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High Power Linacs for ADS[1]

JOHN GALAMBOS, Oak Ridge National Laboratory

Accelerator Driven Sub-critical (ADS) fission systems are proposed for energy production and for burners of long-lived fission product wastes. Generally the ADS concepts involve using beams of $\sim$ 1 GeV protons with powers of $\sim$10 MW. An important requirement is high reliability, with minimal machine trip rates. Superconducting RF powered linear accelerators have been proposed as an accelerator choice, as an approach to high reliability, modest operating cost accelerator technology. The advantage in operational reliability arises from the possibility of providing additional standby accelerating cavities that can be rapidly brought online to compensate for accelerating components that may have equipment issues. Also, the recent demonstration of 1 MW, 1 GeV proton beam operation with a superconducting linac for over 5000 hours/year at the Spallation Neutron Source (SNS) offers confidence in the approach. A description of the technologies involved in high power proton linacs and a review of the SNS experience will be given. Also beam loss requirements and experience will be discussed.

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