



Contribution ID: 25

Type: **invited**

Automation of Large Scale RF Systems

Wednesday 12 October 2005 10:00 (20 minutes)

Future accelerator projects such as the European X-FEL and the International Linear Collider (ILC) will require the operation of the order of 1000 to 10,000 cavities. The operation of these large scale RF systems must be highly automated to guarantee high performance and availability of the linacs.

The automation must provide a framework in the accelerator control system such as sequencers or state machines which allow the implementation of operational procedures developed by experts or operators. The procedures include turn-on procedures, basic parameter settings, exception handling and self protection of the system.

In addition, the automation should provide a procedure to continuously optimize machine parameters operating close to the performance limit where a human operator would be overstrained by the quantity of single subsystems to be operated and the complexity in interaction between the systems and influence on the beam quality at the end.

It looks like due to the evolution of procedures, the lack of concept the large scale linear accelerator facilities nowadays planned will run into problems.

We describe a useful ansatz for an automation concept and a concept for a universal interface for implementing each of the single accelerator components to be automated.

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Session Classification: Talks Session 3