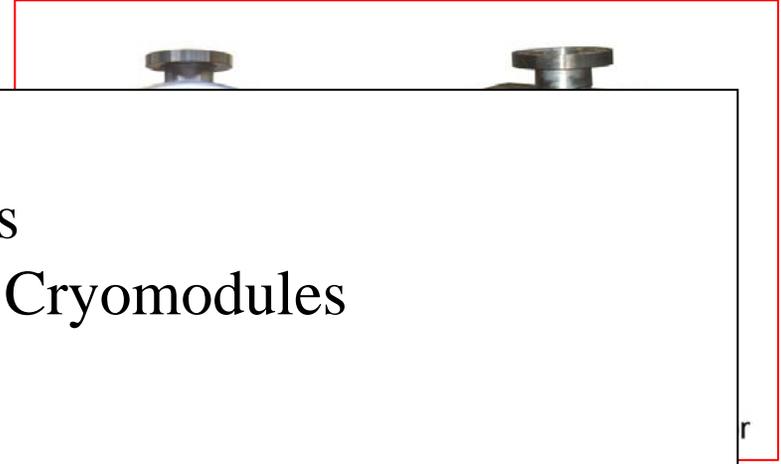


HINS R&D: a possible Project X Front End

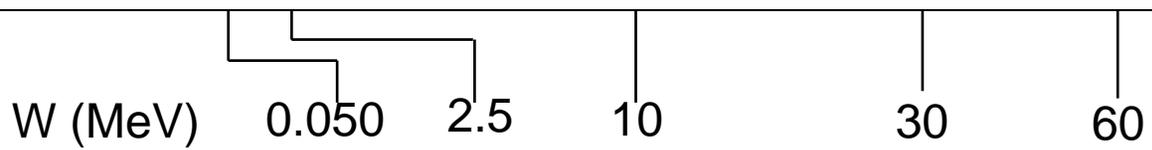


Beam Line Elements:

- 19 Conventional RT Cavities
- 29 SC Spoke Cavities and 3 Cryomodules
- 42 SC Focusing Solenoids

RF Power Elements:

- one 325 MHz Klystron/Modulator
- one 400 kW RFQ FVM
- 19 ~20 kW FVM/Fast Tuning for RT Section
- 29 ~20-120 kW FVM/Fast Tuning for SC Section
- Power Supplies, quench protection, beam diagnostic,...



ANL-FNAL Collaboration on R&D

- **HINS R&D Phase: Proof of innovative approach to high intensity beam acceleration !**
 - 2007-2011/12 R&D period
 - **Prove, Develop & Build Front-End in Meson Bldg. at 325 MHz (0-60 MeV) since much of the technical complexity is in the FE Mechanical/RF Systems**
 - **Demonstrate for the first time Amplitude/Phase Modulator (FVM) Technology and RF Power Scheme with H⁻**
 - **Demonstrate for the first time RT-SC Transition at 10 MeV for High Intensity**
 - **Acquire capability to test/operate SC Spoke Cavities at FNAL**
 - **Demonstrate for the first time beam loading and pulsed operation of Spoke Cavities**
 - **Demonstrate Axis-Symmetric focusing and Beam Chopping**
 - **Demonstrate for the first time the ability to drive multiple RT and SC Sections with a single klystron**
 - **Retain conceptual design compatibility between HINS and ILC**
 - **$\beta=1$ R&D is necessary in the event of an 8 GeV Linac phase**
- **Project X Linac Phase:**
 - “Post-2011/12” period

ANL-FNAL

- In FY06 and FY07, some level of funding for the HINS program has allowed a limited-scope collaboration between ANL and FNAL for activities related to the design and development of the technology.
- **FY06**
 - 350 k\$ **Beam Analysis and Design**
 - 350k\$ **Single Spoke Resonators design and US Industry Develop.**
- **FY07**
 - 150 k\$ **Beam Analysis and Design**
 - + additional support for a Guest Scientist (S. Aseev)
 - 50k\$ **Single Spoke Resonator Processing (US Prototypes)**
- **FY08 Proposal (still to be discussed with ANL Management)**
 - 150 k\$ **Beam Analysis and Design**
 - + additional support to a Guest Scientist (S. Aseev)
 - 50k\$ **Single Spoke Resonators Processing (India Prototypes)**

HINS Mid-Term Future Activities



- **FY09 & FY10 “Hopes”**
 - Strengthen ANL-FNAL Collaboration on HINS/AEBL
 - ?? k\$ Processing of ~20 Single Spoke Resonators for HINS
 - ?? k\$ Large Scale Production (& Industrialization) of SCSR in US

1M\$ Question:

Will (how/when) HINS and Project X converge ?

- Final decision on advanced (i.e. HINS-like) or conventional (SNS-like) Front End for the Linac portion of Project X will (*should*) be the subject of an engineering, cost, risk and benefit analysis by the Management team in the early stages of an approved Project X
 - Project X Accelerator workshop at FNAL (Nov 12-13 2007) has maintained the endorsement (already expressed by FNAL AAC Review) of the HINS R&D innovative effort.
- HINS as novel FE technique will likely continue to completion of 60 MeV FE through ~FY11-FY12
 - Funding for ANL-FNAL Collaboration
 - Fertile ground for development of ideas (SC to 10 MeV, solenoidal focusing) and technology (Spoke resonators, AEBL-Project X alignment, ...)
 - Cavities processing and (possibly) testing, possible focusing magnets from FNAL for AEBL,..

- **If HINS technology chosen for Project X FE**
 - **Interest on major “sub-project” expressed by ANL at Project X workshop:**
 - **TSR**
 - 66 cavities
 - 11 or 22 cryomodules
 - **Spoke Cavities Processing**
 - **Participation in commissioning of 60 MeV Linac**
 - **Beam Dynamics Performance validation on 60 MeV Linac**
 - **Alignment of cavities development for Project X and AEBL**