Proton Linacs as ADS Drivers

The presentation will focus on the potential and the main critical issues for high power proton linacs to drive a subcritical reactor. As an introduction the main beam requirements for an Accelerator Driven System (ADS) will be reminded: to safely guide and accelerate a continuous wave (CW) MW class beam with a high level of performance, and thus with an extreme level of reliability. Then, the choice for using RF superconducting resonators to accelerate a CW beam will be explained. The main criteria to optimise the transition between normal conducting and superconducting accelerating structures will also be discussed. The second part of the presentation will focus on the reliability requirements to drive an ADS, and the guidelines to follow to fulfil these requirements. The concepts of Fault-Tolerance and Fast Failure Compensation will therefore be introduced. Finally, the impact of such concepts on the linac design, on the beam dynamics, as well as on the R&D – in particular for accelerating structures - will be exposed. Throughout the presentation, the arguments will be supported by examples of linacs presently operated or on-going projects such as: the Oak Ridge Spallation Neutron Source, the European Spallation Source, the Chinese ADS linac and more particularly the studies for the MYRRHA linac.