

Stochastic cooling tests with polarized protons

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There are two main ideas:

- 1) Use the proton beam to verify the design of the stochastic cooling system.
- 2) Use the stochastic cooling system as experimental hardware for protons.

Verifying the design

Similar to what we did in 2006, mostly parasitic.

There are several steps/requirements

Adjust the number of kicks on the tune meter bunch. Final intensity about 10^9

This is needed since the cooling time scales with the number of particles.

Gate the pickup signal so the other bunches do not saturate our electronics.

Have the storage cavities on at around 100 kV to get longitudinal mixing from synchrotron frequency spread.

Set up transverse cooling and see signal suppression.

Set up longitudinal cooling to create diffusion in longitudinal action so all particles undergo transverse cooling.

Use the polarimeter to see the evolution of the transverse profile. This will require expert help.

Once the system is verified some interesting experiments will be possible.

Longitudinal impedance

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

The main idea is to adjust the gate timing and the gain of the first amplifier to allow for measuring nominal proton bunches.

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.

Data analysis needs some thought.

Significantly more work

By using BPMs as transmitters and receivers it might be possible to transmit microwaves through the RHIC beam pipe.

5-8 GHz might

be OK.

Relevant BPMs non-operational.

Significant prep needed.

Probably better

to do when

SC work winds down.

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PHYSICAL REVIEW LETTERS

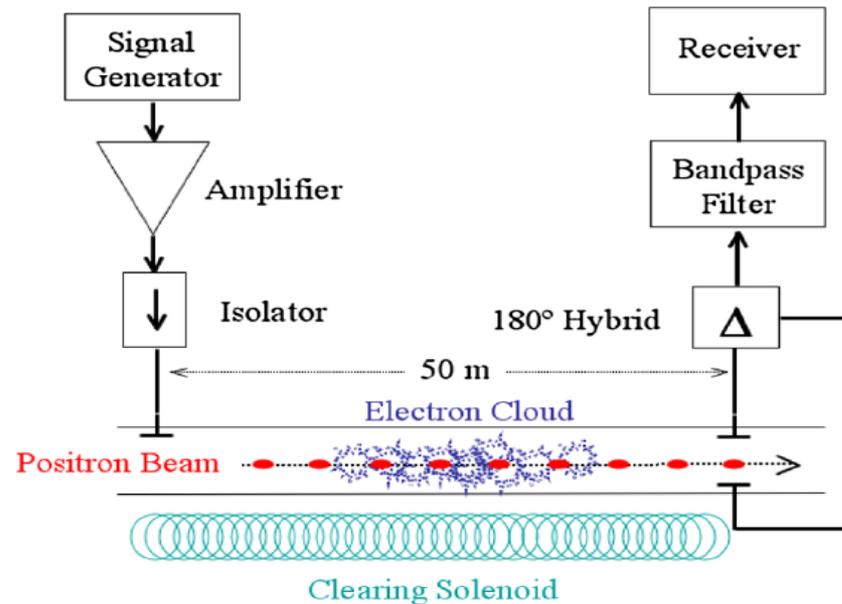


FIG. 1 (color online). Schematic diagram of experimental setup.