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A Study on Incoherent Scattering of Gamma Ray and Its Experimental Study

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Abstract – Electromagnetic radiation passes through matter there arises complicated phenomena which are analyzable in terms of statistically independent elementary interactions. Bach elementary process subdivides the energy of the incident photon. The radiation is thus progressively degraded in energy and deflected in various directions. The magnitude of each of these processes is given by the corresponding cross section. The cross section of these processes depend in turn on factors like the energy of interacting photon (E) and the atomic number of interacting material (Z). Considering the agent with which gamma ray interacts and the consequent result, the processes are classified in several groups.

Keywords: Incoherent Scattering, Gamma Ray

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INTRODUCTION

Incoherent scattering is one of the significant mode of interaction of gamma ray with issue in the vitality district of around 1 MeV. In this procedure every electron in the atom demonstrations freely, and the normal scattering per atom is the whole of the normal scattering for all electrons in the atom. Since the powers as opposed to the amplitudes of scattering by the individual electrons are to be included, the scattering is portrayed as incoherent.

Contrasted with the coupling vitality of electron if the episode photon vitality is sufficiently high the electron can be viewed as free. The occurrence vitality contrasted with which official of atomic electron can be ignored relies upon the scattering edge just as the atomic number of scattered material. For a free electron the vitality force protection law suggests that the vitality of dispersed photon will be not exactly the episode photon vitality, the distinction in vitality being bestowed to the drawing back electron which is thought to be very still before impact. Such an inelastic scattering with x-rays was seen by Compton in the second decade of this century. The wave length move of dissipated x-rays given by Compton recipe was direct showed up experimentally pleasant. However, soon from an estimation of Ross and Kirkpatric (1934) it was discovered that the situation of the line of maximum force isn't the one given by Compton's equation and furthermore the line as opposed to being sharp is widened. Consequently both the expanding of the line and the move were ascribed to the coupling powers following up on scattering electron.

At the point when the official of atomic electron can't be ignored it is accepted that the electron ingests a portion of the force and either stays in an excited state or leaves the iota, so the dispersed photon has less essentialness than the event photon. For this circumstance there is no unequivocal stage association between the radiations scattered by the different electrons of a particle, as opposed to coherent scattering. All out dissipated force is gotten by including powers dispersed by every electron of the atom. Consequently the scattering is inelastic incoherent type.

The cross sections for scattering of gamma ray by free electron have been inferred by Klein and Mishina (1929). In a real case for low vitality photons (little k0) the struck electron carries on as though bound in the atom. As an outcome of restricting certain lowering of cross section esteem was noted. To-consider the effect of official on cross section, incoherent scattering function was presented. Experiments done in this field are structured either to test the legitimacy of Klein Mishina recipe or to decide the energy appropriation of electron within the scatterer atom.

DuMond and his collaborators (1933, 1937, 1938) l_{or} the first run through concentrated the Compton scattering of K x-rays of Mo by bound electrons of

carbon, helium and hydrogen. The underlying photon vitality was little contrasted with the electron rest vitality, the vitality moved to electron in the crash was little contrasted with starting photon vitality and the atomic restricting energies were not exactly the vitality moved in a free electron impact. The primary outcomes acquired in their examination were as per the following:

(i) The vitality appropriation of the Compton line was appeared to compare to the Doppler widening delivered by electrons having a given energy circulation recommended for electrons in atom

(ii) The vitality width of the line at half force was assessed to be approximately equivalent to $4[I (k_0 - k)]^{1/2}$ where I is the coupling vitality of electron and ko and k are the underlying and last photon energies separately for scattering by free electrons,

(iii) The most plausible photon vitality for incoherent scattering by bound electron everywhere edges is more prominent than the photon vitality for scattering by free electrons by a measure of the request for $k^2I(k_0^2-kI)$.

INVESTIGATION WITH GAMMA RAY

The experimental examination of incoherent scattering of gamma ray photon by bound electrons began since mid sixties. Countless papers, hypothetical just as experimental have been distributed from that point forward, which have to a great extent extended our insight regarding the matter. The experiments conveyed so far on bound electrons can be assembled into two classes considering either the scattering to happen from electron having a place with a specific atomic shell or from the atom as a whole. In the accompanying both the type of experiments are talked about independently.

Singular Shell Experiments

Here the commitment of an individual shell towards the cross section is disconnected by methods for a good experimental set-up. The majority of the individual shell estimations were done on K-shell scattering for 662 keV photons, while territories of other photon energies and atomic shells remained essentially unexplored. She discovery technique utilized in these experiments are basically indistinguishable and depend on the accompanying rule. At the point when a photon is dissipated incoherently by an electron bound in the K-shell of an atom the electron is taken out of its circle leaving an opening in that shell. The opening is filled in a very brief time $(\sim 10^{-16}\ \text{sec})$ by changes from the external shells and an X-ray normal for that shell is discharged. Accordingly the photons dissipated from different shells and the photons dispersed coherently (as these doesn't leave an excited atom) are excluded consequently from estimation.

From an examination of force of occurrence checks with the power of photons dissipated from a low - Z material (in which the electrons because of low restricting can he viewed as free) the dog to free cross section proportion is acquired.

To limit the pace of incidental checks a few precautionary measures are taken. The potential reasons for fake or alleged bogus incident check rate are genuinely various. Anyway the most significant single reason is the photo electrons which may create bremstrahlung in the scatterer and additionally ionize different atoms bringing about the discharge of extra x-ray. This would' offer ascent to a x-ray peak in the y-ray counter. Compton electrons catapulted from external shells may likewise deliver x-ray and would offer ascent to a peak in the gamma ray counter. Other than these occasions which happen inside a scatterer, false checks might be delivered from different sources moreover. For example

(i) There is a considerable including rate in the two locators because of the y-rays dissipated by air and those that go through the shields. These y-rays could disperse from one gem to the next to give occurrence

(ii) y-rays entering into one of the indicators, in the wake of scattering from the scatterer's, may dissipate once more (in single or multiple procedure) into the other locator giving incidents

(iii) Coincidences emerge because of second request effects mix of at least two of the %> previously mentioned procedures. When all is said in done, the reliance on the objective thickness of that piece of the fake tally rate created by synchronous location of an immediate item and a by-result of a scattering occasion won't be equivalent to that of the genuine check rate. The commitment to the deliberate check rate is typically, in this way, controlled by taking estimations on focuses of differing thickness all together 'to decide the greatness of the thickness subordinate rectification.

A portion of the significant works in this field are given beneath, within the section vitality of y-rays utilized, scatterer test and maximum precise extend secured are noted. Brini et al (i960) (662 keV, Pb, 10°-85°), Sujkowski and nagel (1961) (662 keV, Pb, 28° - 132.5°), Motz and Missoni (1961) (662 keV, Sn, Au, 20° - 110°), Varma and Eswaran (1962) (662 keV, Pb, 60° - 124°),

Dilazzaro and Missoni (1963) (662 key, Au, U, 90° - 120°), A.R. Reddy et al (1966) (662 keV, Pb, la, Sm, Sn, 30° - 130°), Shimizu et al (1965) (662 key, Sn, la, Pb, 20° - 100°) Pingot et al (1968) , A.R. Reddy et al (1968) (1002 keV, Sn, Sm, Ta, Pb, 40° - 128°), East and Lewis (1969) (662 keY, la, Pt, Au, 15°-70°), D.Y. Krishnareddy et al (1970) (662 keV,Pt, 30°), Murty et al (1971) (662 keV, Pt, Bi, 50°), D.V. Krishnareddy et al (1974) (662 keV, Pt, Bi, Ih, 30°-125°), Spitale and Bloom (1977) (662 keV, 320J keY, 145 keV, Pe, Su, Ho, Au, 20°-140°), Pradoux et al (1977) (662 keV, Ge, 90°"135°, 60 keV, Gu, Mo, 50°) Kane et al (1977a) (1.12 MeV, Ih, la, Au, Pb, 25°-120°), lageswara Rao et al (1977) (279 keV, \ Bi, 30°-150°), Kane et al (1977b) (1.12 MeV, Au, Pb, Ih, 60°-100°), Acharya et al (1980) (145 keV, Sn, Ag, Mo, 110°), Shuman et al (1981) (145 keV, Sn, Mo, 30°~150°), Acharya et al (1981) (145 keY, Ag, 30°-150°), Chu-Han-Chang et al (1982) (662 keV, la, 30°-60°), Raghava Rao et al (1982) (145 keV, Au, Ag, Y, 40°-100°).

As have just expressed the vast majority of these examinations were with K-shell electron dissipated by 662 keV gamma radiations. Dominant part of these examinations utilized a pair of Nal(ll) indicators in incident mode. East and Lewis (1969) were the main creators who utilized 2 c.c. Ge(Li) finders in happenstance mode and Pradoux et al (1977) utilized Ge(Li) identifiers in triple fortuitous event set up.

A general pattern noted in the experimental outcomes is that for little scattering points the cross section proportion of bound to free electrons is not as much as solidarity and approaches zero as the edge diminishes to zero. This conduct essentially shows that at the little scattering edges the force move to the k-shell electrons will in general be little contrasted and their underlying minute and there is little likelihood that the atom will assimilate enough vitality to expel the electron from the K-shell.

Comparative conduct for this proportion is anticipated by no relativistic counts of the incoherent scattering function talked about by Grodstein (1957).

The precise reliance of the proportion of bound to free electron cross-section show that the bound Compton cross-section is essentially littler than the Klein-Hishina cross section for snail scattering points. Notwithstanding, the relativistic consequences of Whittingham (1971) are altogether bigger than the incoherent scattering function Calculation and concur well with the experimental outcomes for scattering points beneath 100°.

Relativistic figuring of Whittingham predicts abatement in $d\sigma_K/d\sigma_F$ at bigger scattering points. Just Pradoux et al (1977) found an abatement in the cross section from 80°-135° for 662 keV photons scattering from Ge and Kane et al (1977a) found an unequivocal reduction from 90°-120° for 1.12 MeV photons dispersed by Au. Anyway no clear design in the z-reliance of $d\sigma_K/d\sigma_F$ was watched. Everywhere $\frac{\theta}{2}$ the diminishing in $d\sigma_K/d\sigma_F$ concur with Gavrila's (Tseng et al 1973) drive approximation figuring and the relativistic structure factor count of Pradoux et al (1977) for 662 keV photons dispersed by Ge however can't help contradicting all incoherent scattering function estimation.

Extensive disparity in the outcomes acquired by various laborers has been noted. The first since forever estimation of incoherent scattering with gamma ray by Brini et al (I960) in I960 gave cross section a request for extent bigger than that by a free electron. This might be because of the way that the consequences of previously mentioned creators didn't contain remedy for the commitment of bogus happenstance checks and target thickness effects.Since these significant components were disregarded the outcomes demonstrated an enormous deviation. In 1961 Motz and Missoni (1961) distributed the aftereffects of their estimation which demonstrated that the proportion of the cross section for the k-shell electron to that for a free electron approaches zero as the photon scattering edge diminishes while everywhere edges their proportion exceeded solidarity.

For huge scattering points Motz and Missoni determined the cross section utilizing a model initially created by Jauch and Rohrlich (1955). In this model the struck electron is thought to be at first free yet _not very still. Comparing cross section is thusly determined by considering a free electron having speed equivalent to that of K-shell electron. Motz and Missoni found the experimental outcomes to concur well with the computation.

Presently Sujkowski and Uagel (1961) contemplated both the unearthly circulation and differential cross section of 662 keV photons dissipated in flexibly by K-shell electron. They, nonetheless, didn't consider the fortuitous events between the photons compton dissipated by electrons other than those in K-shell and the x-rays transmitted when the compton electrons produce K-shell ionization in the scatterer. This effect could make a calculable commitment to the watched an outcome. Following Schnaidt (1934) they acquired an expression for the vitality circulation of dispersed photons utilizing both non-relativistic hydrogen like wave function and a relativistic electronic wave function. They additionally assessed the incoherent scattering function for singular shell electron.

Shimizu et al (1965) additionally applied incoherent scattering function way to deal with the scattering of gamma rays. In any case, experimental outcomes veered off significantly

from their hypothetical expectation as may be expected since the non relativistic approximation utilized isn't appropriate to the K-shell electrons of high Z atoms.

Extensive estimation of the differential cross section for incoherent scattering by K-shell electron have been accounted for by Spitale and Bloom (1977). Three episode photon energies 662, 320 and 145 keV separately were utilized and dissipated photons rising at scattering points running from 20° to 140° were recognized unintentionally technique. In addition to other things noted was a lowering of the forward scattering cross section when contrasted with the free electron scattering Klein - Nishina forecast. This effect has been anticipated in a few incoherent scattering function and structure factor hypotheses. The rakish reliance of the semi Compton scattering cross section shows a tumble off at forward edges which is to be expected from a basic semi old style model utilizing Klein - lishina recipe related to the expected energy appropriation of the K-shell electrons. Such a model was utilized by Motz and Missoni (1961). Utilizing basically a similar model Spittle and Bloom appeared at forward points just that bit of the electron energy dissemination which is both huge in greatness contrasted with the normal extent and subterranean insect parallel in bearing to the episode photon will add to the inelastic scattering.

Since the model disregards in addition to other things the coulomb scattering in middle state (after retention of the occurrence photon) it tends to underpredict the forward edge scattering. In this manner case in point, the cross section can't be expected to vanish in any event, utilizing the semi traditional model, despite the fact that it will be a lot littler than the free electron forecast, as was found experimentally. They saw information at 145 keV as in excellent concurrence with semi old style computation. Anyway not every one of the information could be imitated by such count. An experimental outcome got by Chu-Iun-Chang (1982) was found to concur with Whithingham's (1981) exact relativistic estimation.

At lower photon energies just a couple of examinations were completed. For 320 keV and 279 keV episode photon energies, the outcomes demonstrated the proportion of the cross sections to be not as much as solidarity even everywhere scattering edges. Spitale (1977) who extended the examinations to 145 keV likewise watched a comparable outcome. His outcomes at 320 keV, nonetheless, showed the estimations of the cross section proportion to be bigger than one at in reverse points. At 279 keV the consequences of Pingot (1968) are lower than the comparing aftereffects of different examiners. It in this manner gives the idea That Pingot's outcomes convey methodical mistake.

Incoherent scattering of gamma rays from L-shell has additionally been accounted for. Rule of estimation being same as that utilized in the event of K shell. Patterns of experimental outcomes are additionally of comparable nature as the K shell. In any case, the quantity of examination is not many to propose any unequivocal end.

Announced estimation on L-shell are expected to : Dilazzaro and Missoni (1963), Swamy (1976), Basavaraju et al (1982).

Other than the differential cross section estimations expressed above, estimation of integral incoherent scattering cross section has been accounted for by a few experimenters. However, these are of minimal down to earth use in assessing incoherent scattering functions.

While there are genuinely various information on cross-section proportion, examination on phantom shapes are generally not many. The vitality range of gamma ray incoherently dissipated by K electrons of overwhelming atom has been estimated by a few specialists; Yarma and Eswaran (1962), Dilazzaro and Missoni (1966), last and lewis (1969), Spitale and Bloom (1977) Pradux et al (1977), Eane et al (1977).

East and lewis (1969) were the first to induce the otherworldly shapes utilizing Ge(li) finders. Yarma dnd Eswaran (1962) and East and lewis found that the range was widened in connection to that of a free electron and there was no critical move of the peak of the range from the free electron compton vitality.

The principal efficient investigation of the range shape was completed by Dilazzaro and Missoni (1966). Regardless of the precautionary measures taken to guarantee exact estimation, the range shapes acquired by them were questionable. As a rule they watched the width of. Experimental spectra to be smaller than the processed ones. Peak move of 10%. Towards lower photon energies and an expansion in the range at low dissipated photon energies were noted. These highlights were upheld by their hypothetical computation. They assessed the ghastly shapes by legitimately assessing the second request S - matrix for the Compton procedure and dismissing electron official in the moderate and last states.

Pradoux et al (1977) likewise watched range to be widened contrasted with those acquired from scattering by free electrons. The maximum of the range showed up, in any case, at energies sLightly bigger than the vitality for scattering by free electrons. Vitality move of 15 keV for © = 90° and 20 keV for © = 155° were seen which were inverse way to that acquired by Dilazzaro and Missoni.

An ordinary range acquired by Spittle and Bloom (1977) by and large shows a dispersed semi

Compton peak which is typically much smaller than would be expected from the bound state electron movement. Instead of monotonically expanding with atomic number the peak width was maximum between Z = 50 and Z = 67 and again it was maximum for scattering edges somewhere in the range of 45° and 60°. Eo compton imperfection to within + 20 keV was watched. Another intriguing component of the range was a continuum basic the semi compton peak which wanders at the low end of the dissipated photon range. This infracted. Dissimilarity (IRD) with an approximately 1/fc (k = initoal photon vitality) reliance was generally noticeable if there should arise an occurrence of 320 keY information. The existence of IRD is in concurrence with non-relativistic theory of Gavrila (1972a, 1972b). Be that as it may, tile semiclassical model utilized by the creators doesn't al all anticipate the IRD. a Babaprasad et al (1977,) watched an expansion beneath 250 keV for K-shell scattering of 1.12 MeV photons through 60° and an increment underneath 180 keV for scattering through 100° by Au. They anyway found no deformity to within + 15 keV in the event of 1.12 MeV photon dissipated from K-shell electrons of Au, Pb and Th.

WHOLE ATOM MEASUREMENT

Here commitment to scattering from all electrons in an atom is considered. One part of examination in this field is to think about the profile of compton line and its connection to the electron force dissemination of scatterer atom. Such thinks about were diligently followed in the thirties by DuMond and Kirkpatric (1938) and Ross (1934). With the approach of high goals strong state finders these investigations toere continued lately (Williams 1977) with a view to accomplish better exactness in experimental estimation. These investigations, known as Compton profile, are utilized to examine the force dissemination of electron in atom and thus the electronic design of atom existing in vaporous, liquid or strong state.

Since the bound electron scattering is basically a three body process the standard vitality state of Klein-Nishina plan doesn't hold and the debased photon vitality at any scattering point isn't special. The bound electron powers the atom to take an interest all the while. The atom will retain vitality and be raised to an excited or ionized state when an episode photon moves force to any of atomic electrons. In this manner the debased photon vitality is on a fundamental level a continuum in the vitality extend from $^{0\ to\ h\nu-B}$ where $^{h\nu}$ is the episode photon vitality and B is the coupling vitality of atomic electron. This makes the estimation of whole atom incoherent scattering cross section extremely troublesome as the proficiency of gamma ray indicators are found to diminish with expanding photon vitality. Nonattendance of a reasonable finder constrained experimenters to utilize roundabout techniques. Thusly all the previous strategies utilized are basically aberrant subtraction strategy. This strategy comprises of deciding the absolute atomic cross section by transmission experiments in great geometry. By subtracting the hypothetical total of photoelectric effect and coherent scattering from the deliberate all out cross section, the incoherent scattering cross section is extracted. In spite of the fact that the technique is more straightforward than different strategies, it experiences the weakness that vulnerabilities in the theory of contend ting forms make it fairly hard to make unmistakable determination with respect to the impact of electron official. In addition just integral incoherent scattering cross sections are acquired in these experiments.

An information on differential estimation is anyway alluring for assessing the incoherent scattering function and for the investigation of other scattering experiments where incoherent scattering offers ascend to huge foundation. From writing overview apparently M. Singh et al (1963) just because endeavored for a flat out estimation of the differential incoherent scattering cross section. These creators expelled the trouble looked with customary Nal(Tl) finders by changing over it into a consistent proficiency type utilizing aluminum channels before indicator. The steadiness accomplished in this way» be that as it may, is legitimate over a restricted vitality district just of 0.5 to 2.4 MeV. Utilizing such locator they acquired cross section of 662 keV. Gamma ray in iron at points extending from 20° to 90°.

In a large portion of different experiments with Nal(Tl) identifier, photon dissipated from either annular or barrel shaped scatterer at various scattering edges, are distinguished in balanced geometry where source-scatterer and scatterer-locator strong edge stay steady all through. The strategy for deciding the incoherent scattering cross section at any aggie then comprises of acquiring the partial number of gamma ray dissipated at that edge. The quantity of includes in the region under the photo peak in the dissipated range is 'resolved which is identified with the differential incoherent scattering cross section, proficiency of identifier, the strong edge subtended by the indicator at scatterer, number of electrons exposed to the occurrence bar and the power of photon source. In the event that different components are known precisely, the differential incoherent scattering cross section can be resolved. To kill the mistake which might be available in the assurance of source quality and scatterer-locator strong point, the typical practice is to utilize an auxiliary wellspring of much diminished quality in the situation of scatterer and to record the information in indistinguishable geometry. On the other hand dissipated range is contrasted and that got by supplanting scatterer by low-z material, normally aluminum. The hidden supposition in utilizing such auxiliary scatterer is that because of their little restricting vitality the

electrons of aluminum atom can be considered as free. Ordinarily at little scattering edge auxiliary source is utilized while everywhere scattering point auxiliary scatterer is liked. At that point information on two checks and relative estimation of solidarity of essential and auxiliary source related to other realized variables give the differential incoherent scattering cross section.

One major issue engaged with such estimation particularly at little scattering point is that in the range of dispersed photons the incoherently dissipated photons are not unmistakably isolated from coherently dispersed ones. Sanjeevaiah et al (1980) in their estimation with 662 keV photons at little scattering points, subtracted the coherent scattering cross section by figuring it hypothetically. To consider the self retention and multiple scattering within the scatterer numerous specialists have assessed the differential scattering cross section at various objective thicknesses. The incoherent scattering cross section along these lines got by extrapolating these to zero scatterer thickness. Sanjeevaiah et al (1980), Eao et al (1983) to give some examples who have pursued such method.

Plate scatterer and Ge(Ii) indicators are additionally utilized by certain specialists. With high goals Ge(li) indicator the issue of confining the incoherently dispersed photons from coherently dissipated ones gets more straightforward. Schumacher (1971) used the Ge(li) indicator for estimation of differential scattering cross section of 662 keV photons in Pb at three scattering edges 62°, 85° and 135° separately. They utilized auxiliary scatterer with the goal that the effectiveness factors commonly counteract from expression of differential cross section. By coordinating the experimentally watched cross section profile over the dissipated photon vitality differential cross section was gotten. The outcomes were contrasted and relativistic structure factor figuring.

Uniform affectability photon counters grew indigenously in our research facility have been utilized as of late by Ray (1978) for estimation of incoherent scattering cross section in ring geometry set up. The counter basically included a Nal(Tl) identifier fitted with appropriately picked aluminum channel. The technique utilized to locate the dispersed force is anyway not the same as that utilized by Singh et al (1963). Rather than considering the checks under the photo peak because of inelastic scattering Ray decided the tally rate because of both coherently and incoherently dispersed photons. Prom the deliberate all out differential scattering cross-section he subtracted the coherent commitment determined hypothetically.

Intriguing uses of incoherent scattering of gamma ray have been accounted for as of late by Sanjeevaiah et al (1983). The strategy is helpful to locate the differential incoherent scattering cross section for situations where the example f , in natural structure isn't accessible. Incoherent scattering cross section of strong or liquid compound of these components is resolved experimentally wherefrom the commitment because of individual constituents is discovered utilizing mixture rule.

In the accompanying a rundown of whole atom incoherent scattering estimation, both integral and differential, is displayed.

a) Integral estimation : Ramana Rao, et al (1965) (280 keV, 0. Al. Cu, Gl), Ramana Rao et al (1965) (84, 100, 129, 145 keV, C, Cu, Al), Parthasaradhi et al (1967) (320, 44, 662, keV, G, Al, Gu, Svi), Parthasaradhi (1968) (145-662 keY, Al, Cu, Pb), Gopal et al (1973) (84, 129, 145, 279, 322, 662 keV, C, Al, Gu, Sn, Pb), lakshminarayana et al (1984) (Y, Cs, Eu, Dy),

b) Differential estimation : Singh et al (1963) (662 keV, Fe, 20° - 90°), R. Quivy (1966) (662 keV, Pb, 20° - 160°), Sahota et al (1966) (662 keV, 1.25 MeV, Al Pe, Pb, 40° - 90°), Schumacher (1971) (662 keV, Pb, 62°, 85°, 135°), Sinha et al (1976) (662 keV, 1.33 MeV, low, medications and high z component, 10° - 165°), Shivaramu et al (1977) (662 keV Pe, Cu, Sn, 30° - 130°), Shivaramu et al (1978), (662 keY, Pb, 10° - 120°), Kane et al (1978) (1.17 and 1.33 MeV, Pb, 4,5°-8°), S.T.P.V.J. Swamy (1979) (279 keV, Pt,30°-150°) Sengupta et al (1979) (145 keY 1.33 MeY, low, prescription and high Z component, 15° - 170°), Shivaramu et al (1980) (279, 322, 662, 1115 keV, Gu, Sn, Pb, 10°-120°), Visweswara Rao et al (1981), P.P. Kane et al (1983), (1.17 and 1.33 MeV, Pb, Gu, Sn, 4.5°-12.05°), Yisweswara Rao et al (1983) (84.4, 123.6, 145 and 320 keV, Sc, I, la, Gu, Gd, Dy, W, Pt, l Pb, 30°-130°).

Most experimenter contrast their outcome and either Klein-Nishina theory or with non relativistic incoherent scattering function, assessed utilizing different model of charge dispersion. The most well-known and generally utilized models being those due to Hartruee-Pock or Thomas-Fermi.

Quivy (1966) saw experimental outcomes as in great concurrence with KLein-Nishina theory for scattering points above 30° while a few creators [Rao et al (1983), Goncalves et si (1984), Sengupta et al (1982)J have discovered the non-relativistic incoherent scattering function dependent on HF figuring to give a decent gauge of the scattering cross section over the whole scope of scattering points. A couple of years back Biggs and virgule f-J (1973) examined the status of experimental information of whole atom differential incoherent scattering cross section

wherefrom apparently the information covers just a restricted locale of force move, additionally the information contain enormous experimental vulnerability. Most prominent disparity was found for instances of low force move. For low Z components (Z< 6) the experiments will in general support the incoherent scattering function dependent on Brown's design interaction figuring (Brown 1970, 1971, 1974) as opposed to the non-relativistic HF estimations of Gromer (1969). For higher Z components the concurrence with the Gromer esteems is within the experimental mistake bar except for A1 and Pb at low force move district, where the Cromer esteems are methodically higher.

CONCLUSION

We have looked at a muddled and a sound model for multiple scattering. The most conspicuous contrasts are the notable intelligible backscattering cone and a significant forward projection. We have thought about the forecasts of these two models to the experimental aftereffect of the natural radiation pressure power following up on the focal point of mass of the nuclear cloud and found that this power is certifiably not a decent contender to distinguish lucidness impacts in multiple scattering. Utilizing a successful coupling quality for the particle light coupling in multiple scattering, we locate a palatable quantitative understanding between the analysis and the numerical model. It is fascinating to think about how these outcomes contrast with past hypothetical and experimental outcomes, where a mean field approach as far as single photon super radiance has been utilized.

REFERENCES

1. Storruste, A. and Tjom, P.0. (1958), Nucl. Phys. 6, 151-

2. Strickler, T.D. (1953), Phys. Rev. £2, 923*

3. Sujkowski, Z. and Nagel, B., (1961), Arkiv, Pysik, 20, 323-

4. Swamy, S.T.P.Y.J. and Murty, D.S.R. (1976), Physica, 840, 289.

5. Swamy, S.T.P.Y.J., (1979), Ind. J. Pure Appl. Phys., 16, 800.

6. Talukdar, B., Mukhopadhyaya, S. and Ghatterjee, D. (1971), Phys. lett. 35A. 37-

7. Tamm, I. (1930), Z. Physik, 62, 545.

8. Thomas, l.H. (1926), Proe. Capb. Philos. Soc., 25, 542.

9. Tommasino, L. (1970), Int. Report, lab. Dosimetria e Standardizzazione, CUM, Gasaccia, Roma, Italy.

10. Tommasino, 1. and Armellini, G. (1973), Radiat. Effects, 20, 253-

11. Tseng, H.K., Gavrila, M. and Pratt, R.H. (1973), University of Pittsburgh, Rep. No. 2.

12. Yarma, J. and Eswaran, M.A. (1962), PRys. Rev., 127. 1197.

13. Yeigele, ¥m. J., Briggs, E., Henry, E.M., Bates, L. and Bracewell, B. (1971), Kaman Sciences Corp. (Colorado Springs, Colo.), Report KBf-71-43l(R), 1, Rev.l.

14. Veigele, Wm. J. (1973), Atomic Data, 51*

15. Veigele, Wm. J., Briggs, E.A., Brown, R.T., Cromer, D.T., Howerton, R.J. and HuRRelt, J.H. (1975), J. PRys. CRem. Ref. Data, 4, 471.

16. yon Droste, G. (1936), Z. PRysik, 100. 529- Waller, I. and Hartree, D.R. (1929), Proc. Roy. Soc. A124. 119-

17. Writing Ram, I.B. (1971) J .Plays. A, ±, 21.

18. Writing Ram, I.B. (1981), Aust. J. PRys., I63.

19. Williams, B.G. (1977), Compton Scattering (Me Graw-Hill, Hew York) Wilson R.R. (1951), PRys. Rev. 82, 295- Wilson, R.R., (1953), PRys. Rev. £0, 720.

20. Young, D.A., (1958), Hature (london), 182, 375* Yukawa, H. and SaRata, S., (1937), Sci. Jap. Inst. PRys. CRem. Res. (Tokyo) 21, 187.

21. Zernick, W. (I960), PRys. Rev. 120, 549.

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