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PS3-07 Electron Channeling Resonance and de Broglie's Internal Clock

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Louis de Broglie predicted that the electron has an internal clock oscillating with frequency $\nu_B=(m_e c^2)/h$ determined by its rest mass me [1]. He then deduced that the frequency of a moving electron observed in a laboratory will be $\nu_L=\nu_B/\gamma$ where γ is the relativistic time dilation factor. Detecting the internal electron clock seemed out of the question because of the ultrahigh frequency $\nu_B \sim 〖10〗^{20}\ s^{(-1)}$. The possibility of direct detection as a resonance in electron channeling has been investigated in reference [2, 3]. An early experiment showed a resonance for Si <110> at electron momentum 81 MeV/c [4, 5, 6]. An experiment is under way at DAFNE-BTF (Frascati) with <110> Ge at electron momentum 84 MeV/c to confirm it.
In this work we simulated the structure of the internal clock model in considerable detail with the aim of identifying new experimental implications. The properties of both angular and spatial distribution of electrons under resonance condition at <100> and <110> channeling in germanium crystal have been investigated. The simulation of trajectories, angular and spatial distributions of electrons on the screen monitor has been performed taking into account initial spatial of electron beam with and without resonance.

References

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