BEAM EXPERIMENT PROPOSAL:

Evaluation of electron cloud in the arcs

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1. INTRODUCTION

- We have diagnostics for pressure rises at warm sections (some of them not well understood).

- Fill #5350 shows possible electron cloud in the cold regions.

- Simulations shows that, for "extreme" cases (large bunch intensities, 3 buckets spacing), we can have e- cloud at dipoles.

→ **Can we have a diagnostic from situation at the (cold) dipoles with the available instrumentation?**

2. POSSIBLE DIAGNOSTICS

If the EC consequences in the cold regions are above the available detectors sensitivity,

2.1. Direct evaluation:

- Calorimeters from the cryosystem. Need faster (every ≈20sec) data acquisition.
- "Pressure" gauges in the cold regions.

Otherwise,

2.2. Indirect evaluation:

- EDs → Measure e- flux into the wall
- Pressure gauges in the warm regions.
- PLL → Measure of ΔQ

3. EC EVALUATION FROM ΔQ

Can we *decouple* the influence of warm vs cold sections in the measured ΔQ?

$$\Delta Q = \frac{r_p}{\gamma} \oint \beta\rho \; ds$$

Assuming round beams (injection):

$$\Delta Q \approx \frac{r_p}{\gamma} \cdot \sum \overline{\beta_i}\overline{\rho_i} L_i = \frac{r_p}{\gamma}[(\overline{\beta\rho L})_{warm} + \sum(\overline{\beta\rho L})_{cold}]$$

One attempt last year: Fill # 5350, see Beam Experiments Workshop, September 16th.
No heat load was detected, but some "pressure" rise was.

ΔQ measures show it is possible EC at the cold regions, but... **Need reproducibility!!**

4. BEAM EXPERIMENT PROPOSAL

INSTRUMENTATION:

- PLL + (Artus)
- ED + pressure gauges
- Improve heat load detectors for arcs (Tony, R.C. Lee)

BEAM REQUIREMENTS:

- High bunch charge $\geq 1.5 \cdot 10^{11}\ e$
- Smallest bunch spacing $s_b = 108$ ns
- Round beams: Change the optics so that the average β at the warm sections is smaller?

MACHINE TIME:

- 1-2 hours per fill, 4 or 5 times during the Run
- parallel with other high intensity experiments