



Contribution ID: 102

Type: Oral

High Efficiency Traveling Wave Linac

Wednesday, 17 May 2023 11:40 (20 minutes)

The accelerating structure is a critical component of particle accelerators for medical, security, industrial and scientific applications. Standing-wave side-coupled accelerating structures with small apertures and nosecones are used when available rf power is at a premium and average current and average power lost in the structure are large. Meanwhile, typical on-axis coupled traveling wave structures have relatively low shunt impedance because rf power flows through the aperture, which therefore cannot be small. Here, we present a traveling wave accelerating structure that combines the high shunt impedance of nosecone standing wave structures with the advantages of traveling wave structures such as easier fabrication and tuning. As an example of its application, we will show the physics design of a compact X-band linac with pulse-to-pulse tunable output energy.

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Session Classification: Accelerator: Normal Conducting RF

Track Classification: Accelerator: Normal Conducting RF