



# 4<sup>th</sup> EUROTeV Annual Meeting

WP3: Damping Rings

*S. Guiducci, INFN-LNF*

DESY - 30 January 2009

## ILC Activity - Damping Rings R&D

- WP3 activity has been focused on the issues that have a very high priority in the GDE R&D plan:
  - e-cloud and fast ion instability (E-CLOUD task)
  - Fast kickers (RFSEP task)
- Two workshops on Damping ring R&D have been organized by the GDE with an active participation of WP3:
  - “ILCDR08 - 4th R&D Workshop and CesrTA Kickoff Meeting”, Cornell University, July 8-11, 2008
  - “International Linear Collider Workshop (ILC08)”, Chicago, Illinois, November 16-20, 2008

# Damping Ring WP3 Tasks

- **ECLOUD**: Studies of Electron Cloud and other Instabilities (CERN, DESY, INFN, CCLRC)
- **RFSEP**: Application of RF Separators and Fast Kickers to DR injection (INFN)
- **WGLRDYN**: Wiggler Field Modelling and Impact on Dynamic Aperture (INFN)
- **LETS**: Low Emittance Tuning Simulations (DESY, CCLRC)

# WP3 Milestones and Deliverables

Milestone	Milestone name	Work-package	Lead Contractor	Planned (months)	Achieved (months)	TASK
1	Detailed scope and planning report	3	9	6	6	ALL
2	Presentation of results and detailed implementation at Second Workshop	3	9	18	25	ALL
3	Presentation of results and detailed implementation at Third Workshop	3	9	30	30	ALL
4	Full report on electron-cloud benchmarking and simulation studies	3	4	48	48	ELOUD
5	Comparative study of existing beam-based alignment strategies complete	3	2	48	48	LETS
6	Development and benchmarking of wiggler models complete	3	9	48		WGLRDYN
7	Final evaluation report on RF separator technology	3	9	48		RFSEP
Deliverable No	Deliverable name	Work-package	Lead Contractor	Planned (months)	Achieved (months)	
1	Documented and experimentally benchmarked code for e-cloud simulations	3	4	48	48	ELOUD
2	Report on impact of e-cloud and fast ion instabilities on DR performance, including recommendations for controlling the effects	3	4 / 1	48	48	ELOUD
3	Report on impact of wiggler dynamics on DR dynamic aperture	3	9	48	48	WGLRDYN
4	Report on comparative studies of beam based alignment	3	2	48	48	RFSEP

# ECLLOUD

Task reporter: F. Zimmermann

- The 2 deliverables were completed:
  1. Documented and experimentally benchmarked code for electron-cloud simulations (EUROTeV- Report-2008-82)
    - The Faktor2 code allows electron-cloud simulations both for 3D problems and arbitrarily shaped boundaries (wiggler structures, antechambers, rough or grooved vacuum chambers)
  2. Report on the impact of electron-cloud and fast-ion instabilities on DR performance, including recommendations for controlling the effects (EUROTeV- Report-2008-83)
    - Impact and recommendations reported for ILC and CLIC DRs
    - 14 references
    - Many contributors from different labs including CERN, DESY, LNF, STFC, SLAC, KEK

# E-CLOUD

## Deliverable 2

ILC and CLIC damping rings

requirements and recommendations for controlling E-CLOUD and FII effects

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

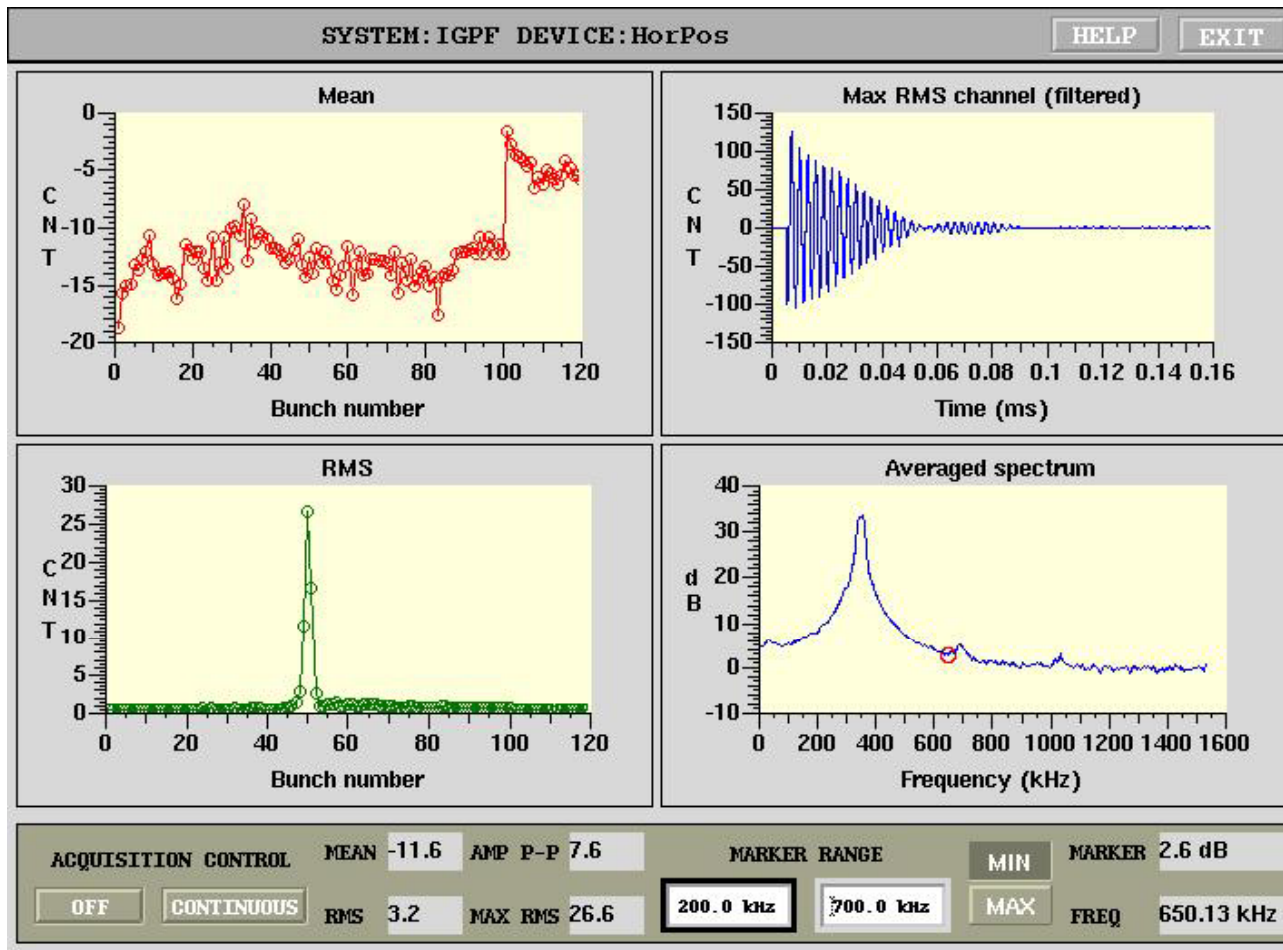
# ECLOUD

- Electron build-up studies
- Single-bunch instability studies
- Development and test of electron-cloud mitigation
- Electron-cloud diagnostics
- Investigations of ion effects
- Vacuum aspects and pressure instability
- Participants: CERN, DESY, LNF, STFC
- Collaborations: BNL, ESA, GSI, KEK, LBNL, U. Rostock, SLAC
- 14 papers and many presentations at International Workshops

# RFSEP

Task reporter: F. Marcellini

- Stripline kickers tested at DAFNE with fast pulsers

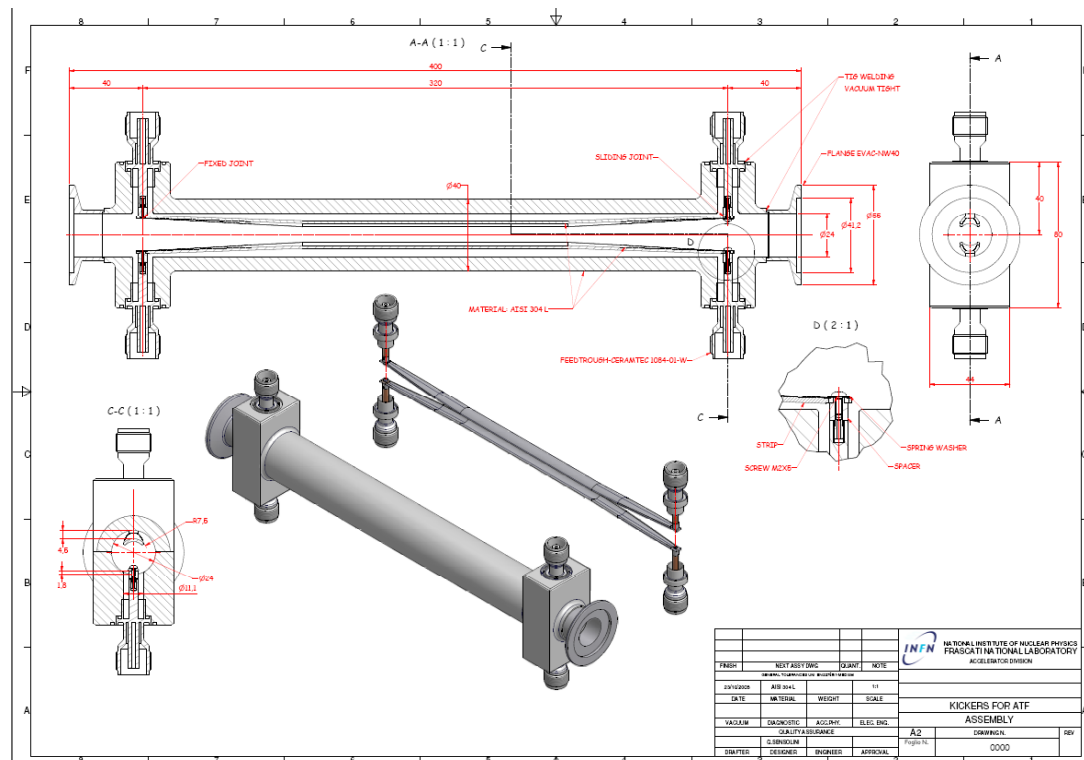




# RFSEP

Task reporter: F. Marcellini

- Stripline kicker with ILC characteristics designed and ordered
- To be tested at ATF in the next months



# RFSEP

Task reporter: F. Marcellini

- No Deliverables
- Milestones reformulated according to ILC DR requirements at the 1st scientific workshop
  - Goal 1. Feasibility study for testing RF deflectors on ATF.  
No interest in RF separators for ILC DR (see Configuration Recommendations Document and S3 task force R&D plan)
  - Goal 2. Study of a strip line kicker for ILC damping ring.  
DONE, designed and ordered
  - Goal 3. Design and tests of a strip line kicker for beam injection in DAFNE storage rings. DONE
- Progresses done on the fast kickers make these devices by far preferred for damping ring injection
- LNF resources have been dedicated to fast kickers
- LNF activity on RF deflectors for CTF3 (not included in EUROTEV) has achieved the objective allowing a current multiplication of a factor 4 in the Combiner Ring

# WGLRDYN

Task reporter: S. Guiducci

- In the GDE working group on damping rings, after the recommendation of the CESR type superconducting wiggler for the ILC DR, the effects of wiggler nonlinearities on the dynamic aperture were considered a low priority issue. In fact the field quality of this type of wiggler is so good that it is equivalent to an ideal wiggler and the effect on the dynamic aperture is in practice negligible.
- no resources were dedicated to this activity in 2008

# LETS

Task reporter: J. Jones

- In 2008 the LETS work has been centred on applying the algorithms developed and tested in previous years to the latest DR design.
- The analysis shows that the new DR design can be tuned as well as, and sometimes better, than the previous designs.
- Simulations have also been performed to test the limits on diagnostics required for the new machine design
- The *Deliverable 4* “Report on Comparative Studies of Beam Based Alignment” is described in the *EUROTeV-Report-2008-084*.

## WP3 impact on ILC DR

- Significant contribution to the definition of the **Baseline Configuration**
  - Layout (dogbone, ring, racetrack)
  - Size (17, 6, 3 km)
  - Lattice, parameters and technical systems
- E-cloud and Fast ion
- Fast kickers
- **DAFNE** as test facility for kickers
- Collaboration to test facilities in US and Japan  
**CesrTA** and **ATF**