Stochastic Cooling Project

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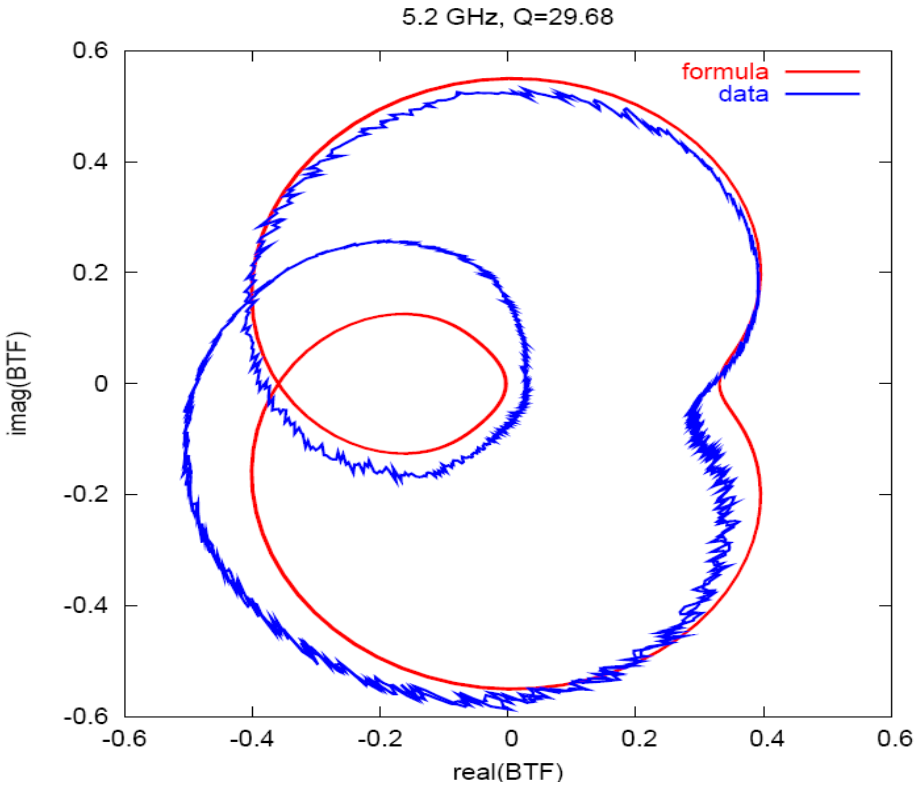
The goal is to have operational cooling a few weeks after stores begin.

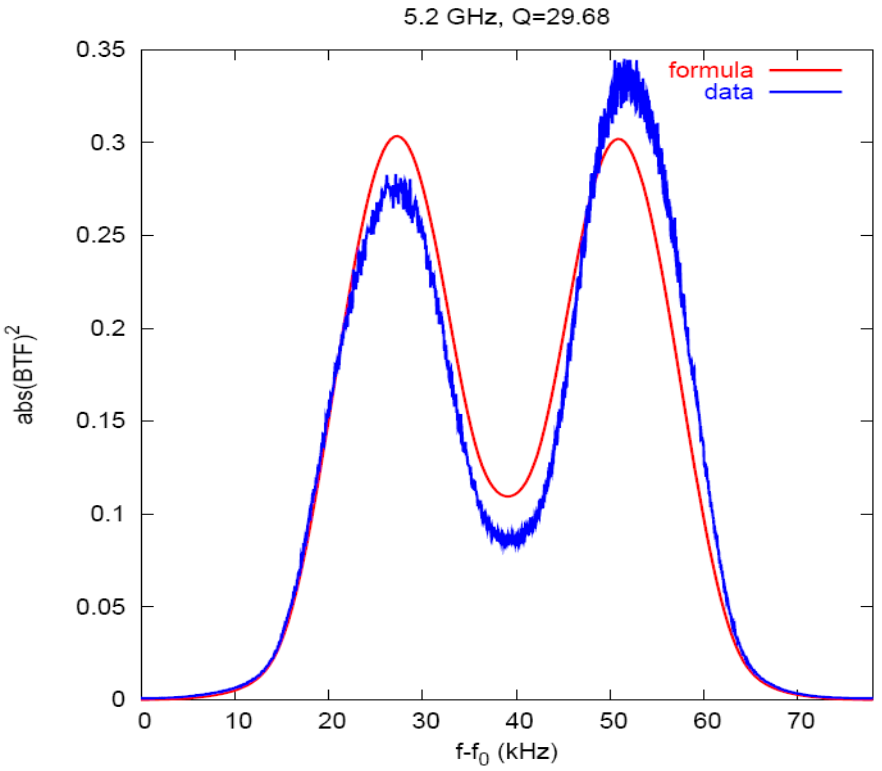
There are many things to do, mostly practical details.

After stochastic cooling is operational we could use the pickup and a beam-synch gate in a dedicated experiment

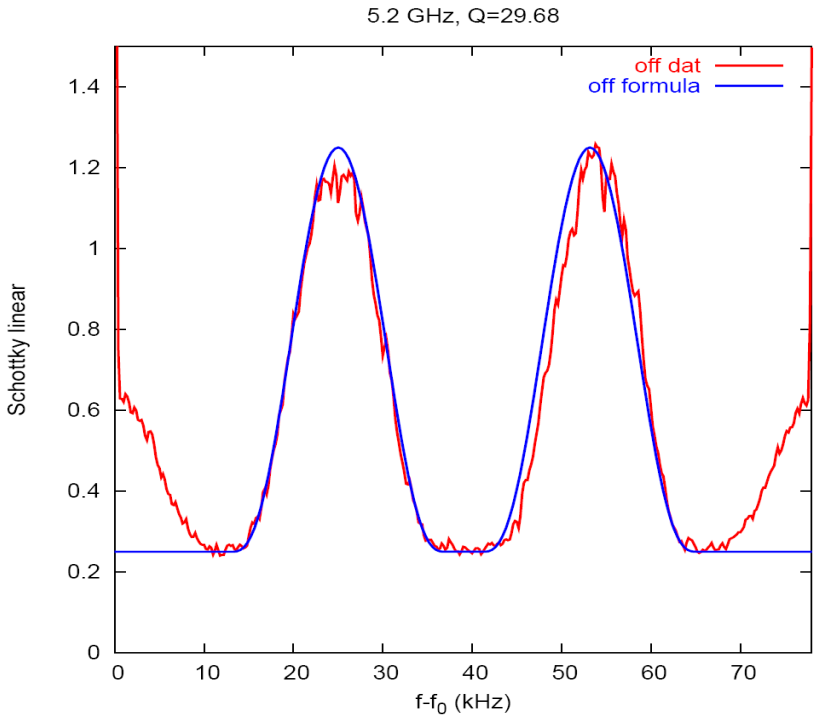
First, consider last year's data.

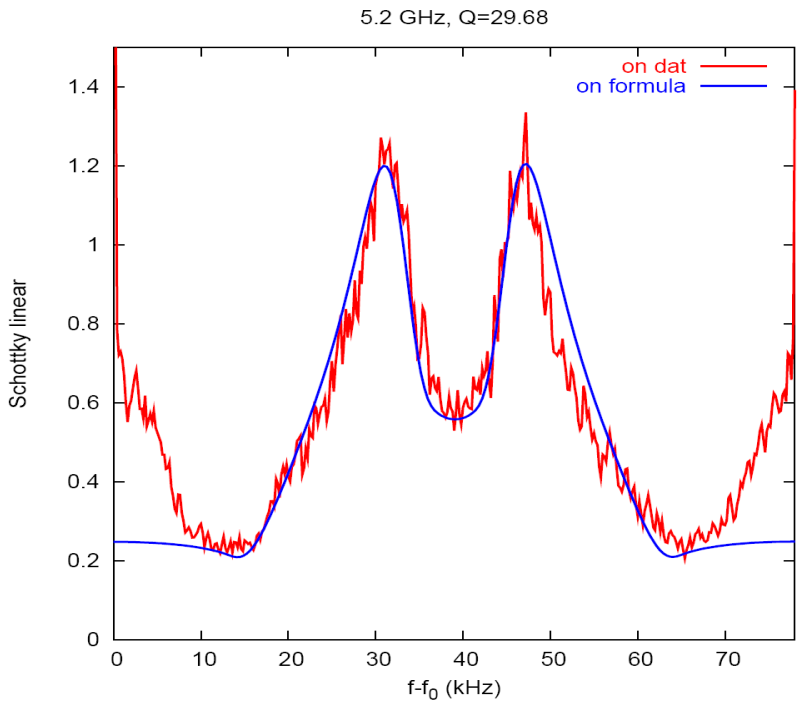
Measured open loop Beam Transfer Function and prediction using the coasting beam approximation agree fairly well.





The effect of the feedback loop on the pickup signal can be calculated for a coasting beam.
The suppressed signal is well modeled, even with the errors, so cooling should proceed as planned.
Suppression was non-uniform due to bad tune with protons.



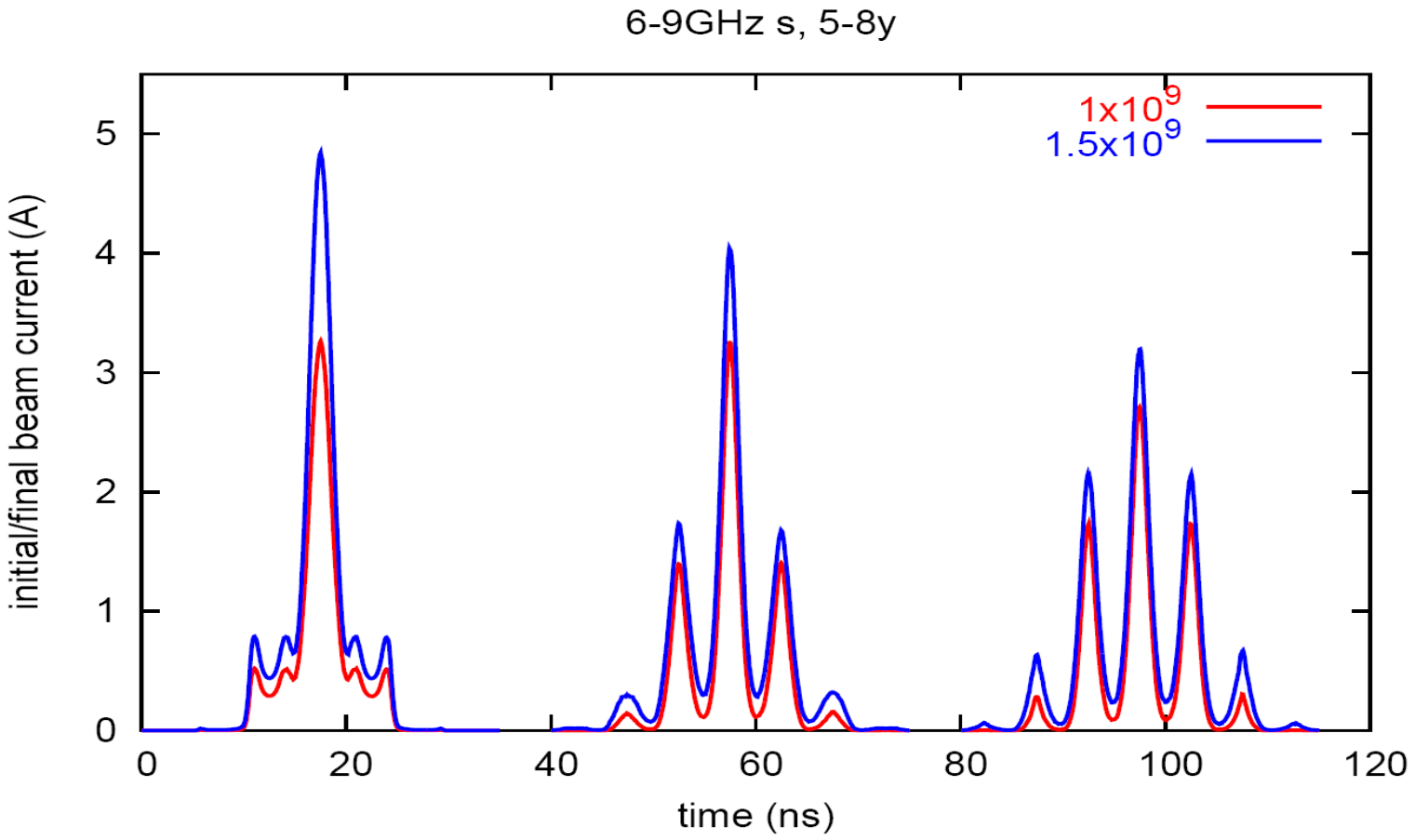


Predictions for this run:

Current profile at 0, 2.5 and 5 hours without burnoff.

4 MV on storage system, IBS suppression lattice

Vertical cooling only dQmin=0.01, dQbare=0



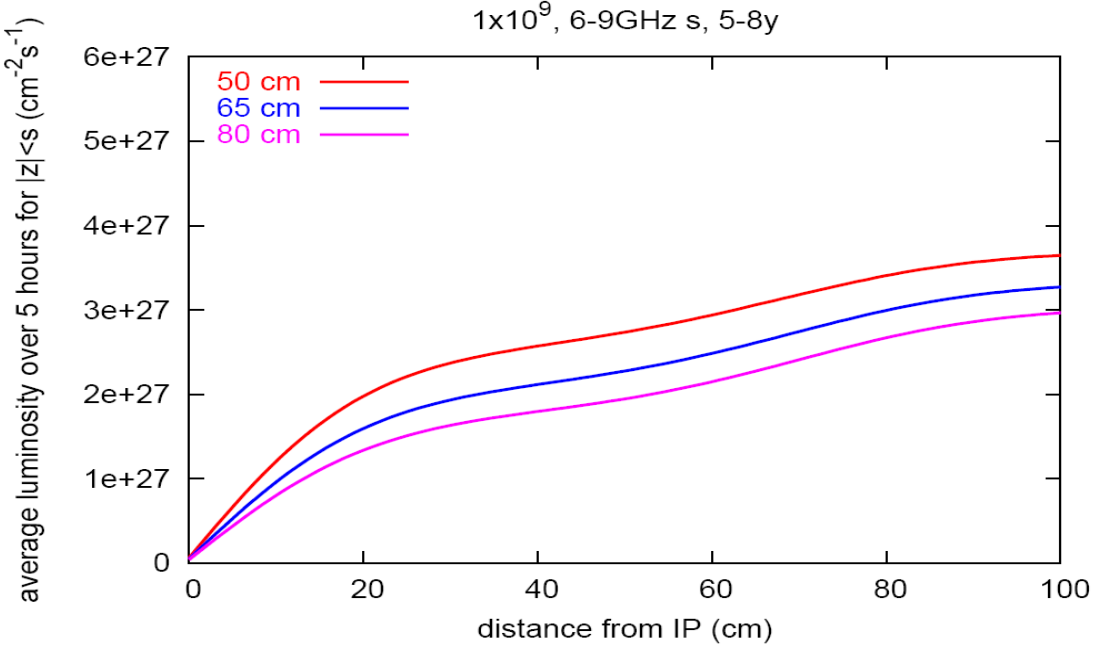
Expected luminosity for different β* and intensities.

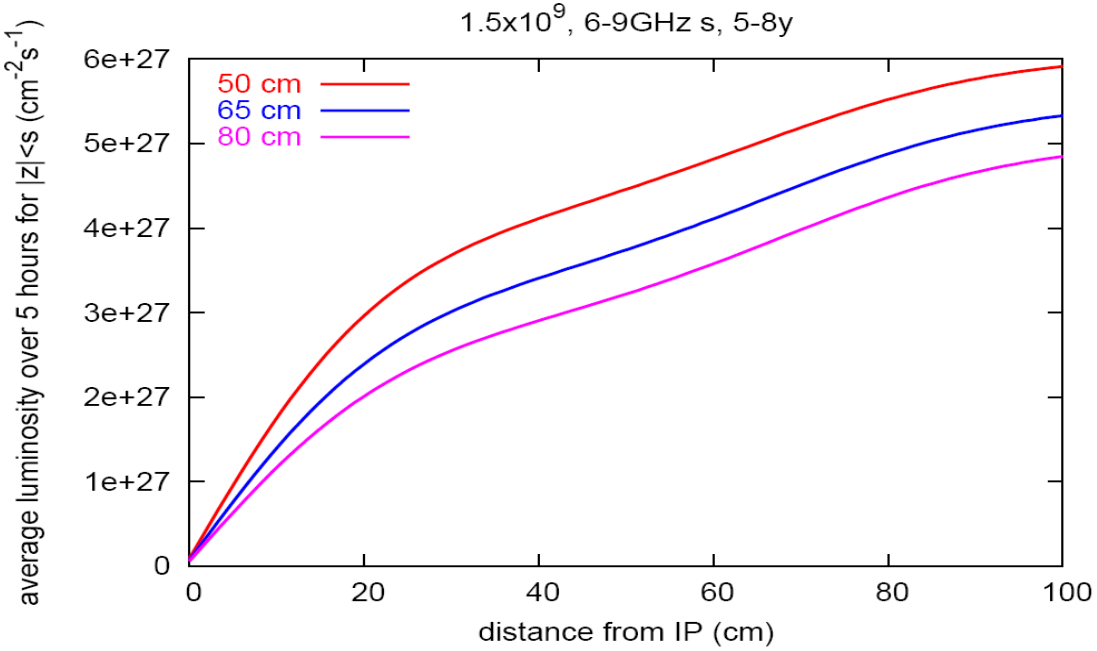
For small distance from the IP the luminosity scaling is linear in β*

Burn-off with 60cm is:

17% for 1.0×10^{9}

25% for 1.5×10^{9}





Longitudinal Impedance Measurement

Using the SC hardware to measure the Schottky spectrum of individual bunches will constrain the longitudinal impedance.

This would be dedicated time since we require no 197 MHz and a variety of bunch lengths and charges.

We would practice with the data acquisition beforehand but something like 5 minutes per bunch and 10 or 20 bunches seems reasonable for the experiment. 1 minute per bunch might be possible.

Expect broad band Z/n to act like 10 to 20 kV of 28 MHz Voltage.