



Contribution ID: 158

Type: talk

500 MeV High Efficiency Demonstrator for the AWA Short-Pulse Two Beam Accelerator

Tuesday, 17 September 2019 17:10 (20 minutes)

The Argonne Wakefield Accelerator (AWA) group develops the Structure Wakefield Acceleration (SWFA) concept for a future multi-TeV electron-positron linear collider. The main SWFA approach being considered at the AWA is short-pulse (~25 nsec) two-beam accelerator (TBA). An important milestone for this technology will be to demonstrate substantial energy gain using the TBA scheme. To this end, the AWA is planning to install a “500 MeV high efficiency demonstrator” in the AWA facility. It will consist of two stages with two structures per stage to boost the main beam energy from 15 MeV to 500 MeV. Dielectric disk power extractors and high shunt impedance accelerators will be used to achieve 1.2 GW rf power generation and 250 MV/m gradient. The rf to main beam efficiency will also be improved by main beam shaping technologies developed at AWA.

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Session Classification: WG8

Track Classification: WG8 - Advanced and novel accelerators for High Energy Physics