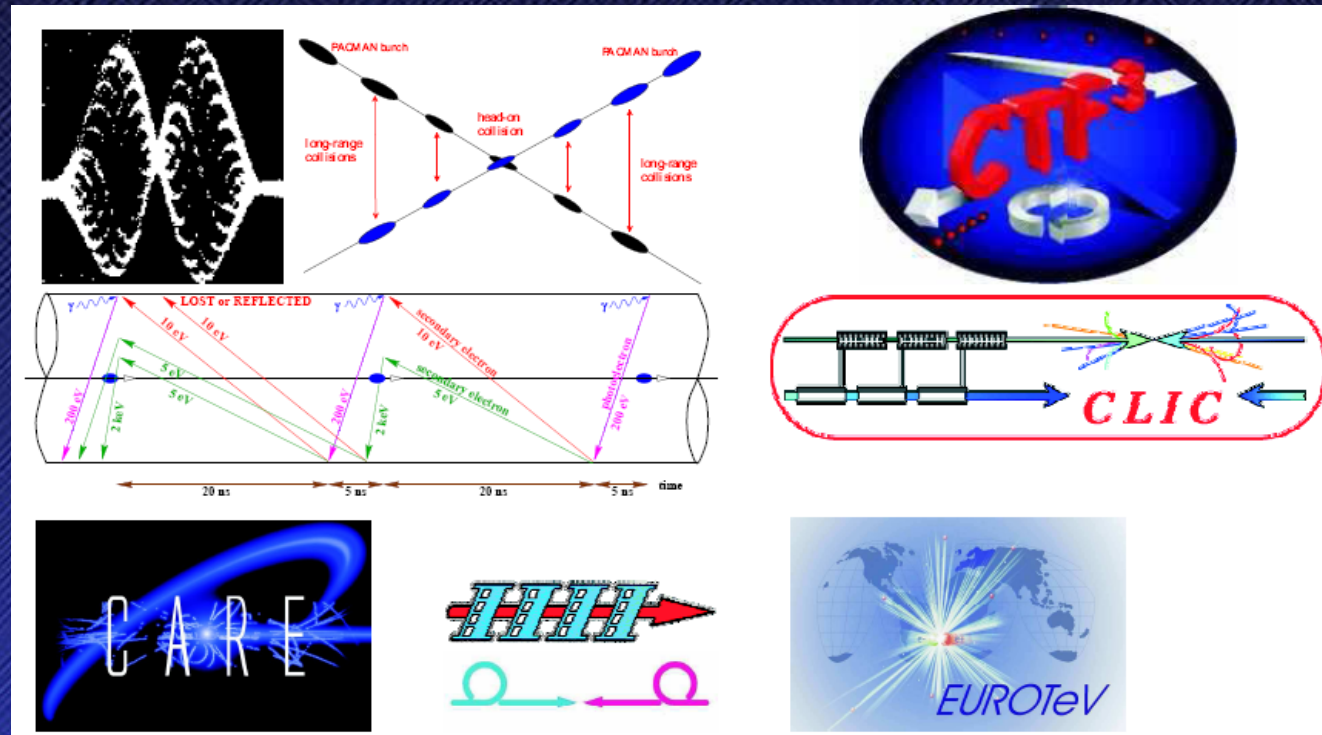


R&D and LHC Collective Effects (RLC)



- Mandate
- Team members and expertise
- Main RLC objectives for 2005
- Additional activities in 2005

<http://ab-abp-rlc.web.cern.ch/ab-abp-rlc/>

RLC mission and expertise

The RLC team carries out theoretical and experimental research in the dynamics of high-intensity particle beams. We are in charge of beam intensity limitations and their control by adequate low-impedance hardware design or operation scenarios to reach and exceed nominal LHC performance. The team coordinates international R&D activities for future accelerators and is in charge of LHC upgrade and CLIC/CTF3 beam dynamics and design studies.

RLC expertise includes instability theory, impedance estimates, synchrotron design, beam induced heating, emittance growth, analytic models, multi-particle simulations. We are in charge of the LHC impedance budget, benchmark our models by machine experiments, collaborate with other teams to understand and improve the beam performance of existing accelerators and test facilities.

RLC team: who are we?

Staff

Hans Braun [HB] (30% LII)

Helmut Burkhardt [HBU] (50% LII)

Roberto Corsini [RC]

Werner Herr [WH]

Elias Métral [EM]

Francesco Ruggiero [FR]

Giovanni Rumolo [GR]

Daniel Schulte [DS]

Rogelio Tomàs [RT]

Frank Zimmermann [FZ]

Fellows

Andrea Latina [AL]

Lionel Neukermans [LN]

Peter Urschuetz [PU]

Students

Elena Benedetto [EB]

Ulrich Dorda [UD]

Peder Eliasson [PE]

Maxim Korostelev [MK]

Tatiana Pieloni [TP]

Javier Resta-Lopez [JRL]

Some Collaborators

Takao Asaka [TA] (JASRI)

Warner Bruns [WB] (TU-Berlin?)

Alexej Grudiev [AG] (AB-RF)

Dobrin Kaltchev [DK] (TRIUMF)

Main RLC objectives for 2005

- **LHC impedance and conventional instabilities**
 - LHC "impedance police": collimators, absorber, pumping modules, kickers, wire scanners, transformers, monitors, etc. \Rightarrow AG, EM, FR, FZ
 - review of LHC and SPS impedance, integrated impedance database, investigate single and multi-bunch effects \Rightarrow EM, FR, GR, FZ
 - beam physics tools, instruments, and procedures needed for LHC beam commissioning, including software \Rightarrow WH, EM, FR, GR, RT, FZ
- **LHC beam-beam effects**
 - extensive tune scan to find good LHC working points \Rightarrow WH+DK
 - LHC correction procedures with beam-beam \Rightarrow WH+DK
 - strategies for ramp & squeeze including beam-beam \Rightarrow WH,EM,FR,FZ
 - realistic simulations of coherent beam-beam effects \Rightarrow WH+TP
 - SPS long-range beam-beam compensation project, collaboration at RHIC and investigation of a pulsed-wire option \Rightarrow FZ+UD

Main RLC objectives for 2005

- **LHC electron cloud studies**
 - code developments and benchmarking. Update SPS simulations and parameter scans for LHC and its upgrades \Rightarrow DS, GR, FZ+EB
 - LHC scrubbing scenarios: emittance growth, also in dipoles \Rightarrow FZ+EB
 - proposal and analysis of new experiments: SPS, RHIC \Rightarrow FR, DS, FZ
 - generalized electron cloud wake and impedance \Rightarrow GR, FZ
- **LHC Upgrade studies (within CARE-HHH)**
 - CARE-HHH Network and APD WP coordination \Rightarrow FR, FZ
 - LHC intensity limitations and upgrade scenarios \Rightarrow FR, GR, FZ
 - narrow down choice for LHC Interaction Region upgrade: dipole-first vs quadrupole-first, Crab cavities, bb compensation \Rightarrow RT, FZ, OB+RDM
 - potential and possible design of a new Super-SPS and Super-ISR, with small beam losses and slow-extracted test beams \Rightarrow FR, RT, GA

Main RLC objectives for 2005

• CLIC studies

- coordination of CLIC cost study \Rightarrow HB
- define and document CLIC parameters and design \Rightarrow HB, DS
- design and parameter optimization of the RF power source \Rightarrow HB, RC
- develop model of beam halo and tails \Rightarrow HBU+LN
- luminosity and emittance tuning in a realistic collider \Rightarrow DS+PE
- design of a non-linear collimation system \Rightarrow DS,FZ+JRL
- increase momentum bandwidth and reduce chromatic emittance growth for CLIC Beam Delivery System \Rightarrow TA, RT, DS, FZ
- document and pursue damping ring design: effect of wiggler nonlinear fields, tuning studies, and collective effects \Rightarrow FZ+MK, GR

Main RLC objectives for 2005

- **CTF3 studies**
 - coordinate design, parameters and commissioning of CTF3 \Rightarrow HB, RC
 - produce 75 MW pulses at 30 GHz with duration > 70 ns \Rightarrow HB,RC+PU
 - commission modified injector and delay loop \Rightarrow RC
 - technical coordination with INFN for CTF3 \Rightarrow RC
 - definition of new equipment for TL2 and CLEX and integration of RF gun photo-injector in drive beam linac \Rightarrow HB
 - beam line optics, collective effects, and layout in new CLEX building with emerging constraints from civil engineering \Rightarrow HB, GR, RT
- **CLIC/CTF/ILC and EU activities**
 - coordinate CLIC/CTF beam dynamics studies, CERN contribution to EUROTev and ELAN, and EUROTev/ILPS+ELAN/BDYN WP \Rightarrow DS
 - convene ILC working group on overall design \Rightarrow DS
 - coordinate electron-cloud and fast-ion effects for ILC \Rightarrow FZ
 - integrated luminosity performance and tuning studies \Rightarrow DS+AL
 - electron cloud studies and new simulation code \Rightarrow WB, DS, FR, FZ

Additional activities in 2005

- Analysis of 2004 PS and SPS experiments \Rightarrow EM, FZ
- LHC optics and CNGS studies \Rightarrow WH
- MADX modules \Rightarrow WH, FZ
- APC chairman and LTC member \Rightarrow FR
- CERN linkman for ATF collaboration \Rightarrow FZ
- CERN Summer School program/lectures \Rightarrow FR/EM
- CERN Academic Training \Rightarrow EM
- AB seminar organization and CAS lectures \Rightarrow WH
- EPAC conference organization and ECFA member \Rightarrow FR
- Yellow Reports, PRST-AB and Springer editorial board \Rightarrow FR
- Associate Editor of Physical Review Letters \Rightarrow FZ
- Member of SNS and PEP-II MAC \Rightarrow FZ