in October 1966 on the evolution of stars of low mass. *Paczinski* discussed the dynamical stability of stellar envelopes near the limiting Hayashi track. *Cameron* described a model of an X-ray source based upon accretion.

## 5.

An additional informal session was devoted to the problem of semi-convection in massive stars.

## 6. ADDITION TO THE DRAFT REPORT, SECTION III

It is now possible to report on the work of Carson *et al.* on new opacity calculations. Two separate and independent attacks—one using the Thomas-Fermi statistical model of the atom and numerically computed wave-functions (1), the other retaining the general approach of Mayer subjected to a critical analysis (2)—lead to the same conclusion namely that while there is broad agreement, at the upper end of the temperature-pressure scale, with previous calculations, the latter are consistently low at the lower end (by a factor of about 3 for  $T \simeq 10^6$ °K).

*References*

1. Carson, T. R., Mayers, D. F., Stibbs, D. W. N. 1967, *The Calculation of Stellar Radiative Opacity* (in press).
2. Carson, T. R., and Hollingsworth, H. M. *A critique of the Hydrogenic Approximation* (in press).