whole volume of the channel carries current, A is the product of the channel width and the electrode pitch rather than the real electrode area.

Deviations from linearity on the voltage–current characteristics were observed in many cases at high current values; however, the voltage measurements are least precise in these regions: a linear relationship has been used to derive the conductivities quoted here. Fig. 2 shows the average electrical conductivity along the generator channel compared with thermal equilibrium values in the same temperature-range for several runs; a seeding fraction of 0·1 atomic per cent was used in obtaining the equilibrium values and the two curves refer to the appropriate static pressures at channel inlet (the lowest observed in the channel). The observed conductivities are up to fifty times greater than the thermal equilibrium values. Accounting for these values merely by incorrect temperature measurement requires, in the highest cases, errors of more than 300° C temperature measurement. All other factors (seeding fraction, channel pressure, current-carrying area, voltage sheaths near the electrode and internal current leakage) are likely to increase the difference between the observed and equilibrium conductivities. The measurement of such electrical conductivities indicates that some mode of extra-thermal ionization is occurring unless corrections to the observed temperatures are very large. Further experiments using more sophisticated measurement techniques are planned.

During the experiments generated current densities at the electrodes of 750 amp/m² were observed at less than 1,400° K. This is greater than the thermionic current density of tantalum but not that of cæsium; thermionic emission cannot therefore be neglected as an electron-producing mechanism at the electrodes if cæsium deposition occurs.

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Generation of Giant Pulses from a Neodymium Laser by a Reversibly Bleachable Absorber

The generation of high-peak power pulses of short duration from a ruby laser by the incorporation of a reversible bleachable absorber into the optical cavity has recently been reported[1]. This communication reports the observation of giant pulses at 1·06μ from a neodymium glass laser using the polymethine dye 3,3′-diethyl-9,11; 15,17-dineopentylene-thia-pentacarbocyanine iodide[2] as the bleachable absorber.

Initially, the dye molecules absorb light due to an allowed singlet–singlet transition at the laser wave-length and laser operation is inhibited. When the gain becomes high enough to overcome this absorption, laser action begins and the dye molecules are rapidly bleached. The cavity Q is suddenly increased and the stored energy is released in a giant pulse.

A 0·25 in. × 2 in. rod of neodymium-doped glass with external dielectric mirrors was used. The threshold for ordinary laser action was approximately 850 joules. A solution of the dye in a rectangular cell was placed in the cavity. The optical density of the dye cell was increased by steps from 0 to 0·3 in a series of experiments. The pulses were measured with a fast rise S-1 planar photodiode calibrated calorimetrically and observed on an oscilloscope having a 4 nsec rise time. The ordinary laser pulses (optical density zero) had a minimum width of about 1 μsec and a maximum amplitude of 12 kW with an input pumping energy of 1,800 joules. As the optical density was increased, the half-width of each pulse, as well as the number of pulses, gradually decreased until a limiting value of 25 nsec (full-width at half maximum) was reached when five pulses occurred. Further increase in optical density, although decreasing the number of pulses obtained, did not lead to an increase in the peak power of each pulse. Giant pulses of 1-MW peak power were obtained. The total energy output of such a giant laser pulse was typically 5 per cent of the total ordinary laser output. No deterioration of the dye due to exposure to the laser light was noted in approximately 100 flashes.

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Absorption Spectra of Silver Vapour

The line spectrum of silver vapour in absorption was first examined by R. G. Loyarte and A. T. Williams[1]. In their work the metal was vaporized in an electric oven of King's type at temperatures between 1,200° and 2,200° C, and the continuous background was furnished by a hydrogen discharge tube. They found altogether 11 lines lying between 3383 Å and 2320 Å, of which two strong ones situated on the long wave-length side of the region, namely, λλ3382·86 and 3280·66, were ascribed to the first doublet of the principal series of silver atom, and nine other weaker lines to ionized atom of the same metal. More recently, J. Ruamps[2], using the same type of oven, observed two band systems of silver in emission, one designated as system A extending from 4900 Å to 5050 Å, and the other as system B from 4100 Å to 4600 Å. Vibrational analysis of the second system led Ruamps to attribute it to silver. As to the more complicated system A, because of the experimental conditions, he was unable to ascertain whether it was due to silver or to other kinds of molecules such as AgN, AgO or AgC. Similar analysis of the bands of system B was afterwards repeated by B. Kleman and S. Lindkvist[3] both in emission and in absorption.

In view of the fact that silver commences to vaporize appreciably at a temperature somewhat lower than its melting-point (960·8° C), and that fused silica tubing can endure a temperature as high as 1,200° C for some time, it was felt to be of interest to investigate the spectral absorption of silver vapour within the workable temperature range of fused silica, so that better controllable experimental conditions could be achieved. The fused silica absorption tube with flat windows at both ends, used in our work, was about 80 cm in length. This tube was connected to a pumping system through which pure inert gas, argon or neon, could be introduced into the tube, in case of necessity. The central part of the absorption tube where a few grams of spectrally pure silver grains were placed could be conveniently heated to any