

36. COMMISSION DE LA THEORIE DES ATMOSPHERES STELLAIRES

Report of Meetings

PRESIDENT: K. H. Böhm.

SECRETARY: E. Böhm-Vitense.

Business Meeting, 23 August 1967

The Draft Report was unanimously accepted. The members of the Commission were informed that the Organizing Committee had agreed to hold one business and only one scientific session, in which Dr. Nagirner (Leningrad University) should present a summary of recent work on the theory of line formation done in the USSR. The commission members agreed to this proposal.

The suggestions for a new president and a new vice-president were announced by the president. The following astronomers were elected by the commission as members of the new organizing committee: K. H. Böhm, J. T. Jefferies, V. V. Sobolev, R. N. Thomas, S. Ueno.

K. H. Böhm suggested to have a general discussion about plans for further colloquia to be organized by Commission 36 and about the next Harvard-Smithsonian Conference. *O. Gingerich* announced the plans for the next Harvard-Smithsonian Conference on stellar atmospheres which will be held in Cambridge (Massachusetts) in April 1968. The duration of the meeting will be three days. The suggested topic is: Theory and observation of normal stellar atmospheres. *O. Gingerich* and *C. A. Whitney* explained that the Harvard-Smithsonian group was especially interested in a discussion of the relation between spectral classification and the predictions from theoretical model atmospheres. *Gingerich* suggested to prepare a grid of model atmospheres in advance. There followed a discussion between *Underhill*, *Thomas*, *Gingerich*, and *Whitney* about the possible definition of normal stars. *Miss Underhill* suggested to exclude explicitly the discussion of atmospheres of intrinsic variable stars from this conference. On the other hand it was agreed to include supergiant atmospheres. *Thomas* stated that one of the aims of this meeting should be a clear definition of normal stellar atmospheres. The commission members agreed in principle to the proposed topic for the next Harvard-Smithsonian Conference.

Underhill and *Böhm* suggested to have the next colloquium of Commission 36 in 1969 somewhere in Europe. Tentatively they proposed 'Chromospheres and Coronas' as a possible subject of this meeting. *Mrs Böhm-Vitense* and *Miss Underhill* suggested to treat not only the usual radiative transfer and spectroscopic problems but to include also the fundamental hydrodynamic problems of stellar chromospheres. There followed a detailed discussion about the problem whether early type as well as late type stars should be the subject of this conference. There were strong arguments by some members of the commission to include both types of stars.

Thomas proposed to have no short contributed papers during this meeting but to limit the agenda to detailed summaries and discussion from the floor. *Miss Underhill* suggested to hold the meeting in Utrecht.

Scientific Meeting, 29 August 1967

As a supplement to the communications made at the business meeting the president announced the names of the suggested new members of Commission 36.

Dr D. I. Nagirner gave his review on recent work in 'Resonance Radiation Transfer Theory' done in the USSR.

He paid special attention to the recent work by V. V. Sobolev and his collaborators at the Leningrad University. Especially those problems for which an analytical solution can be found were discussed. The basic physical assumption used in most papers by the Leningrad astrophysicists are as follows:

- (1) The gas consists only of one kind of two-level atoms with no continua.
- (2) There is complete frequency redistribution.
- (3) The frequency dependence of the absorption coefficient as well as the probability of quantum survival are space independent.
- (4) The atmosphere is plane-parallel and either infinite, semi-infinite or finite.

Many of the arising problems for infinite atmospheres can be solved using the generalized H-function originally introduced by V. V. Sobolev. The cases in which the line absorption coefficient has either a Doppler-, Lorentz- or a Voigt-profile has been considered. Special attention has been paid to the asymptotic behavior (for large optical depth) of the solutions. In the case of finite atmospheres the solutions could be expressed in terms of certain types of X - and Y -functions. A comparison of the analytical solutions found by the Leningrad group with the purely numerical solutions by Avrett and Hummer has been carried out and excellent agreement has been found.

In conclusion *Dr Nagirner* emphasized that certain multi-level problems have also been considered by Sobolev. Exact analytical solutions for some non-stationary problems have been found by V.V. Ivanov and Nagirner.

In the following discussion *Dr Nagirner* restated (answering a question by *Dr Houtgast*) that the solutions given are really analytical solutions and that no iteration like in some numerical procedures is required. *Miss Busbridge* emphasized that, though a number of simplifying assumptions go into these computations, the mathematics is really very complex. Answering a question by *Cayrel*, *Nagirner* stated that no analytical solution would be possible if the space-dependence of the absorption coefficient were taken into account. In answer to a question by *Böhm*, *Nagirner* suggested that an analytical solution should be possible if the continuous absorption were taken into account. *Kalkofen* drew attention to the fact that analytical solutions can be found for interlocking problems with a common lower level if the stimulated emission can be neglected.

Y. Sobouti communicated briefly some of his own results on non-coherent scattering in finite atmospheres. He has applied principles of invariance. He was able to consider more general cases of the redistribution function.

Miss Busbridge drew attention to the large number of papers which have been written on analytical solution of non-coherent scattering problems and which had not explicitly been mentioned in this session. *J.T. Jefferies* emphasized the importance of the analytical work, but also drew attention to the fact there is not much hope to treat line transfer problems for more realistic model atmospheres by these methods. He strongly emphasized the importance of the numerical work on line transfer problems which has been done during recent years. He gave a very brief summary of this work.

SESSION MIXTE 12 ET 36

Report of Meeting, 28 August 1967

CHAIRMAN: E. Böhm-Vitense.

A joint session of commissions 12 and 36 was held on the following subject: 'Observations and Theory of the Continuous Spectrum of the Solar Photosphere and Chromosphere Below 4000 Å'.

The program included the presentation and discussion of the following brief papers:

1) *J. Houtgast*: 'A Survey of Observations of the Continuous Spectrum of the Sun between 3000 and 4000 Å'.

2) *O. Gingerich* and *J. Rich*: 'The Far Ultraviolet Spectrum of the Sun and the Identification of the Continuum of the First Excited Level of Si'. (Dr. Gingerich also discussed in some detail the predictions of the ultraviolet spectrum from the 'Bilderberg' model.)

3) *J. Blamont*, *R. Bonnet*: 'Données expérimentales sur la transition photosphère-chromosphère et leur discussion'.

4) *A. Sauval* (presented by *L. Neven*): 'The Solar Ultraviolet Continuum'.

5) *K. Nishi* (presented by *F. Moriyama*) 'The Energy Distribution and Center-to-Limb Variation of the Solar Ultraviolet Continuum'.

6) *O. Namba* and *J. Houtgast*: 'Continuum Location and Total Line Absorption in the Solar Spectrum between 3000 and 4100 Å'.

7) There was also a very brief communication by *H. Neckel*, in which he compared Houtgast's results to those of Labs and Neckel and drew attention to the excellent agreement.