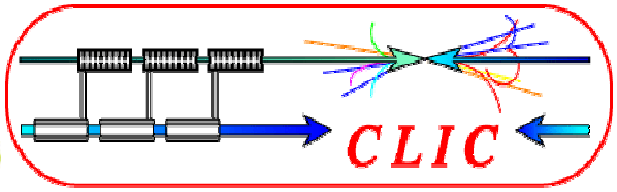
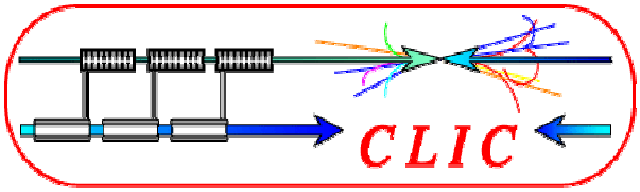


Areas of Collaboration for Low Emittance Technologies

T. Lefevre, M. Palmer, E. Wallen

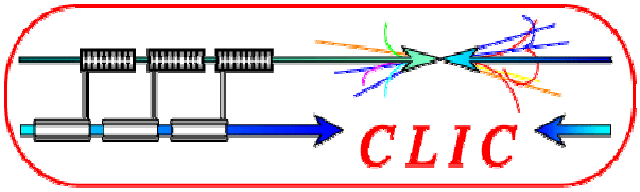
January 15, 2010

Technology Connections Between Groups



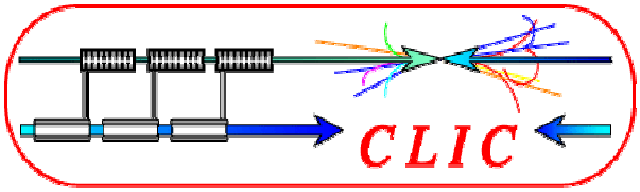
- Potential or existing areas for collaboration between groups:
  - **Pulsed magnets and kickers**
    - Low impedance strip-line kickers
      - Broadband requirements, high voltage reliability
      - Ongoing collaboration: DAΦNE, Damping Rings groups
    - Fast rise- and fall-time high voltage pulsers with good amplitude stability and high reliability
      - Ongoing collaboration: DAΦNE, Damping Rings groups
    - Methods to minimize kicker-induced orbit errors
    - Pulsed magnet design for on-axis injection schemes
  - **Magnet Designs**
    - High Field Wigglers and Undulators
      - Aperture, peak field, field quality and shimming, and non-linear optimization for widely varying applications
      - SC wire choices, properties, and methods for SC designs
      - Connection with vacuum chamber design: photon absorbers, electron cloud build-up, cold-mass heat loads, protection against losses, radiation damage
    - Conventional magnet approaches for low emittance cell design, particularly when “high occupancy” cells are required

Technology Connections Between Groups



- Alignment
  - **Precision alignment and magnet fiducialization**
    - Vibrating wire technique (with detailed study/suppression of systematic effects) provides alignment capability which is well-matched to low emittance ring requirements.
  - **Beam-based alignment techniques**
  - **Real-time alignment technologies**
    - Girder alignment/movers ⇨ magnet movers ⇨ correctors
- Instrumentation
  - **BPM Systems**
    - Turn-by-turn capabilities and correction methods
    - Orbit feedbacks and maximum attainable bandwidths
    - Calibration and stability/repeatability issues
  - **Synchrotron Radiation Monitors for Emittance Characterization and Tuning**

Technology Connections Between Groups



- Feedback Systems
  - **Impact of digitization resolution on low emittance operation**
  - **Specifications for control of instabilities in high intensity, low emittance rings**
- RF Systems
  - **Low Level RF Design**
  - **RF Power – solid state amplifiers vs klystrons**
  - **Cavity design for various bunch structure requirements**