RF MD#6 Request

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MD14346
RF flat bottom optimization for ion debunching

- **Motivation**
  - In 2023, lot of issues with losses at injection and start of ramp
  - Small capture voltage and/or large longitudinal emittance increases capture/injection losses, but decreases IBS
  - With large capture voltage and/or small emittances, capture losses are decreased, but IBS-induced debunching increases the start-of-ramp losses
  - Where is the optimum in terms of RF settings?

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- **First part of the MD**
  - Determine the optimum voltage
    - Vary capture voltage and vary the time spent on flat bottom
    - Presently used 8 MV was chosen somewhat arbitrarily
    - Try “dips” at injection, decreasing voltage for capture and increasing after filamentation
- **Second part of the MD**
  - Optimizing the longitudinal emittance
    - Cannot vary SPS extracted bunch length – determined by slip stacking
    - Use RF phase modulation at LHC flat bottom – compare bunch profile evolution
    - Optional: batch-by-batch blow-up

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- **Third part of the MD**
  - Vary intensity from SPS/LEIR and compare IBS evolution in LHC to determine the ratio of RF noise to IBS
- **Fourth part of the MD**
  - Perform 1-2 ramps to measure start-of-ramp losses
    - Use trains with different longitudinal emittances (via RFphase modulation)
    - Use trains that spent different times on flat bottom
    - Different RF voltages
- **Beams**
  - Up to 300 bunches/beam
  - Intensity range: 1.3-2.7e10 charges/bunch (varied from LEIR)

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