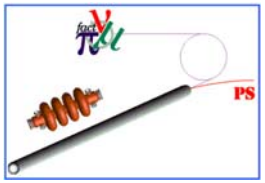
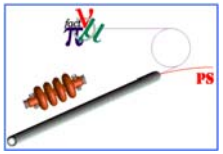
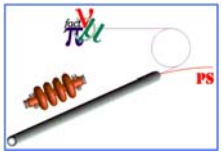


Status of CERN Injectors Upgrades

- SPL CDR-2
- Progress with linac4 developments
- Planning (update)

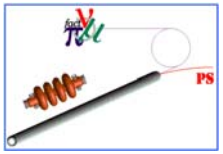


SPL CONCEPTUAL DESIGN nb. 2



SPL CDR-2

- Motivation for CDR-2:
  - Refined estimate of the physics needs: neutrino superbeam with a 150 km detector => 3.5 GeV proton beam energy
  - Very good results on $\beta<1$ 704MHz bulk niobium superconducting cavities
  - Improved cost/performance ratio
- Contributors:
  - SPL study group
  - CEA (Saclay)
  - INFN (Milano)
- Planning:
  - Publication at end 2005

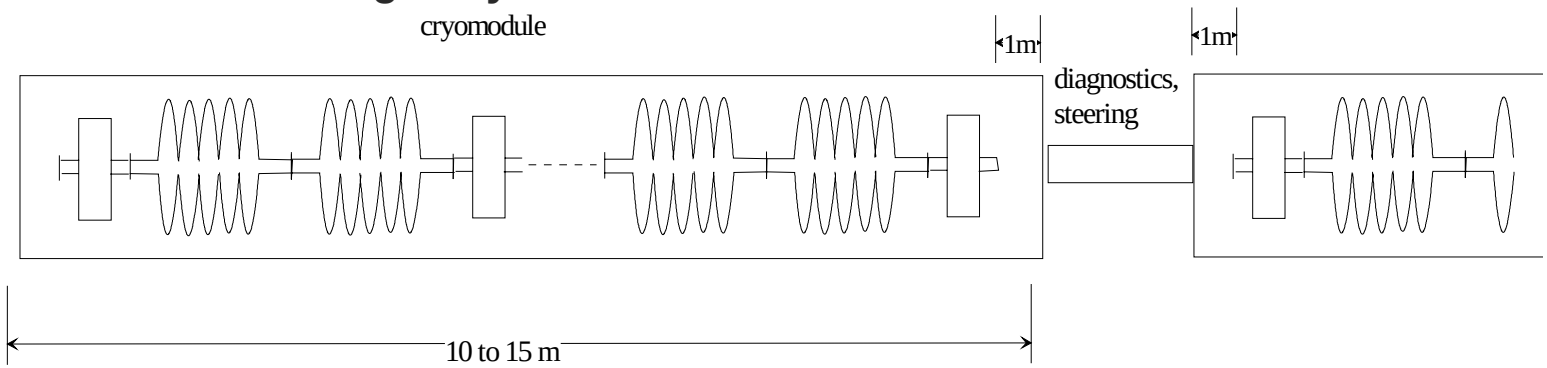


SPL - CDR2 parameters

Ion species	**H^-**	
Kinetic energy	**3.5**	**GeV**
Mean current during the pulse	**40 (30 ?)**	**mA**
Mean beam power	**4**	**MW**
Pulse repetition rate	**50**	**Hz**
Pulse duration	**0.57 (0.76 ?)**	**ms**
Bunch frequency	**352.2**	**MHz**
Duty cycle during the pulse	**62 (5/8)**	**%**
rms transverse emittances	**0.4**	**π mm mrad**
Longitudinal rms emittance	**0.3**	**π deg MeV**

SPL - CDR2 baseline

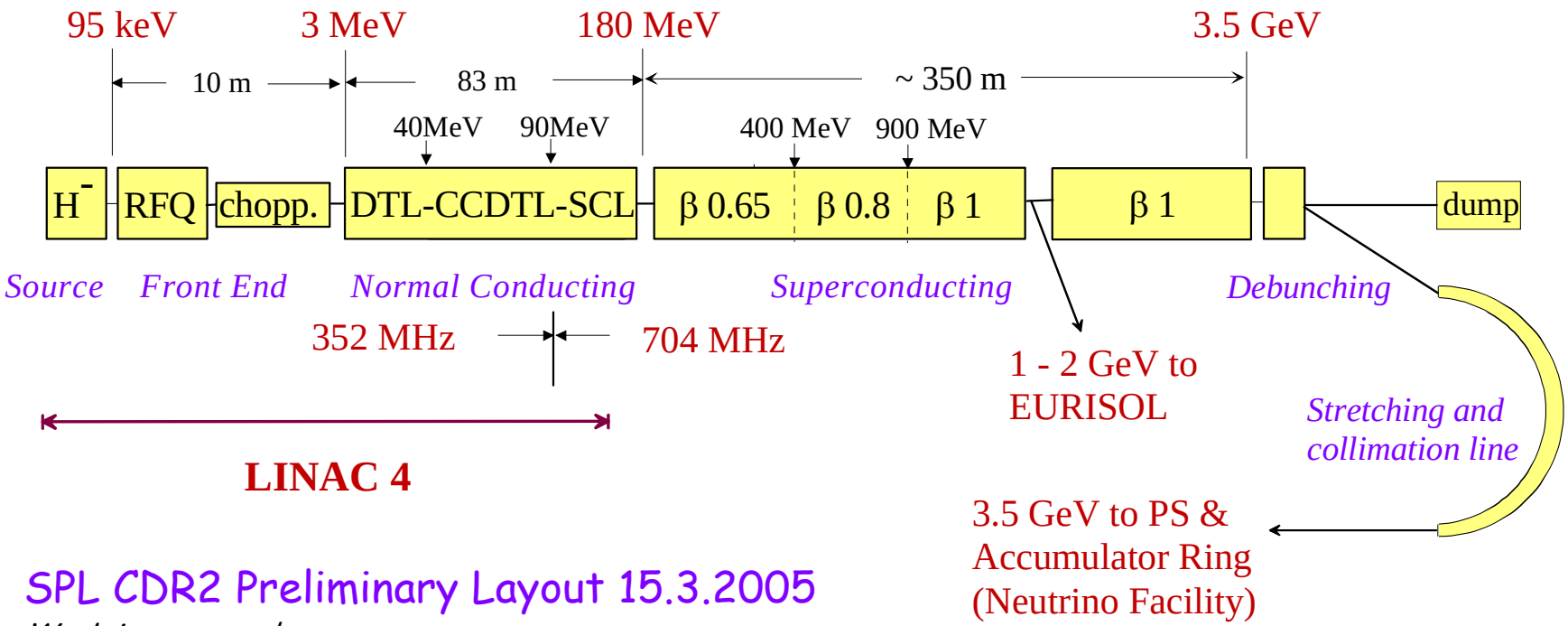
- Cold (2K) quadrupoles inside cryomodules (=> less cold/warm transitions + higher real estate gradient + larger aperture).
- Cryomodules of maximum length (between 10 and 15 m), containing n cavities and (n+1) quadrupoles. Diagnostics, steering etc. between cryomodules.
- Cavities length limited by fabrication and handling considerations => 5, 6 or 7 cells per cavity for the three sections.
- 2 MW max power /coupler
- Standard design beyond 2 GeV



- 704 MHz bulk Niobium cavities
- 3 families : beta =0.5,0.85,1.0
- gradients : 19, 24, 25 MV/m
- 5, 6 and 7 cells per cavity

SPL - CDR2 block diagram

SPL2 : 0 to 3.5 GeV in 450 meters



SPL CDR2 Preliminary Layout 15.3.2005

Work in progress!

PROGRESS WITH LINAC4 DEVELOPMENTS

Collaborations

- **IPHI-CERN**

  RFQ construction is progressing
  - Need for one more thermal treatment at 600 deg.
  - Planning refined
  - 1 set of vanes have now been fully processed and machined. RF measurements soon; if OK, brazing will follow…
- **HIPPI**

  Regular progress. First quarterly report issued for 2005.
- **ISTC projects**

  Meetings in Snezhinsk, Moscow and Sarov in the period 13-19, April:
  - Dynamic attitude from Russian management. Technological design progressing very well. Actions taken to solve the problems found.
  - If satisfying progress confirmed before end 2005, probable request for additional resources for the Alvarez DTL and the CCDTL.
- **CHINA**

  Collaboration meeting in Beijing (14-16, May):
  - Strong Chinese interest due to CSNS project.
  - Highly valuable Chinese contributions identified. Approval pending CSNS project authorization.
- **INDIA**

  Visit of Indian President on May 25:
  - Themes of collaboration well identified
  - Pending official signature

Resources

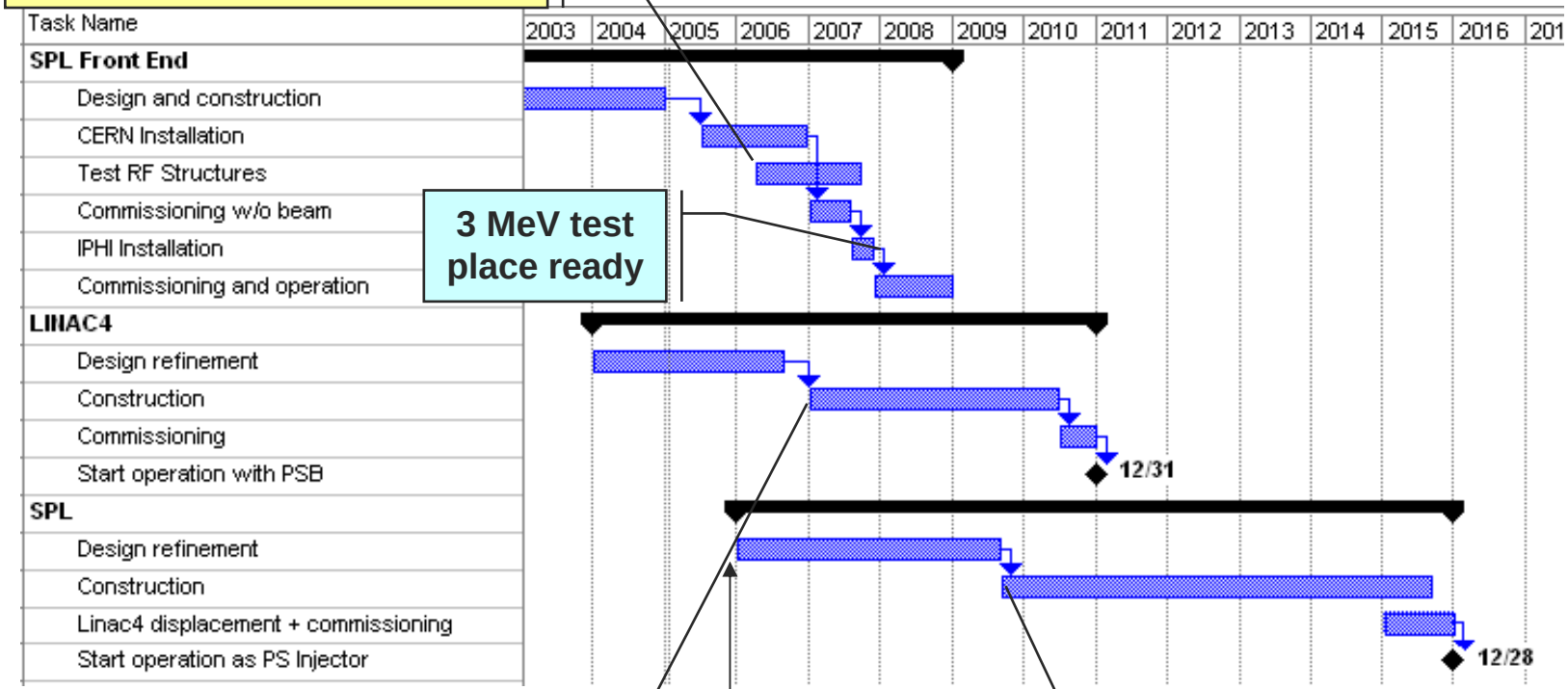
- **Total cost of the 3 MeV test place evaluated:**
  - ✓ Request to R. Aymar for additional resources in 2005, 6 and 7 at the rate of 400 kCHF/year
  - ✓ R. Aymar's approval obtained on the basis of the commitment to the EU and the need to progress correctly towards Linac4
- **However, resources are still tight:**
  - ✓ Additional unbudgeted items have been found…
  - ✓ More resources needed for the completion of the Russian prototypes
  - ✓ Need for an H- source

PLANNING
(Update)

Global planning

RF tests in SM 18 of prototype structures* for Linac4

* Quotes from R. Aymar (Jan.2005)



3 MeV test place ready

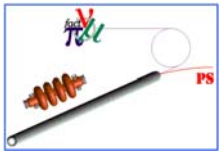
Linac4 approval *

"... in **2006-2007**, to decide on the ***implementation of the Linac 4 and any increased R&D programme***, depending on new funds made available and on a new HR policy"

CDR 2

SPL approval *

"in **2009-2010**, ***to review and redefine the strategy for CERN activities in the next decade 2011-2020 in the light of the first results from LHC and of progress and results from the previous actions.*** "



Next steps

- **Creation of two working groups reporting directly to the CERN direction:**
  - **"PAF" (Proton Accelerators of the Future") to elaborate, through multiple iterations with the physics group and under the control of the CERN direction, a baseline proposal for the next decade at CERN, as a basis for decision in 2010-2011.**
  - **"POFPA" (Physics Opportunities with Future Proton Accelerators) to receive and organize the physics proposals, formulate the needs to the PAF and interact with it to optimize the physics potential, within the constraints provided by the direction.**
- **Preparation of the special INTC meeting (CERN – October 2005)**
  - **AB department will probably submit proposals for contributions**