Recent ILC Activities in Japan

R&D for Cost Reduction

Response to NRI Report

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Effort for Cost reduction

- MEXT asks for possibility of cost reduction
- Mainly in SCRF technology
  - ILC budget completely cut off in US but there is still some budget in US for SCRF
- Possible items: improvement of cavity
  - High Q and High G by nitrogen doping
  - Niobium material (large grain, low RRR)
  - Coupler improvement
  - Tuner improvement
- Cannot expect significant cost reduction in other fields

Big Cost Reduction

- The cost reduction items in previous page give at most 10-15%
- Much larger reduction may be demanded
- Now cost reduction by lowering the initial stage energy is being estimated (at KEK)
  - 250GeV ?
  - 350GeV ?
  - Tunnel length

Response to NRI Report

- NRI (Nomura Research Institute) Report on ILC Technology
  - “ILC計画に関する技術的実現可能性等調査分析報告書” (in Japanese only)
  - http://www.mext.go.jp/b_menu/shingi/chousa/shinkou/038/gaiyou/1374357.htm
  - ~240 pages in 3 volumes.
  - The report assigns 4-level ranks for ~30 items of ILC technology
    - ◎ : Double circle: prototype and test done, improvement by small scale R&D
    - ○ : Single circle: prototype and test done, some more R&D needed for mass production
    - △ : Triangle : no prototype, no validation, break through needed
    - × : Cross : basic technology premature

Triangle Items

- There is no “cross” item but there are several “triangles”
- Marx modulator
- Undulator source
  - Target (water cooling failed, no prototype for others)
  - Undulator (field accuracy, no beam test)
- e-Driven source
  - No target prototype
  - Detailed design of AMD & booster linac
- Feedback system in Damping Ring (high ADC bits)
- Main beam dump (14MW)
  - No prototype
  - Window
  - Safety
  - Possibility of collaboration with CERN being pursued
- Crab cavity
  - No prototype of 9-cell cavity
  - HOM coupler
  - Cryostat design

Budgets

- JFY2016,2017: Regular year budget only. No specific budgets for R&D
  - Will stop STF operation and reduce the operation time for ATF2
- May expect additional budget in JFY2018, 2019.

e-Driven Source (1)

- Target
  - Had a meeting at KEK with Rigaku and non-positron people
  - Key technology is the magnetic fluid in high vacuum (evaporation)
    - Equilibrium vapor pressure is a strong function of temperature: log P proportional to -1/T
    - P around 10^{-7} Pa for temperature at 50 deg C for material of good endurance under radiation (though the data is still poor)
  - The rotation speed less important
    - Hence, this study will also help water cooling of undulator source target
  - Conclusion:
    - Continue present prototype construction with Rigaku (~$50k in JFY2016, and hopefully, plus ~$50k in 2017)
    - With a bit different emphasis
    - → Add differential pumping for testing high vacuum
    - → Cannot be done in JFY2016. Design only.

e-Driven Source (2)

- NC SW cavities right after FC
  - 3 problems:
    - Radiation effects (discharge)
    - Temperature change by heating
    - Beam-loading
  - Detailed design study in JFY2016+2017
- Detailed system design
  - Radiation shield
    - Good info from undulator source study
  - Cost estimation
    - Presumably more costly than undulator source but how much?
  - Tend to focus on 1312 bunches

Undulator Positron

- Reconfirm that the baseline is the undulator source
  - Japanese involvement has been limited up to now
  - Should contribute more
- Undulator: we claim
  - Accurate field can be obtained by careful winding
  - Beam test not needed
  - So, no new R&D being planned
- Target
  - R&D for water cooling of e-driven source will also help the undulator source
  - Can we contribute something for radiation cooling?