

# BEAM SCRAPING FOR LHC INJECTION

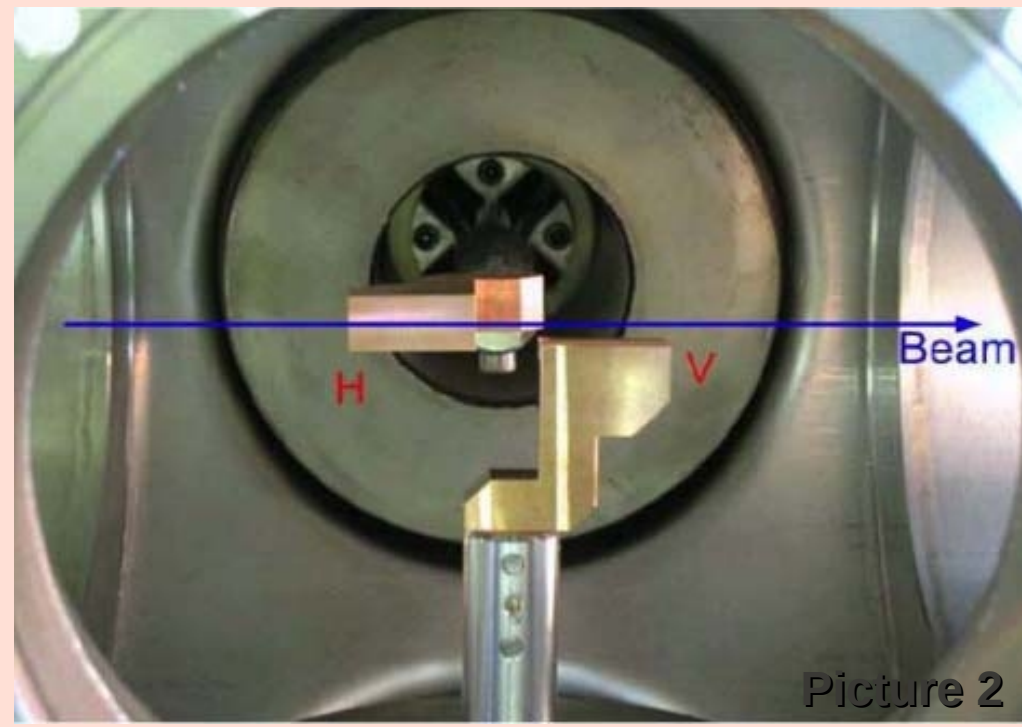
## (E. VEYRUNES-CERN)

Injection into the LHC requires well defined high intensity beams to be extracted from the SPS. A SPS fast scraper system is used to remove any existing halo prior to beam extraction, thereby providing beams of well defined transverse size and regulated intensity, ensuring clean beam transfer to the LHC and minimizing the risk of superconducting magnet quenches at injection.

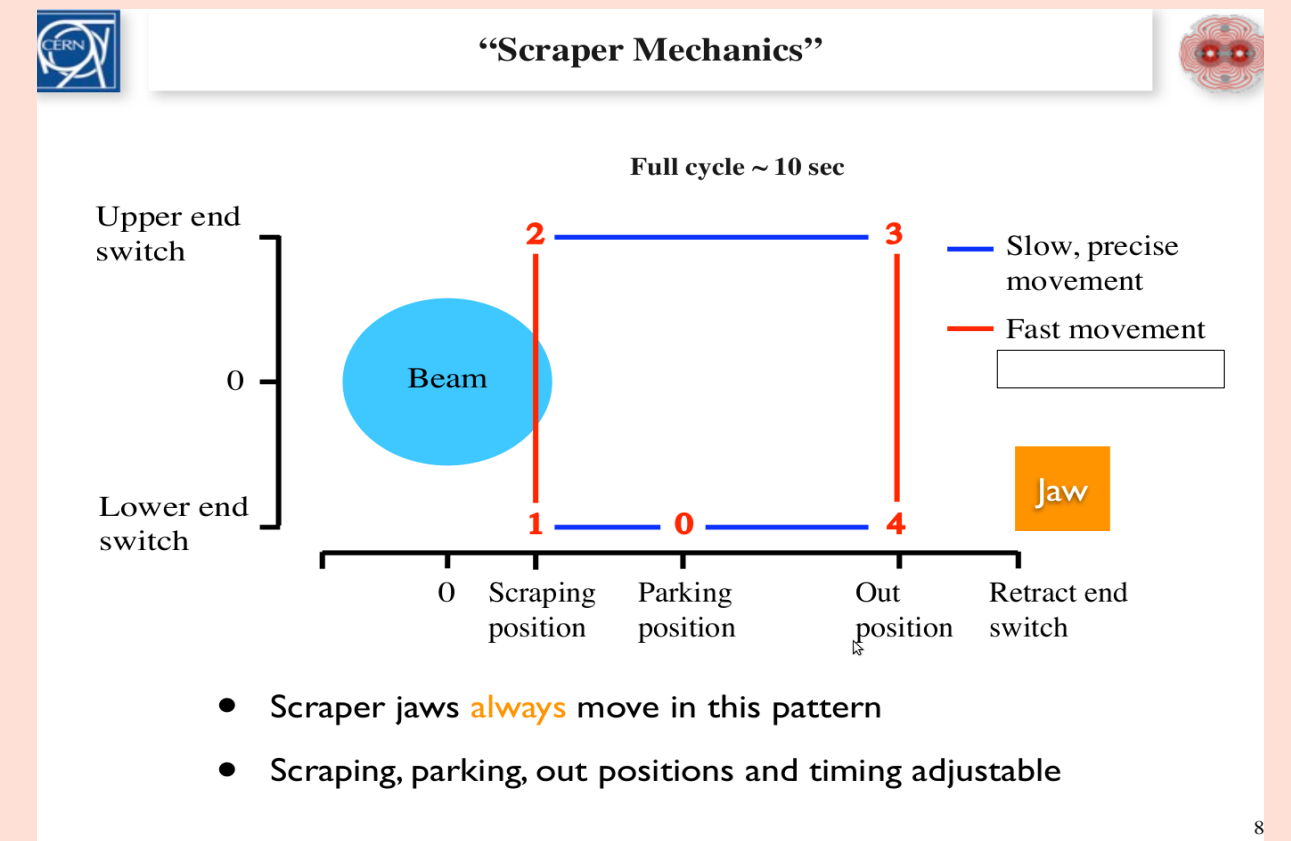
### What the Scraper looks like



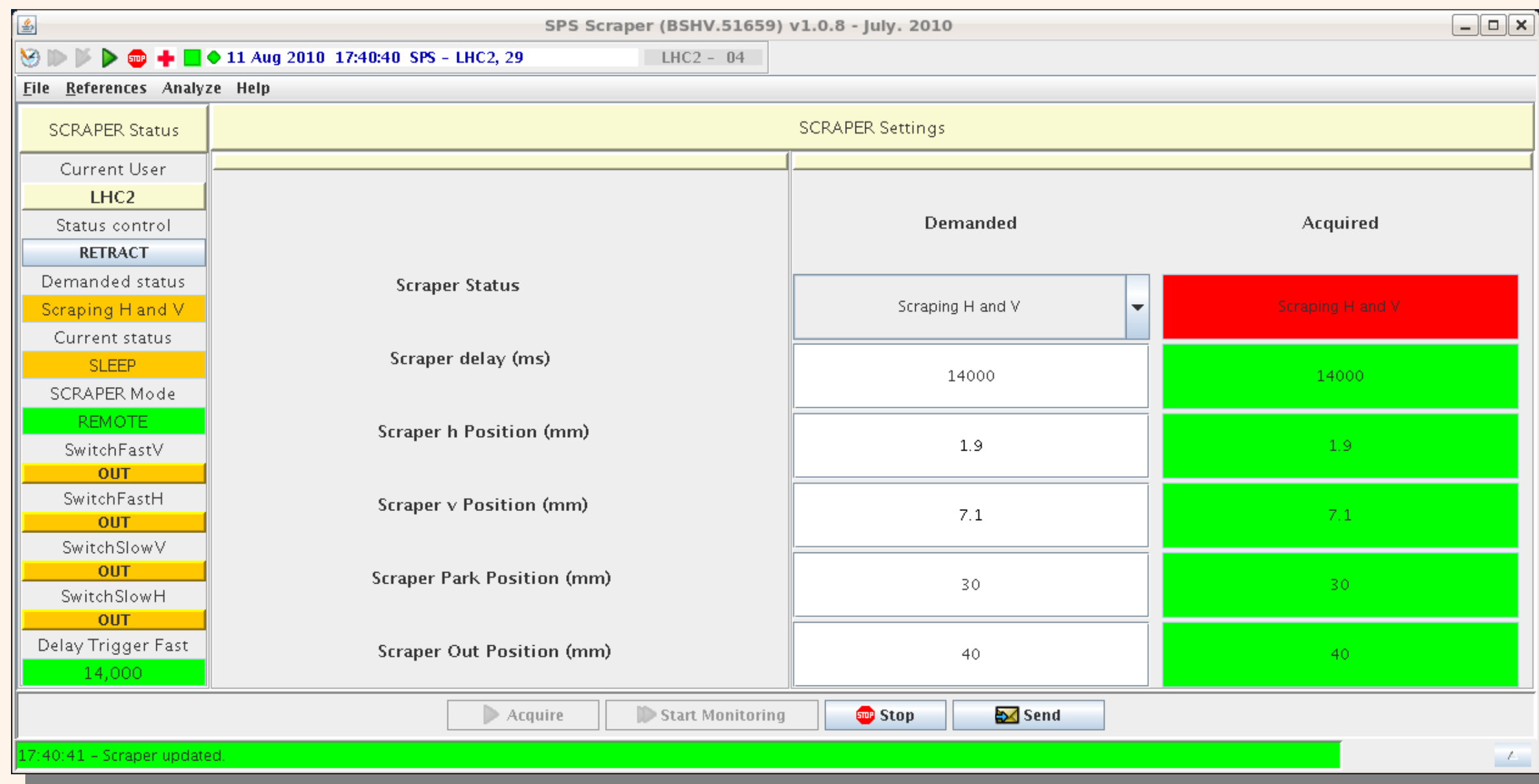
Picture 1



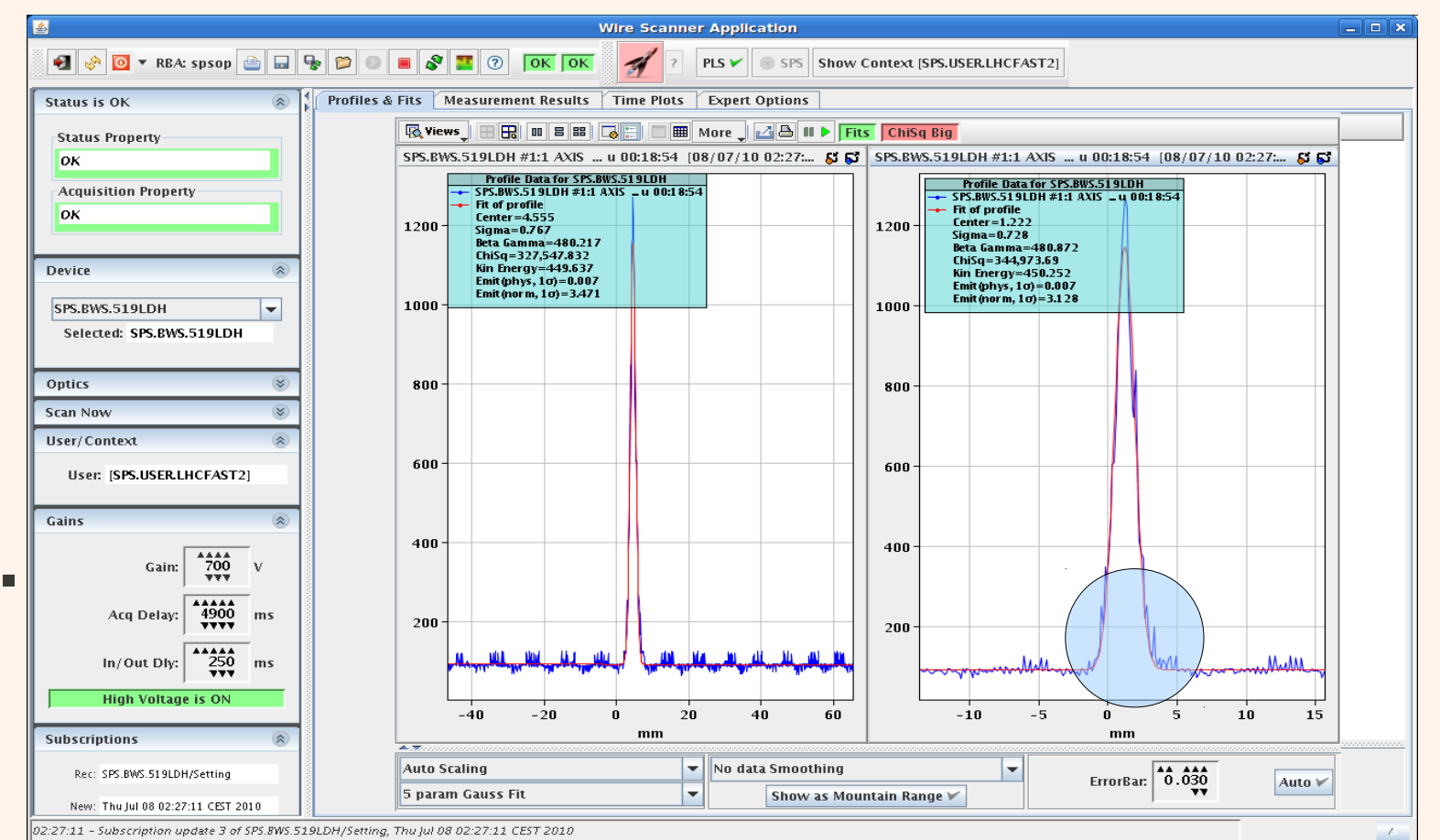
Picture 2



### Scraper Application

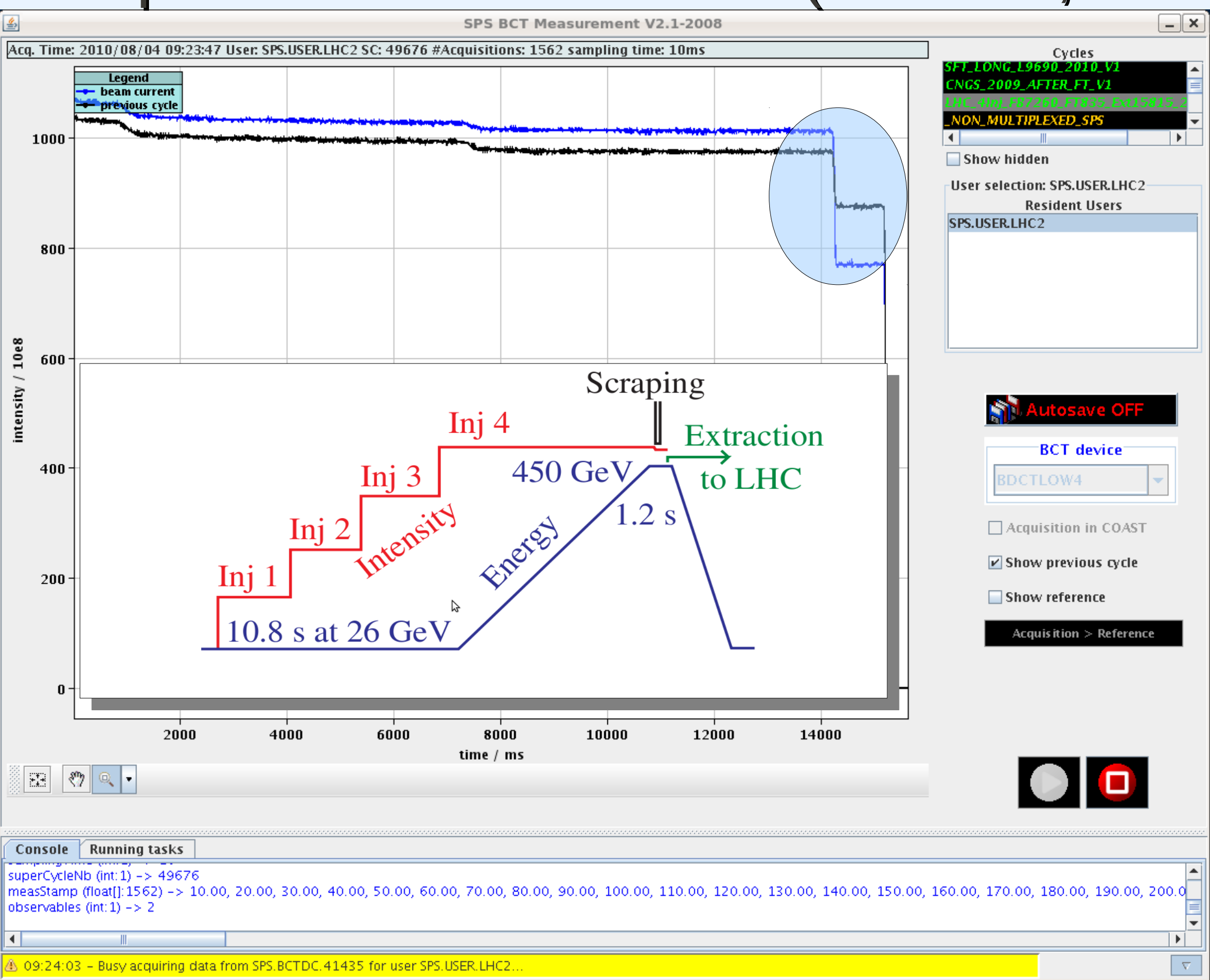


The SPS Scraper Control is a Java application developed in conjunction with the hardware and is used in both Machine development and regular operation of the SPS. The application allows for the operators to Maintain the transverse beam size of 3.5+-0.5 S. Beam blow-up (both in H and V) from the RF Damper mean readjustment is necessary before injecting into the LHC.



Scraper motion is done by stepper motors and uses the same technologies and infrastructure as the LHC collimator system. This implies step resolution of 100 um and a step speed of 3 cm/s.

### Scraper effect on LHC beam ( 1 bunch, Intensity = 1.1 e11 protons)



Regulation of Beam Intensity Scrapping used to set the intensity of the extracted beam.

2010 :Scraper jaws changed from copper to graphite to allow for scrapping of nominal intensity LHC beams and shielding has been added to mitigate the radiation levels and reduce losses in the SPS.

