PSB Upgrade

The main magnet damping resistors with the new magnetic cycle.
Ramp 1 – 1.4 GeV

Damping Resistor – R = 10 Ohms
Coil = 2.5 mOhms, 1 mH
Capacitance (Unknown) – 1 µF
Resistor Current = 0.96 A RMS
Results - Circuit Voltage at 1.4 GeV Cycle

Without Damping Resistance

With Damping Resistance

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Ramp 2 - 2 GeV

Damping Resistor – $R = 10$ Ohms  
Coil = 2.5 mOhms, 1 mH  
Capacitance (Unknown) – 1 $\mu$F  
Resistor Current = 1.55 A RMS
Circuit Voltage at 1.4 GeV Cycle

Without Damping Resistance

With Damping Resistance
Test at 1 Amp (1.4 GeV), 180 Deg C, confirms machine measurements.
Thermal Measurements at 2 GeV cycle

Conclusions:
• The temperatures measured in the machine are consistent with the simulations and measurements made in the lab.
• The resistors dampen the effects on the voltage caused by the coil parasitic capacitance, the value of the coil capacitance is un-known but will be measured.
• For the 2 GeV upgrade the power rating of the resistors will need to be increased to maintain an acceptable temperature.
• The Quadrupole magnet resistors must also be considered.

Test at 1.5 Amp, 296 Deg C