$\pm 1.0)\times 10^{-46}$ cm^3 erg, several orders of magnitude smaller. If from either expression one would further conclude by an argument of charge-independence that there exists of a term H_{PNev} with a similarly large coefficient, this term would give rise to beta-disintegrations much stronger than those observed, as the coefficients to be used in the Fermi theory for agreement with observations lie between 10^{-48} and 10^{-50} cm^3 erg.

We therefore conclude that charge-independence of the phenomenological direct nucleon-lepton interactions is not to be expected. This is not surprising, if we believe that these direct interactions are the result of interactions through fields, which are radically different in the three cases mentioned. If the Lamb shift arises from purely electromagnetic interactions,[7,8] it is obvious that no corresponding effect of the same magnitude should be expected for H_{NNee} or H_{PNev}. If H_{NNee} is due to a cooperation between an electromagnetic and a mesic interaction,[5] again this effect does not contribute to H_{PNev}, which may then be taken either as a real direct interaction or as a cooperation between the interactions of nucleons and of leptons with the mesic field,[9] the latter interaction being very weak.

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Gamma- and Alpha-Produced Scintillations in Cesium Fluoride*

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SMALL anhydrous cesium fluoride crystals have been grown in a hydrogen atmosphere without the addition of thallium or other activators. These crystals scintillate with light output predominantly in the blue-ultraviolet region. The total integrated pulse height for Co^{60} gamma-rays is between 1/10 and 1/12, the integrated pulse height of anthracene when using an ultraviolet sensitive C 7140A photomultiplier, whereas the CsF pulse height is of the order of 1/20 of the anthracene pulse when using a 5819 photomultiplier.

Gamma-radiation from Cs^{137}, Co^{60}, ThC″, and from the Po(α)−Be reaction show the gamma CsF pulses to be approximately proportional to energy. More exact measurements of pulse height cannot be made until larger clear crystals are available.

The decay constant (time for pulse to decay to $1/e$) was measured using the pulsed photomultiplier technique of Post and Shiren.[1] 2500-volt square pulses of 10^{-6} sec duration were applied across the divider network of an internally shielded C7140A. The anode resistor of 93 ohms was connected directly across the vertical deflection plates of a 5XP11 cathode-ray tube swept at 2×10^8 cm per sec. CsF pulses produced by the Co^{60} gamma-radiation were photographed. The area under the decay portion of the traces was graphically integrated (to smooth out statistical fluctuations) and then plotted on semi-log paper. The decay constant was determined to be $5\times 10^{-9}\pm 1\times 10^{-9}$ sec. CsF is therefore the fastest inorganic material thus far studied. Its decay constant compares favorably with the best solid organic scintillators, although it is not as fast as some liquid scintillators.

A freshly prepared crystal was mounted in a dry chamber on a photomultiplier whose anode resistor was 100 kilohms in order to obtain integrated pulses. When alternately exposed to the alpha-radiation of Po^{210} and the gamma-radiation of Co^{60}, direct comparison showed the 5.3-Mev alpha-pulses to be of the same size (within 10 percent) as the 1.3-Mev gamma-pulses. Furthermore, the alpha produced pulses were visibly slower; the alpha-pulse decay constant is estimated at 2×10^{-7} sec. The possibility of surface deterioration of the crystal was ruled out by introducing RaCl directly into a crystal. In this case, fast gamma-pulses, superimposed on the somewhat smaller slow alpha-pulses, were observed.

The wide difference in the decay constants of gamma- *versus* alpha-produced pulses suggests that the mechanism of the alpha-produced scintillation is somewhat different from the mechanism of the gamma- (electron) produced scintillation. This observed difference suggests that it would be worthwhile to investigate better known scintillators in an effort to find similar variations of decay time. It is known that silver activated ZnS shows a reversed behavior:[2] The alpha-scintillations are four times as fast as beta-scintillations.

CsF crystals should be useful because of their speed, high density (3.586 g/cm^3), and high atomic number, the latter permitting observation of gamma-pair and photopeaks. On the other hand, the pulse height is small and the crystals are quite deliquescent.

CsF is similar to the organic scintillators in the following respects: (1) It apparently scintillates in the pure state, (2) has a decay time of the order of allowed atomic transitions ($\sim 10^{-8}$ sec), and (3) has a lower relative luminous efficiency for the alpha-*versus* electron-produced pulses.

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Paramagnetic Relaxation in Cesium Titanium Alum

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IN a recent paper[1] the author extended the usual phenomenological theory of paramagnetic relaxation by considering the effect of a finite thermal conductivity. The expressions for the real and imaginary parts of the susceptibility of a paramagnetic salt were developed in powers of T/τ, where $T=\rho c_H r_0^2/15K$. τ is the measured relaxation time, ρ is the density, c_H is the specific heat at constant magnetic field, r_0 is the radius of the specimen (assumed spherical), and K is the thermal conductivity. Ordinarily T/τ is small so that only the zero-order terms in the expansions need to be considered. However, according to recent measurements of Benzie and Cooke[2] the relaxation time in cesium titanium alum is extremely short. One can therefore expect that the distortion of the χ' *vs* χ'' curves caused by the finiteness of the thermal conductivity will be observable provided a sufficiently large and very pure single crystal is used in the experiments.

The densities of CsAl, CsV, CsCr, CsFe, CsGa, CsRh, and CsIn alums range between 1.97 and 2.24 g cm^{-3} so it seems reasonable to take the density of CsTi alum as about 2.0 g cm^{-3}. CsTi alum obeys Curie's law very closely and therefore $c_H=c_M+CH^2/T^2$, where c_M is the specific heat at constant magnetization. According to Benzie and Cooke, the molar Curie constant is 0.120 and $c_M T^2/C=2.7\times 10^4$. Since the molecular weight of CsTi alum is about 589, we have $C=2.04\times 10^{-4}$ deg g^{-1} and $c_H=2.04\times 10^{-4}(2.7\times 10^4+H^2)/T^2$ erg g^{-1} deg^{-1}. We shall asume the specimen has a radius of 1 cm. It is difficult to say what value should be taken for the thermal conductivity. As a very rough approximation we shall use the expression $5.3\times 10^5 T^3$ erg sec^{-1} cm^{-1} deg^{-1} which represents Garrett's[3] measurements on potassium chromium alum at temperatures between 0.14 and 0.30°K. According to