that there exists some group of neutrons, very strongly absorbed by gold, but transmitted through cadmium. The actual half-value thickness for the selectively absorbed neutrons was measured by replacing the bottom disk of the six by a number of very thin (0·01 mm.) disks. The result was about 0·02 mm., whereas the figure for neutrons not filtered through cadmium is 1–2 mm.

Replacement of the cadmium by boron (both elements are strong absorbers for slow neutrons) diminished, but did not eliminate the effect. In some rough experiments where the gold was replaced by other elements (copper, rhodium and silver) no marked effect was found. Alteration of the thickness of cadmium beneath the gold had little or no influence on the effect. The effect disappeared, and the total activity was very small, when the gold was activated without surrounding the source with paraffin wax.

An experiment was made in which the gold was completely surrounded by cadmium. It was found that, in addition to the activity of the top and bottom plates, there was a considerable activation of the inner plates. Thus the actual number of the strongly absorbed neutrons is only a small fraction of the total number of neutrons transmitted by cadmium; it is only because the activation produced by the selectively absorbed neutrons is concentrated in a very thin layer that it is so readily detected. This indicates that it is only a small velocity range that is so strongly absorbed.

Amaldi and Fermi[1] have recently discovered a similar phenomenon in the case of silver. They found that the initial part of the neutron absorption curve in silver is anomalously steep if silver is used as indicator, and that the initial steep fall becomes relatively more pronounced on filtering the incident neutrons through cadmium. Szilard[2] has found that indium behaves similarly.

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[1] *La Ricerca Scientifica*, Anno VI, **2**, 9–10.
[2] NATURE, **136**, 950 (1935).

Formation of Negative Atomic Ions of Mercury

WITH the mass-spectrograph by means of which we established the formation of diatomic mercury molecules by electron impact[1], we have now made an investigation of negative ions. No trace of a stable negative molecular ion was detected, but negative atomic ions were found in considerable number.

The ions are formed at a point in the electric field close to the filament. The probability of electron attachment as a function of the energy of the electrons attains a maximum between 0 and 5 volts, then falls to almost zero for electron energies above about 5 volts.

In addition to these ions, which have 0–5 volts less energy than they would have if they had originated on the filament, a small number of fast negative ions, having energies up to 10 volts more than the total potential across the tube, have been detected.

The presence of fast ions suggests dissociating molecules. However, the ionisation potential of the mercury molecule is found by us to be 9·65 volts[1]. Consequently, if the whole electronic energy of an excited molecule were converted into kinetic energy of the constituent atoms, each atom could have at the most only 4·8 volts energy. The origin of these fast ions is now being investigated.

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[1] NATURE, **135**, 999 (1935). *Proc. Roy Soc.*, A, **153**, 359 (1936).

Continuous Spectra of Certain Types of Stars and Nebulæ

THE continuous spectrum of Nova 452.1934 Herculis has been showing a change in the spectral energy distribution which is hard to explain from the point of view of pure temperature radiation. Fig. 1, curve *a*, presents the continuous spectrum observed on December 31, 1934, by Barbier, Chalonge and Vasy[1], and curve *b* the spectrum on March 6, 1935. Intermediate curves between these extremes will be found in the same publication. (The dotted line has been added by me.) Nova Geminorum 2 showed, during 1912–13, a similar energy distribution curve with one or even two secondary maxima in the early stage, which gradually disappeared[2].

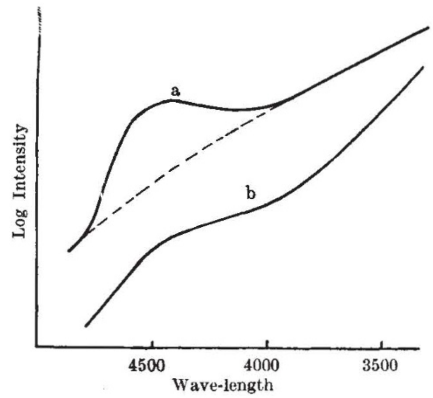

FIG. 1. Energy distribution curves of Nova 452.1934 Herculis. Proposed interpretation of curve *a*: black body radiation below, and continuous electron radiation above dotted line.

An interpretation of these energy distribution curves may be based on the assumption that *two different types of continuous emission spectra* are superimposed in the novæ, these being: (1) temperature radiation, according to the classical laws of black body radiation; and (2) continuous electron radiation, according to more recent results[3]. The conclusion to be drawn from the gradual disappearance of the secondary maxima in the spectra is that the state of a nova which results in the emission of the continuous electron radiation gradually disappears. The early stage of a nova seems to permit the generation of free electrons of high speed.

It remains to be seen whether or not similar secondary maxima exist in the continuous spectra of some early type stars and planetary and diffuse nebulæ. Such secondary maxima are to be explained again by a superposition of the two types of continuous radiations. It should be kept in mind that most energy distribution curves of early type stars and nebulæ have been obtained, so far, over a rather narrow range of wave-lengths, and it seems possible that only *parts* of their real black body