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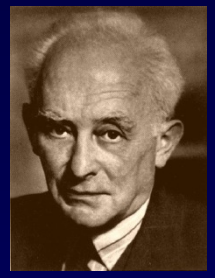
I.2 ON THE QUANTUM MECHANICS OF COLLISIONS

[Preliminary communication]†

MAX BORN



Through the investigation of collisions it is argued that quantum mechanics in the Schrödinger form allows one to describe not only stationary states but also quantum jumps.

If one translates this result into terms of particles, only one interpretation is possible. $\Phi_{n,m}(\alpha, \beta, \gamma)$ gives the probability* for the electron, arriving from the z-direction, to be thrown out into the direction designated by the angles α, β, γ, with the phase change δ. Here its energy τ has increased by one quantum $h\nu^{0}_{nm}$ at the

* Addition in proof: More careful consideration shows that the probability is proportional to the square of the quantity $\Phi_{n,m}$.

"Again an idea of Einstein's gave me the lead. He had tried to make the duality of particles – light quanta or photons - and waves comprehensible by interpreting the square of the optical wave amplitudes as probability density for the occurrence of photons. This concept could at once be carried over to the Ψ-function: $|\Psi|^2$ ought to represent the probability density for electrons (or other particles). It was easy to assert this, but how could it be proved?" M. Born, Nobel Lecture (1954).