

DISCUSSION

In the discussion of the papers by Prof. Ambartsumian and Dr Ledoux, Dr E. Schatzman expressed himself as being much impressed by the arguments of Ambartsumian concerning the origin of the non-thermal radiation in the stars. He regarded it as very probable that the explanation of this phenomenon in the UV Ceti and T Tauri stars, and in the variable cometary nebulae, lay in the domain of nuclear processes. However, Schatzman wished to propose a different explanation from that of Ambartsumian for this nuclear phenomenon. He stated that it seems possible that hydromagnetic processes would be able to communicate considerable velocities to atoms in the outer layers of certain stars. During this process, nuclear reactions would take place, and Schatzman thanked Mrs Burbidge for having drawn his attention to the resonance reaction $\text{Ne}^{20} + \text{H}^1 \rightarrow \text{Ne}^{21} + e^+$, and to the subsequent formation of neutrons from the reaction $\text{Ne}^{21} + \text{He}^4 \rightarrow \text{Mg}^{24} + n$. These neutrons would lead to the formation of radioactive elements, which are carried out to produce the non-thermal radiation of the variable comet-like nebulae.

Regarding the paper of Dr Ledoux, Schatzman remarked that the value of $E/L_{\text{min.}} \times \tau_{\text{obs.}}$ for the UV Ceti stars, being several orders of magnitude smaller than for the other stars of Table 1, indicates that the flare-star phenomenon is of an entirely different nature from the processes operating in the other variables. It therefore seems necessary, according to Schatzman, to take magnetic phenomena into account in the study of the instability of the outer layers of such stars.

Mrs E. M. Burbidge stated that she does not believe that the production of neutrons by the reaction mentioned by Dr Schatzman, which may occur in stellar interiors, would be important on the stellar surface. The production of neutrons by reactions between protons and light nuclei might occur, but recent work has suggested that it will do so only if excited regions appearing through violent electro-magnetic disturbance on the stellar surface have much higher kinetic temperatures than those needed to explain the brightness variations in flare stars. If such regions on flare stars achieve equivalent temperatures of $50,000^\circ$ or less, as would explain the flaring characteristics, Mrs Burbidge felt that nuclear reactions would be of very small importance.