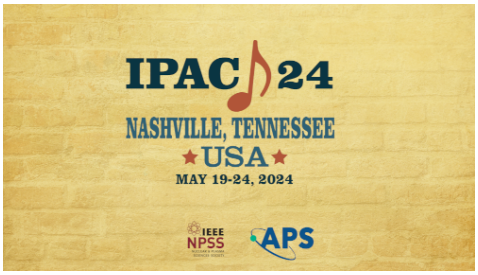


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# Calculation of focal spot of secondary X-rays generated by high-energy electron beam bombarding of heavy metal targets

*Monday, 20 May 2024 16:00 (2 hours)*

One of the main methods to generate X-rays is to bombard metal targets with electron beams. However, this process introduces uncertainty in the electron transport, which leads to uncertainty in the position and momentum of the secondary X-rays. As a result, the focal spot of the X-rays is larger than the electron beam. In this paper, we use the Monte Carlo software Geant4 to investigate the conditions for minimizing the X-ray focal spot size. We assign different weights to the X-rays according to their energy components, based on the actual application parameters, and calculate the focal spot size for three target materials: lead, copper, and tungsten, finding that when the incident electron energy is in the MeV range and the electron source radius is 1 um, the mass thickness of the target of 1.935×10e-3 g/cmˆ2 is the limit for achieving the smallest equivalent focal spot size.

## Footnotes

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