opens up a possibility of replacing the length standard by an adopted value of c, chosen so as to reproduce the present ^{86}Kr standard within its limits of precision. This question has been discussed in a comprehensive review by Cook (**2**).

Secondary standards

The wavelengths of 34 lines in ^{86}Kr I between 5563 and 9755 Å, emitted by a microwave-excited electrodeless lamp, have been measured by Eriksson and Norlen (**4**). They derive a system of energy levels valid for this kind of light source. For levels of the configuration 5*s*, 5*p* and 6*p* the results are practically identical with those derived by Kaufman and Humphreys (**9**), while for 7*s*- and 6*d*-levels there is a small systematic difference. The measurements by Czerwonka *et al.* on 9 infrared lines of ^{86}Kr I, mentioned in the previous report, have now been published (**3**). A paper by Humphreys and Paul (**6**) summarizes all their results on ^{86}Kr I and ^{86}Kr II.

Humphreys and Paul (**7**) have published the results of covering the region from 3949 to 35079 Å, and give a set of energy levels derived from these measurements. The same authors report in (**8**) their interferometric measurements on 108 lines of ^{136}Xe II from 3800 to 6500 Å and relative values of the energy levels involved.

F. P. J. Valero (**10**) has made some interesting comments on the derivation of the Th I Ritz standards.

The comprehensive compilation of standard wavelengths that was mentioned by V. Kaufman at the 1970 meeting of this Commission is expected to be available by the time of the forthcoming meeting.

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B. EDLÉN
Chairman of the Committee

Stabilized lasers and the speed of light

Since the last meeting of Commission 14, sufficient progress has been made in the development of stabilized lasers clearly to indicate the probability of a change in the definition of the metre. Such a change may be adoption of a new definition tied to a stabilized laser wavelength. Alternatively, in view of recent success in optical frequency measurement, one can contemplate unifying the time interval and displacement standards while assigning a conventional value to the speed of light. In this case, the stabilized laser would have the fiduciary role of furnishing an approximate realization of the 'light-second' rather than the 'metre'. The type of stabilized laser considered for either application is one which a laser transition has an accidental coincidence with a sharp absorption line in a neutral species, and the wavelength of the laser is tuned to the centre of this absorption profile.

Several such laser systems have been investigated. One, that designed to employ the coincidence of a line of the helium-neon laser with the 3·39μ absorption line of methane, has been extensively studied by Hall and Barger (**1**) at NBS Boulder. Its stability, relative to identical systems, has been

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checked to better than a part in 10^{12} by Hellwig *et al.* (**2**) Its wavelength relative to the kyrpton-86 standard has been measured by Barger and Hall (**3**). That comparison yielded a value of 33922·3376 $\pm$0.00012 Å relative to the centre of gravity of the Kr^{86} line. Measurements on this same line by Giacomo (**4**) at BIPM gave identical results for the wavelength relative to the centre of gravity of ^{86}Kr. Another molecularly stabilized laser system that has been investigated is that involving a coincidence of the 6328 Å line of the helium-neon laser with absorption lines of iodine. This combination was first explored at NRC in Ottawa, and further developed at NBS Washington. There, Deslattes, Layer and Schweitzer utilizing the absorption by ^{129}I, have measured its wavelength relative to both ^{86}Kr and the methane absorption stablized laser (**5**).

At NRC in Ottawa, Baird and his associates have measured the wavelength of the CO_2 line at 10·6μm relative to ^{86}Kr and have also used a 10·6μm laser stabilized to the absorption line in CO_2 (**6**). Additional work with molecularly stabilized laser systems is also underway at PTB in Braunschweig (**7**) and at NPL in Teddington (**8**).

The result of these various developments will be to supply a variety of new wavelength standards in the visible and infrared, tied together to an accuracy of better than $1/10^{10}$, and all of them superior to the present standard.

Other recent work has resulted in new knowledge of the ratio of optical frequencies to the frequency of a caesium beam oscillator which realises the present definition of time interval. In one measurement, Bay and Luther (**9**) have completed a differential measurement using microwave modulation to obtain a frequency for a Lamb dip laser. Combining this measurement with an interferometric wavelength comparison to ^{86}Kr gives their value for the speed of light, namely 299792·47$\pm$0·018 kms^{-1}.

Evenson and co-workers (**10**) have made a direct frequency chain connecting a methane stablized laser (3·39μm) with a caesium beam oscillator embodying the standard frequency. When their result is combined with the Barger and Hall (**3**) wavelength measurement, a value for the speed of light of 299792·4562$\pm$0·0011 kms^{-1} is obtained (**11**).

On the basis of the results described above, we are approaching a situation in which error statements on the speed of light are dominated by the fuzziness of the present standard of wavelength. Such a situation cannot long be tolerated.

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K. G. KESSLER

COMMITTEE 2: TRANSITION PROBABILITIES

A vast amount of work on transition probabilities has been accomplished during the last three years. Wiese and his staff at the National Bureau of Standards, Washington, have continued to collect all numerical results, and they can supply information as to what is available for any parti-

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