If we neglect the effect of nuclear Coulomb field on incident and outgoing electrons

$$\langle \alpha\beta | J^a | \sigma \rangle = \int d\vec{r}\, e^{i\vec{q}\cdot\vec{r}} \langle \Psi_f^{\alpha\beta} | j^a | \Psi_i^{\sigma} \rangle$$

only depend on q, ω, p' and the angle γ between $\vec{p}'$ and $\vec{q}$

ρ_{ab}^{γ} contains the dependence on elektron kinematics

$$\rho_{ab}^{\gamma} = \rho_{ab}^{S} + h\, \rho_{ab}^{A} \qquad h = \text{electron helicity}$$

$$\rho_{00}^{S} = 2\epsilon_L \qquad \rho_{xx}^{S} = (1+\epsilon\cos 2\alpha) \qquad \rho_{yy}^{S} = (1-\epsilon\cos 2\alpha)$$

$$\rho_{0x}^{S} = -\left[2\epsilon_L(1+\epsilon)\right]^{1/2}\cos\alpha \qquad \rho_{0y}^{S} = \left[2\epsilon_L(1+\epsilon)\right]^{1/2}\sin\alpha \qquad \rho_{xy}^{S} = -\epsilon\sin 2\alpha$$

$$\rho_{0x}^{A} = i\left[2\epsilon_L(1-\epsilon)\right]^{1/2}\sin\alpha \qquad \rho_{0y}^{A} = i\left[2\epsilon_L(1-\epsilon)\right]^{1/2}\cos\alpha \qquad \rho_{xy}^{A} = -i\left(1-\epsilon^2\right)^{1/2}$$

$\epsilon_L = -\dfrac{q_\nu^2}{q^2}\,\epsilon$, α = angle between The scattering plane of The electron and The $\vec{p}'\vec{q}$ plane.

Polarization density matrices are given in Terms of irreducible statistical Tensors

$$\rho_{\alpha\alpha'} = \frac{1}{\sqrt{2S+1}} \sum_{kq} (-)^{S-\alpha} (S S \alpha' -\alpha | kq)\, t_{kq}$$

S = intrinsic spin

$t_{00} = Tr(\rho)$, The normalization $t_{00} = 1$

$$\rho_{\alpha\alpha'} = \frac{1}{2S+1}\delta_{\alpha\alpha'} \qquad \text{for an unpolarized particle}$$