

Notes from Tony Duncan to Guide Reading of Kramers and Heisenberg, "On the Dispersion of Radiation by Atoms."

My input would be most helpful in trying to decipher the Kramers–Heisenberg paper. In reading this paper (after "On the verge..." Part 2) one should bear in mind that

(i) the derivation we present in "On the verge.." concentrates on the case where the outgoing and incident light are plane polarized and parallel, so that the $x(t)$ is just a single coordinate (in the direction of the applied electric field E). In Kramers–Heisenberg, the "electrical moment of the atom" (ie dipole moment, ie electron charge times coordinate vector of the radiating electron) is a three vector, as is the applied electric field, and dot products of vectors A and B are written (AB) . This allows them to discuss arbitrary polarizations (although that really does not play a big role in the paper).

(ii) Our formula (100) corresponds to (18) in Kramers–Heisenberg, (101) (the subset of coherent terms) to (25,26) in K–H.

(iii) The inspired guesswork appears (for the incoherent case) in the replacements K–H(32), which lead to (33). The sums over R_a, R_b, R_c in (40,41,42) are disguised multiplications of coordinate matrices.