APEX Session on 20 GeV Au Ramp Development

G. Wang, G. Robert-Demolaize, A. Marusic, MCR

5/2/2016

Introduction

- Motivation

Due to the uncertainty in achieving the desired voltage of the 704 MHz main linac, we are investigating the possibility of testing the CeC principle at $\gamma = 21.5$. Establishing a RHIC ramp with the corresponding energy can provide us the information about the ion beam at this energy, such as bunch length, emittance, beam life time and IBS growth rate. These information are important in estimating the performance of the CeC system.

- Plan

Establish the Au ramp with store energy of $\gamma = 21.5$, measure beam parameters and their evolution at store.

Summary of the APEX session

- Time: 4/27/2016, 16:50 pm ~ 18:10 pm, fill number 19823, Yellow only
- Summary:
    - ✓ The ramp were successfully established with
        12 bunches in yellow, no bunches in blue, initial bunch intensity of 1.2e9, ramp efficiency of 97.4%
    - ✓ Beam optics were measured. At IP2, the measured beta function is 4.6 meters in horizontal plane and 4.9 meters in the vertical plane.
    - ✓ The beam sat at store for 20 minutes so that the evolution of its parameters was measured.
        - ➤ The bunch length growth was slower than that of 40 GeV ramp measured in fill 19590
        - ➤ The horizontal emittance growth was faster than that of 40 GeV ramp measured in fill 19590.
        - ➤ The vertical emittance growth was much slower than that of horizontal emittance.
        - ➤ Both bunch length and normalized emittance of 20 GeV ramp were smaller than that of 40 GeV ramp.
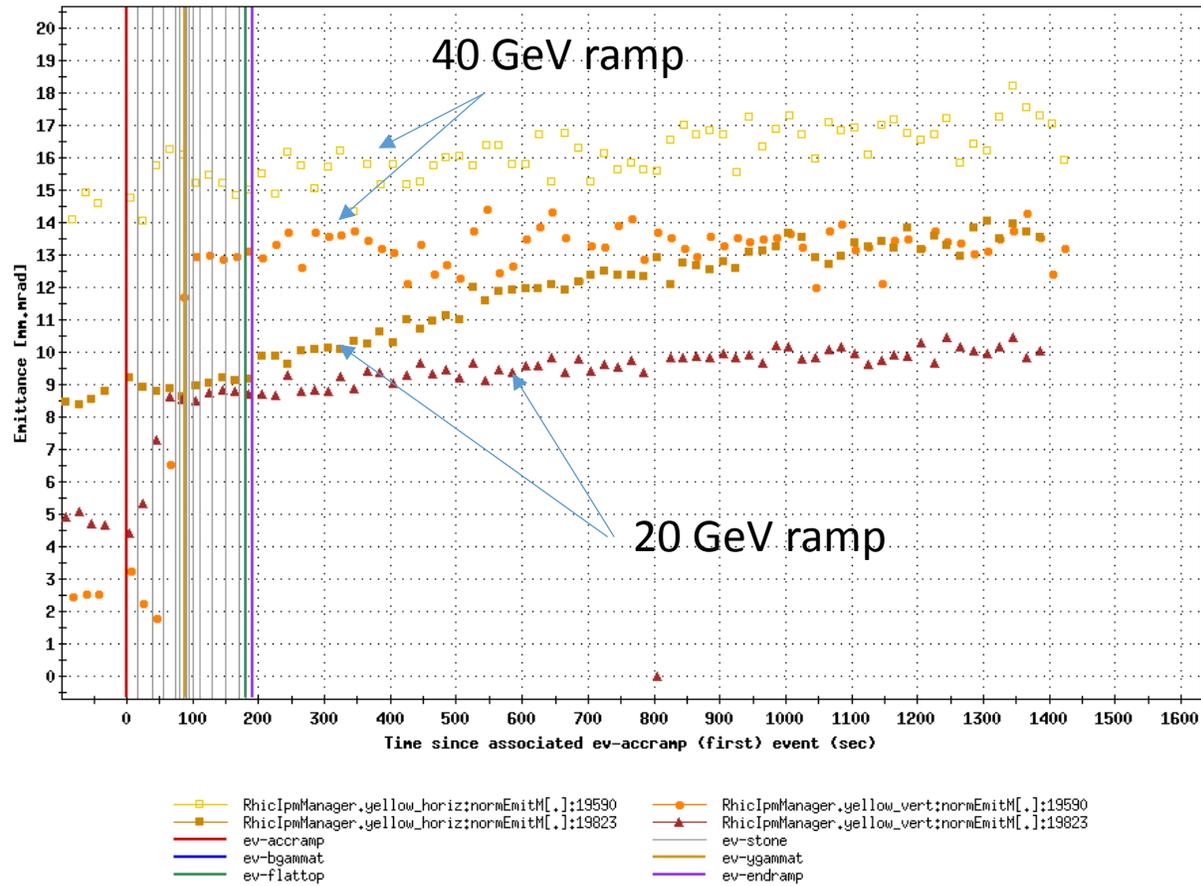
Some plots of the ramp

Beam energy

Total intensity in the ring
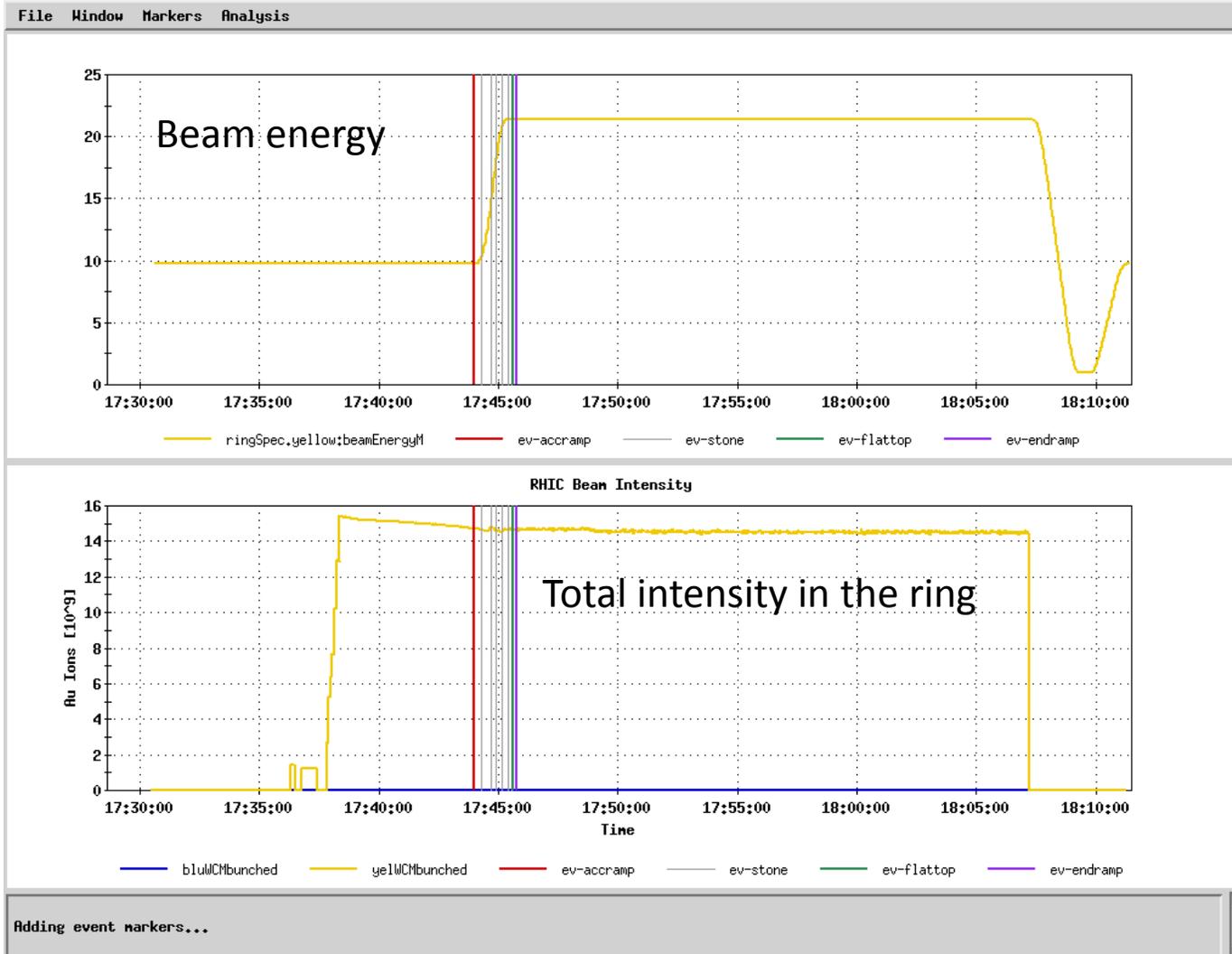
Bunch profile on wall current monitor
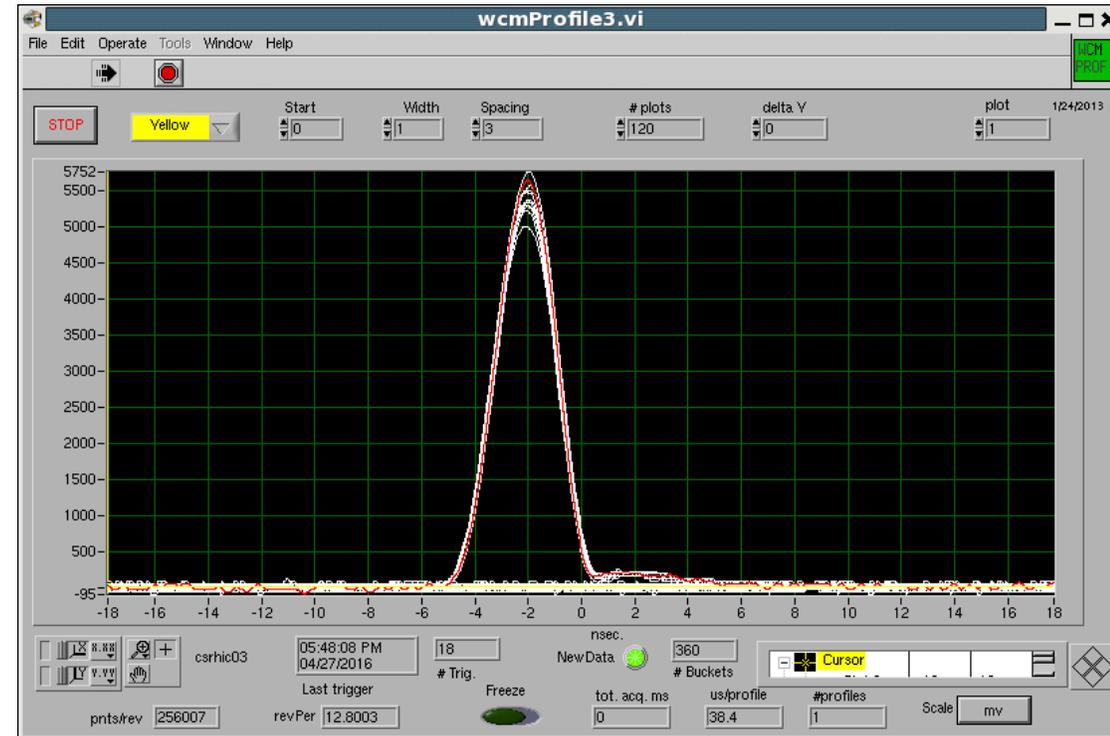
Evolution of beam parameters

Normalized 95% emittances

FWHM Bunch length