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Sergey Shewchuck

December 18, 1952

Berkeley, California

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Radiation Laboratory, Department of Physics
University of California, Berkeley, California

December 18, 1952

Meeting of October 16

I. Emission Time of Secondary Electrons. R. F. Post.

It has always been a problem whether there really does exist a finite delay time in secondary emission and thus whether a very fast scintillation counter can be built. The theory of delay times is quite unsatisfactory. For example, one based on a thermal emission phenomenon would give an appreciable random delay time, whereas a theory based on induced transitions would give negligible delays.

In the past several different values have been obtained for the delay time through various means. Greenblatt had arrived at a value of about 2×10^{-10} sec. At Phillips in Eindhoven, Diemer and Jonker with work on a secondary emitting oscillator tube inferred a value of $< 5 \times 10^{-11}$. But R. R. Law of RCA while investigating power amplifier multipliers discovered an exponential delay which appeared to have a time constant of about 3×10^{-10} sec. This was undoubtedly an inhibitive factor on the photomultiplier program. It is possible that Law's results could have been attributed to the consistent use of barium oxide coating on the cathodes of the tubes.

More recently an experiment at RCA designed to give more definite evidence on the delay time by use of a special beam deflector tube gave a value of less than 5×10^{-11} sec. At Stanford through investigating noise counts from a pulsed photomultiplier an upper limit of 7×10^{-11} sec. was arrived at by ignoring all transit time delays. It has been found by Varian Associates that 10,000 mc (x band) tubes can be made to multipact from 10,000 to 13,000 mc. This would indicate the emission time delay to be probably $< 5 \times 10^{-11}$ sec (unless there are two modes of decay).

It seems safe to say now that it is possible to build multipliers with response up ten times faster than presently available.

II. Phase-Reversal Focussing in Linear Accelerators. Myron L. Good.

An abstract report UCRL-1981 of this talk is in the process of being published and is being quoted as follows:

"A modification, applicable to the linear accelerator, of the focussing principle discovered by Courant, Snyder and Livingston is presented. No foils, grids, magnets, or electrodes are used. One introduces, at periodic intervals along the machine, repeat lengths which are alternately greater than and less than the synchronous repeat length $\ell = \beta\lambda$. This causes the synchronous particle to alternately lead and lag the rf peak by the synchronous phase angle $/\phi_s/$. (This does not affect the energy gain.)

"It has been pointed out by McMillan that in a linear accelerator without grids or foils in the path of the beam one cannot have first-order radial focussing and phase stability at the same time. The above modification causes the beam to periodically alternate from a condition of radial defocussing (with phase stability) to one of radial focussing (with phase instability). Both the radial and phase equations of motion become, for small oscillations, the Hill-Meissner equation and over-all stability results. The strength of focussing is comparable to that obtained by using grids. The phase acceptance angle is being investigated."

Meeting of October 23, 1952

I. Electron Interaction. Dr. E. A. Ash.

Dr. E. A. Ash, who is a pupil of Dr. D. Gabor of England in electronics, is presently working on post-doctorate studies at Stanford. During his talk he described the objectives and the nature of his experimental work conducted at London University to determine and to check with theory the amount of error and the order of magnitude of the effect of electron interaction in plasmas.

Meeting of October 30, 1952

I. Charged Unstable Particles. Dr. C. C. Butler.

During a visit to the University of California campus, Dr. C. C. Butler of Manchester, England, co-discoverer of V particles, spoke at UCRL on the various charged particles found in cosmic rays. Photographs of rare events were shown and the statistical data based on them was interpreted. Among the particles described were tau, K, zeta, and s particles, as well as the possibility of neutral V particles.

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