



Progress in NC Accelerator Structures

November, 2007

Juwen Wang

Progress in NC Accelerator Structures

- Presentation in the EDR Kick off Meeting for e⁻ Source at SLAC on 9/24/2007.
- Presentation in the EDR Kick off Meeting for e⁺ Source at Daresbury on 10/9/2007 through Webex.
- RF Systems for both e⁻ and e⁺ sources.
- Work Scopes for both e⁻ and e⁺ sources in the EDR phase.
- Necessarity of Funding for the R&D of TW Structures.
- RF Processing is going very well, Faya will give a detailed presentation.

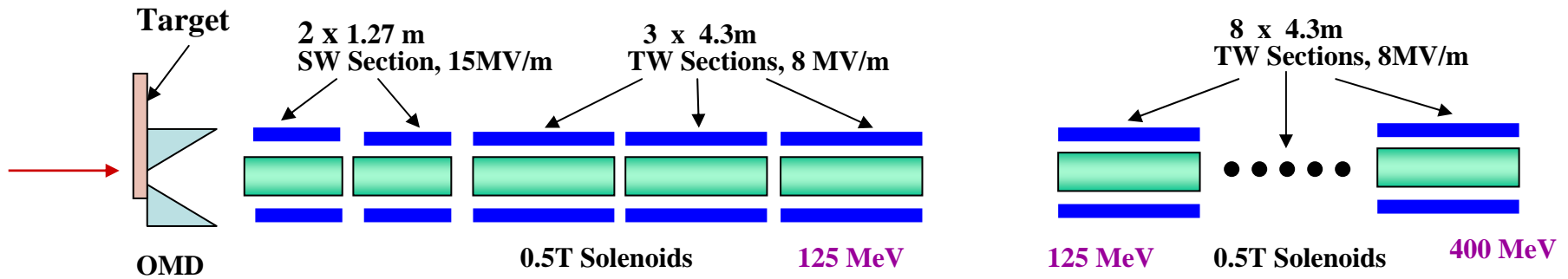
Similar Outline for Both the Talks in e^- and e^+ EDR Kick Off Meetings

- System Layout.
- Accelerator Structures and System Components.
- SLAC Expertise in NC Accelerator Structures
Design and Fabrication Technology.
- Scope of Work.
- Justification of Funding for NC RF System.

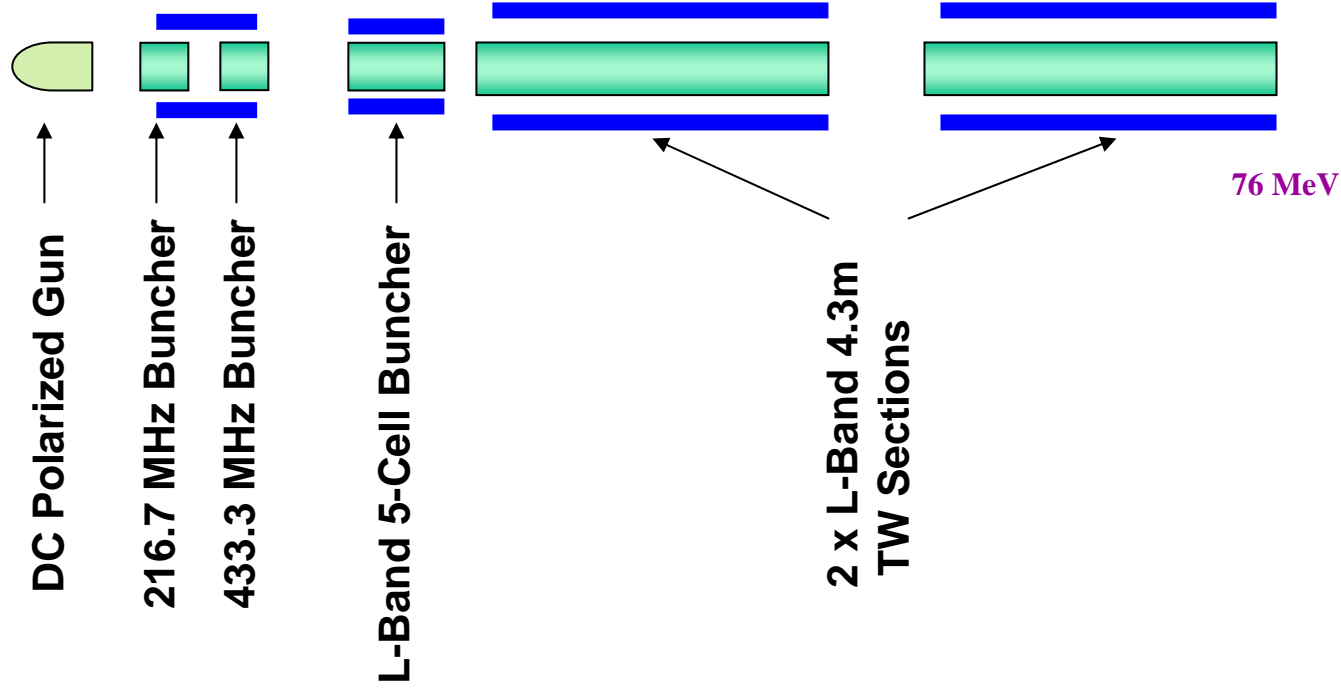
Layout of NC RF System for e^+ Source

Similar Systems for Both

- Main Source
- Keep Alive Source



Layout of NC RF System for e⁻ Source



Scope of Work for e+ Source

- Design of Structure RF Parameters and Power Efficiency, Thermal Calculations and Stability Studies.
 - SW Capture Accelerator Structure.
Design completed and a 5-cell prototype has been built and ready for high power test.
 - TW Pre-Acceleration Structures: completed electrical design.
Parameter design completed and plan to have funding for the design, fabrication and high power test of a short prototype.
- RF Distribution System.
- Key RF components: phase shifters, circulators, windows...
- Design for Other Related Systems:
 - Solenoids and Power Supplies;
 - Vacuum System;
 - Pressured Gas System;
 - Cooling System;
 - Low Level RF System.
- Detailed Parts Count and Cost Estimation.

Scope of Work for e⁻ Source

- Design for RF Parameters and Power Efficiency, Thermal Calculations and Stability Studies.
 - SHB1: single cell structure optimization;
 - SHB2: single cell structure optimization;
 - Buncher: Pro and Cons for SW or TW with smaller aperture;
 - TW Accelerator Structures: ~ completed electrical design.
- RF Distribution System.
- Key RF components: phase shifters, attenuators, circulators, windows...
- Design for Other Related Systems:
 - Solenoids and Power Supplies;
 - Vacuum System;
 - Pressured Gas System;
 - Cooling System;
 - Low Level RF System.
- Detailed Parts Count and Cost Estimation.

We need Funding for the R&D of TW Structures

In order to have a solid design for both positron and electron sources, It is needed to pay a great attention on R&D program for the traveling wave structures. We need to have funding for a short TW structure.

There are many challenges in both electrical, mechanical design as well as fabrication aspects:

- They are long, the balanced cooling and pumping system needs to be carefully studied and inductive brazing technique needs to be practiced at SLAC.
- They have low group velocity (as low as $0.16\%c$), the impact of big transient effects need to be investigated and tested.
- They work at long beam pulses (1 ms), the operational stabilization needs to be carefully studied and tested.

High Power Test of a 5-Cell SW Prototype Structure for Capture Section of e⁺ and e⁻ Sources

