R&D Issues WG3 & 4

• DR feedback and stability
  – Near demonstrations at 3\textsuperscript{rd} generation SR sources
  – Good to complete a more detailed comparison with NLC and TESLA DRs and ATF at KEK, ALS, APS, ESomRF, SNS, ….
    • Incoherent motion amplification
    • Measured motion $\Rightarrow$ implied element motion
    • Stability of measurement devices

– Also add emittances, dispersions, and aspect ratios
  • Random alignment tolerances
  • Measured emittances $\Rightarrow$ implied effective alignment
  • Lifetime / stability of emittances

– Beam extraction stability ?? (scope creep)
R&D Issues WG3 & 4 (2)

- **Linac vibration and stability**
  - Quadrupole vibration EM / SC / PM → stability
    - All are driven by vibrations from rf
      - High power in NC designs
      - Lorentz force in SC designs
    - Coolant induced vibration
    - Active program for vibration in NC designs – SC design??
  - Is it necessary to make measurements at a dedicated test stand
    - How to do this for quads in a cryostat?
    - What is effect of rf breakdowns?
  - Diagnostic stability
    - Tolerances ~1um/week in NC and ~10 um/week in SC
R&D Issues WG3 & 4 (3)

• IR Issues
  – Vibration
    • Quadrupole vibration EM / SC / PM ↔ stability
      – Are compact SC quads OK for both NC and SC??
      – Measure vibration of SC quad (at nm level)
  • Solenoid stability
    – Couples to IR quadrupole (PM, what about SC??) and beam
    – Vibration; creep; field stability
  • Other effects
    – Crab cavity – do we need a demonstration?
    – Intra-train feedback?
  – Instrumentation / backgrounds
    • IR is a horrible environment!
      – SR; beamstrahlung; pairs; lost primary particles; electron/ion from gas
    • Instrumentation is essential for luminosity
      – Will it work? What needs to be tested? What will really be measured at startup when the beams are a mess?
R&D Issues WG3 & 4 (4)

• **IR Issues (2)**
  – **Optics predictions and codes**
    • Discussed yesterday!
    • What needs to be tested – anything??
    • New FFS?? Nonlinear collimation??
      – Be nice but not necessary.
  – **IR engineering studies**
    • This is the topic for Thursday morning but ....
    • What needs beam? What does not? Stand alone vs. system
    • Everybody seems at least partially interested in stabilization
    • Possible test areas:
      – LINX (SLC FFS); new FFS; nonlinear collimation; colliding beams for very accurate position determination; difficult isolation problem
      – AFT2: very low emittance beams at low energy; get to start over and build right but cost ??
      – Others??