ment is successful, we will have verified a cosmological model in the laboratory.

(c) Neutrinos would be welcomed in a cyclic universe as a bridge between mass and energy. If the neutrino possesses kinetic mass (there is no experimental evidence to contradict this) it will be expected to behave differently regarding Olbers's paradox than is the case with photons. This is particularly so since recent experiments have shown the existence of more than one type of neutrino, the kinetic mass of which could well be appreciable. It is only in the cyclic universe that Olbers's paradox is completely explained without attributing special properties to low-energy photons and equivalent mass > 0 particles. The properties of neutrinos in the other cosmological models have been discussed by Weinberg[1].

(d) Full development of the cyclic concept could well accommodate the Dirac negative particles, providing a clue as to the origin of the expansion of the clusters of galaxies.

(e) The cyclic model is the only one intimately concerned with both the micro and macro worlds; most cosmological models only consider the latter.

(f) Recent progress in molecular biology, linked with an Alfvén type process of planet formation, offers the possibility of life itself existing in a cyclic form. The basic requirements for evolution, complex organic molecules, are always available and hence life results when the environment is favourable.

Although the present formulation is non-mathematical, many of the deductions involve interactions which are themselves on a strict theoretical basis, requirements such as the intermediate evolution of galaxies being similar to those of the steady state theory. One of the difficulties of a mathematical approach to the concept is the introduction of a stability term into the usual statistical distribution functions; if this could be achieved the ratio constant and its probable behaviour could then be calculated. However, I feel justified in outlining the consequences of the postulate which leads to imminent experimental test, capable of no other interpretation than that required by a cyclic universe. These experiments involve the focusing of intense laser beams. Meanwhile, if it could be shown beyond doubt[2] that there is a logarithmic increase in the output of Čerenkov radiation in dense media at high 'energies', $> 10^{10}$ eV, the postulate would then have been verified.

The points raised in the present communication are dealt with in more detail elsewhere.

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RADIO ASTRONOMY

Position of the Radio Sources Cassiopeia *A* and Cygnus *A*

To determine the absolute position of radio sources, the geometrical mounting error as well as the phase errors of the equipment must be known. In the case of a two-antenna interferometer these errors may be fairly accurately estimated if a few radio sources are observed in upper, as well as in lower, culmination.

Usually the positions of radio sources are determined relative to one or a few sources the optical counterparts of which are known. There seem to exist very few direct observations of absolute positions of radio sources.

The interferometer at the Oslo Solar Observatory is situated at a latitude of 60° N. so that Cassiopeia *A* and Cygnus *A* may both be observed in upper and lower culminations. The interferometer, which is described in detail elsewhere[1], consists of two mattress antennæ spaced 136·73 wave-lengths on an east–west line. The right ascension of a source may be determined with rather high accuracy.

A series of observations of the two sources were performed during a period of half a year.

After elimination of the mounting and the phase errors the following positions were obtained. The positions given by Smith[2] are shown for comparison.

	Right ascension	
	Oslo (200 Mc/s)	Cambridge (81·5 Mc/s)
Cassiopeia *A*	23h 21m 11s ± 1·5s	23h 21m 12s ± 1s
Cygnus *A*	19h 57m 41s ± 1·5s	19h 57m 45·3s ± 1s

The positions refer to the epoch 1950.0. For Cassiopeia *A*, which has been observed in upper and lower culmination by both observatories, the measured positions are in good agreement. For Cygnus *A* there is, however, a pronounced discrepancy.

We have considered the possible measuring errors in great detail. It is found that the separation between the antennæ is too small to resolve the two components of the source and in this way introducing a measurable phase error. It is further unlikely that other radio sources or the effect of ground reflexions should cause an error larger than the quoted limit of accuracy.

The present picture of the radio source Cygnus *A* is that the two components of radio emission are situated symmetrically about a central galaxy. The position of the galaxy is R.A. 19h 57m 44·5s (ref. 3) and various observers agree that the east–west separation between the components is 1·5 min of arc. If our determination of the position of the radio centroid is correct, one of the radio components will almost coincide with the galaxy in right ascension.

The relative positions of regions of radio emission and the associated galaxies have been examined for a few sources[4]. For radio sources consisting of two emitting components the number of cases investigated is not sufficiently large to determine the most probable relative position of the galaxy and the radio components. It seems very important to find this positional relationship as this displays part of the nature of the radio sources.

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PHYSICS

Pulsed Laser Operation in a High-pressure Helium Neon Mixture

WE have previously reported pulsed infra-red oscillations in the afterglow of a helium–neon plasma at pressures of about 1 torr[1]. This communication describes results obtained at total pressures of up to 240 torr when 84 W output has been obtained. The usual near-confocal mirror system is used[2] containing a quartz tube 2 cm internal diameter and 150 cm long, having windows at the Brewster angle.

The gas is excited by means of external ring electrodes to which are applied 1-μsec pulses of up to 60 kV. Provided the rise time of the pulse is sufficiently rapid, a current of up to 90 amp can be induced to flow in the gas.

With this method of excitation, and using dielectric coated mirrors for the infra-red, the system can be made