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Analysis of laser engineered surface structures' roughness and surface impedance

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This study examines Laser Engineered Surface Structures (LESS) in the context of their potential application within particle accelerators. These structures are investigated due to their efficient reduction of secondary electron yield to counteract the formation of electron clouds, a phenomenon detrimental to accelerator performance. A critical aspect of their evaluation involves understanding their radio-frequency characteristics to determine their influence on beam impedance.

LESS involves intricate surface modifications, integrating etched grooves and deposited particulates, resulting in a complex surface topology. Measurements are conducted on two distinct surface patterns, from which particulates are then removed with incremental cleaning. Acquired data form the basis for mathematical models elucidating observed results.

Novel approaches are investigated in addition to several established surface roughness models, including analysis of geometrical attributes of the surface topology and the associated electric currents. The aim is to develop a framework that describes roughness's influence across varying scales to assist in selecting appropriate treatment parameters.

Footnotes

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Europe

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