Meeting of the

European Global Design Effort

DESY, 10 May 2006

Report from INFN non EU-funded R&D

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Past with TTF/TESLA

- Cryomodules
  - Design, construction and assembling from Cry 1 to Cry 3 (BCD Reference)
  - Cost Optimization and Industrial Studies
- Cavities and Ancillaries
  - Cavity Fabrication, Cost Optimization and Industrial Studies
  - Coaxial Blade-Tuner developpment for superstructures (BCD Reference)
  - R&D on alternative fabrication techniques (spinning at LNL)
- Damping Rings
  - Layout and Engineering Design
  - Ultra-fast Multi-frequency RF Kickers
  - Cost Optimization and Industrial Studies
- Beam Diagnostics
  - OTR, DF, Bunch Length
- Photocathode development and production for: TTF, PITZ & A0
- TTF Remote Control

Present and Future with ILC

From S. Bertolucci conclusions (EGDE Oxford Meeting)

- INFN believes that the ILC is a historical opportunity to make the next step in the field, based on a truly global project.
- INFN will be investing resources to support a brisk R&D program on the accelerator and detectors.
- INFN will have a key role in the promotion of the scientific and financial case with the Italian Government.
- INFN will actively pursue collaboration agreements with all the major actors of the ILC enterprise.

ILC funding and human resources under discussion, **BUT**

- Approval of a strategic program expected by 2006
- Finalization of activities on ILC and group coordination
- Other INFN Groups (Pisa) are being integrated

INFN Ongoing R&D Activities - 1

Electron Sources (Milano)

- R&D on non polarized photocathodes for RF Guns.
  - INFN is pursuing the photocathode activity improving production and handling.
  - The alkali telluride photocathodes developed by INFN are being used in the Module Test Facilities (DESY and Fermilab) and can be used for non polarized auxiliary electron sources.

Positron Source (LNF)

- Preliminary R&D on the Compton based scheme:
  - Collaboration to electron ring design,
  - study of multi-turn storage in the positron damping ring,
  - preparation of a proposal for test of a laser cavity on the beam at LNF (SPARC or DAFNE).

INFN Ongoing R&D Activities - 2

Damping Rings (LNF)

- **Fast Kickers**: April 2006 - Build and test of a prototype of fast strip line kicker with the performance required for a 6 km Damping Ring (DR) (rise/fall time ≤ 6ns, angle 5 mrad @5GeV)
- December 2006 - Install a kicker system (2 kickers at π phase advance) on the DAFNE ring at INFN-LNF and test with beam
- **e-cloud studies**: Benchmarking of e-cloud codes with measurements at DAFNE,
- **Optimization of wiggler design**: Study effect of wigglers on beam dynamics. Optimization of wiggler design and its validation at DAFNE.
- **Collaboration to the design of the DR feedback systems**: Study of possible effects of the vertical feedback on the low vertical emittance, design of the longitudinal feedback kicker cavity (DAFNE type).
- **RF separators**: In 2007, based on the results obtained with the fast kickers, study the possibility of pushing the bunch distance to smaller values by using RF separators.
- *Participation and coordination of EUROTeV work package dedicated to Damping Rings (INFN-LNF)*

INFN Ongoing R&D Activities - 3

Main Linacs (Milano and Pisa + LNL)

- BCD Cryomodule design, based on the INFN-CRY3 experience. This is performed by INFN in collaboration with FNAL, KEK and DESY.
  - Cry3 documentation and specs (2 modules in construction at ZANON)
  - Construction of the first INFN-ILC Prototype ?
- Cryomodule special components
  - Composite support posts
  - Wire Position Monitors (WPM): cold diagnostics for alignment and vibrations
- Cavity ancillaries: INFN Blade-Tuner *(some EU support on piezo R&D)*
  - Extensive tests of the two already built piezo-assisted coaxial tuners, that are at present the most advanced and quoted candidate for ILC.
  - Design reviewing for cost reduction and ILC quotation
  - Realization of 8 blade-tuners for the INFN-ILC Prototype ?
- R&D on SC cavities:
  - HPR qualification (Milano),
  - Fabrication optimization (Milano) and spinning (LNL) *(mainly supported by EU)*
  - EP and EB parameter optimization, surface analysis of treated cavities, etc. (LNL) *(mainly supported by EU)*

INFN Ongoing R&D Activities - 4

Instrumentation & Controls (Pisa, Milano, LNF & Roma2)

- LLRF electronics in collaboration with Fermilab and DESY.
  - INFN will concentrate its activity on the control of the cryomodule component designed and built by INFN as the piezo assisted tuners and the Wire Position Monitors.
  - New concept electronics for WPMs, possibly to apply to BPMs too
- Alternative signal distribution inside and from the Cryomodule
  - to improve reliability and reduce cost.
  - work is inspired by the INFN experience on large detector electronics.
- Beam instrumentation based on TTF experience: DR and OTR
  - Measurements at TTF are continued
  - Diffraction radiation monitors at the DR exit ?
  - OTR in the injectors ?
- *Participation to GAN (Global Accelerator Network), work package of EUROTeV, dedicated to remote control of accelerators.*

INFN ILC Resources (Personal extrapolation)

Adiabatic growing of resources for ILC is expected

- ILC Provisional funding in 2006

  300 k€ + 10 FTE

- Additional funding expected end of June 2006

  200-300 k€

- Expected ILC resources from 2007

  500–1,000 k€/y + 10-15 FTE

- The EU SRF Infrastructure could add 500 k€/y and some TFE
- The possible use of DAFNE for ILC tests could be a plus