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Influence of secondary electron emission on particle generation in a pyroelectric accelerator

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The concept of a pyroelectric accelerator entails a compact device that does not require an external high-voltage circuit or the use of hazardous materials. This enables the generation of an electron flow within a narrow energy range, which converges at a certain distance from the surface of the pyroelectric crystal when its temperature changes in a vacuum. Utilizing a target with a hole promotes the collimation of the electron flow to a specific energy level.

Nevertheless, secondary electron emission from the surfaces of the collimator target and the vacuum chamber strongly influences the dynamics of the electron flow. This limitation can hinder the increase in electron energy and trigger avalanche processes in the space between the crystal and the target. These processes have been studied both experimentally and through computer simulations. This discussion encompasses the mechanisms through which secondary electrons influence the primary electron flow from the crystal surface, as well as the stability of the pyroelectric accelerator.

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