Professor C. H. Townes (Columbia), Professor K. Shimoda (Tokyo), Professor B. Elschner (Jena) and Dr. Ali Javan (Bell Labs.) conducted the lectures on Masers and Maser Spectroscopy. The noise figures of maser amplifiers, the limits on electromagnetic amplification due to complementarity and the phase and frequency fluctuations in a maser oscillator were discussed by Townes. A travelling wave solid state maser developed by Bell Telephone Laboratories was described. The application of masers to generation, amplification and detection of very high frequencies in the optical and infra-red region were discussed and a report on the recently developed infra-red and optical masers was given. The lectures delivered by Professor Shimoda covered the following aspects of beam maser spectroscopy: (1) a discussion of the sensitivity and line-width in both conventional and beam maser spectroscopy in the microwave region; (2) the experimental results that have been obtained using maser spectrometers on (*a*) the magnetic hyperfine structure and the Zeeman effect of the ammonia spectrum, (*b*) the low frequency rotational spectra of formaldehyde at 4·5769 Mc./s.; (3) three-level maser spectroscopy of gases with OCS and HDCO as examples and (4) the applications of the three-level maser for ultramicrowave spectroscopy.

Professor B. Elschner's exposition on solid state masers dealt with Bloembergan's theory of the three-level maser action of a crystal with paramagnetic ion; Javan's theory of three-level masers; applications of these theories to ruby masers; a two-level maser attained by adiabatic fast passage and the experimental results obtained on a Raman-type maser. Dr. Javan described his attempts at the Bell Telephone Laboratories to attain negative temperature in atoms by electron impact.

Professor A. Abragam's (Saclay) exposition consisted of a general formalism for the explanation of double irradiation effects in magnetic resonance. The formalism employs spin density matrices and takes into account the interactions that lead to the phenomena observed. Equations were developed for (1) interaction between electronic and nuclear spins; (2) calculation of line-widths; (3) spin diffusion; (4) Overhauser effect in liquids, metals and semiconductors; (5) experiments at elevated and very feeble magnetic fields; (6) relaxation mechanisms and measurements of earth's fields; (7) the solid effect; (8) electronic and nuclear double resonance (endor). Dr. J. Winter (Saclay) gave a theoretical description for multiple quantum resonance absorption. One of the most interesting results reported by the Saclay School was the observation of nuclear resonance of Co^{59} and Fe^{57} in ferromagnetic substances with no external magnetic fields. The resonance absorption arises from the levels split by the local fields of the order of 100,000 gauss, whose intensity could be arrived at from the Mössbauer effect. The surprisingly large intensity of absorption in Fe^{57} has been explained in terms of the Bloch walls being modulated by the applied *r.f.*, thereby augmenting the intensity of the *r.f.* field at the site of the nucleus.

Among the other subjects discussed in the School were electric dipolar transitions of two quanta in a gas by A. DiGiacomo (Pisa) and the applications of radiofrequency spectroscopy to frequency and time standards by J. De Prins (Neuchatel).

CULTIVATION OF ALGAE IN HEAVY WATER

An exhibit demonstrating the cultivation of green algæ in heavy water was shown by Argonne National Laboratory, Argonne, Ill., at the Seventh International Soil Science Congress at the University of Wisconsin.

This exhibit demonstrated, for the first time, how algæ can grow in an environment where nearly all of the atoms of hydrogen have been replaced by atoms of the rare isotope deuterium.

The exhibit consisted of a transparent plastic container 24 in. in diameter with a rotating paddle-wheel agitator. Nutrient, light, and a mixture of 5% carbon dioxide and 95% nitrogen gas were provided. The algæ were kept cooled to room temperature.

Algæ grown in heavy water synthesize organic compounds containing only deuterium in positions normally occupied by hydrogen. The deuterated compounds, for example, glucose, can then be fed to other plants and animals in research to determine the effects of heavy hydrogen on metabolism. The preparation of many of these synthetic compounds by other laboratory methods is difficult, often impossible.