

# ASAC Recommendations for Accelerator Physics - Linac

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- “In the normal conducting part of the linac, an important item identified for detailed study is the fate of partially chopped bunches, both in and after the RFQ and MEBT.”
  - Done: Nath, Stovall, Crandall, ... (LINAC paper)
- “It will be important for MEBT beam commissioning...that the beam be near a waist for good resolution of the emittance.”
  - We can adjust the optics to make a waist
- “Measured K values of “dressed” cavity...are urgently needed for a realistic calculation of Lorentz Force Detuning....ESS has evaluated the issue of ringing until the next pulse....This work should be reviewed and applied to the SNS case. We encourage conducting appropriate calculations and simulations and comparing results with experimental results from the cryomodule prototype test”
  - In progress: Set of measurements presented by Delayen et. al.

# ASAC Recommendations for Accelerator Physics - Ring

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- “We look forward to seeing the results of measurements of the complete sets of shimmed dipoles and quadrupoles at a future meeting.”
  - **Dipoles OK: Wanderer and Jain**
- “Some of the ring devices..are quite complex...These should be thoroughly checked out and measured to assure their proper performance in the ring. One example ...is to assure that the magnetic field along the path of stripped electrons will lead to the collection point.”
  - **Answer: Plan/mention by Jie?**
- “Given the uncertainties, study of the electron cloud instability should continue and possible corrective actions foreseen.”
  - **Work in progress: M. Blaskiewicz/ H. Hseuh**

# ASAC Recommendations for Accelerator Physics - Ring

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- Impedance Budget: “....should be updated regularly as component design and construction progress.”
  - **New measurements: RF system**
  - **New beamline devices: BIG and tune kicker, others?**
- Extraction Kicker: “Such concentrated attention is appropriate on this important component of the ring, and it should be continued with an effort made to reduce the transverse impedance.”
  - **Recent modification to geometry reduces impedance.**
- Collective effects: “...we have concern about depth and breadth because of the potential that instabilities have for determining the SNS performance limit. A systematic in-depth survey of collective instability issues...is recommended. The survey should identify all collective effects expected to play a role in operation, list the present uncertainties, and suggest potential cures for these uncertainties. The CD-4 level of performance, high beam currents, and halo generation due to instabilities should all be considered.”
  - **The Big One**

# ASAC Recommendations for Accelerator Physics

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- Resonance-based loss model: “The next study should include resonance compensation for those resonances between  $\frac{1}{4}$  and integral values and 3-d SC effects.”
  - Anything to say?
  
- “Fast feedback proved to be an invaluable technique for stabilizing and improving the performance of the SLC...We recommend an AP evaluation of previous applications of fast feedback and its potential value to the SNS.”
  - In progress: Galambos and Henderson

# AP Talks at ASAC

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- AP Overview – **Henderson**
- Applications Programming – **Galambos**
  - Fast feedback
- Front-end Commissioning Plans – **Alexandrov**
  - Operator Training Program/Manpower
  - Testing
  - Physics Plan
- DTL Testing and Commissioning Plan – **Tanke**
  - Operator Training and Manpower
  - Testing
  - Physics Plan
- Linac Physics Update – **S. Nath**
  - Partially chopped bunches study
  - Mismatch study
- Piezo Tuners and Lorentz Force Detuning - **Delayen**
- Ring Magnet Measurement Status – **Wanderer**
  - Dipole shimming

# AP Talks at ASAC



- Collective Effects – **Fedotov/Danilov**
  - Overview of Collective Effects
  - Painting/3-d SC/Halo resulting beam distributions, tune footprint
  - Impedance Budget (inc. extraction kicker mods)
  - Instability Thresholds (vs. chromaticity,  $dp/p$ , RF params)
  - Beam loss model with resonance compensation
  - Halo Generation
  - Growth Rates and Mode Spectra
  - Feedback System requirements, parameters, performance
- Electron Cloud Effects – **Blaskiewicz/Hseuh**
  - SEY study of coatings
  - Physics: comparison with Pivi/Furman
  - Instability Thresholds, growth rates and mode spectra
  - Use ultimate (cleaned) SEY??
  - Mitigation: clearing electrodes and/or solenoids
  - Electron Production Map (e- line density vs. s??)

# ASAC Timeline

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- Tues Aug 13 – Today
- Tues Aug 20 – Linac Conference
- Tues Aug 27
  - S. Nath: partially chopped bunches and mismatch study
  - C. Pillar: RF Reference Line
- Tues Sept 3
  - Update of LFD? Any new measurements?
- Tues Sept 10
  - Ring Collective Effects Forum
- Tues Sept 17 – ASAC Dry Runs
- Tues Sept 24 – Thurs Sept 26 ASAC