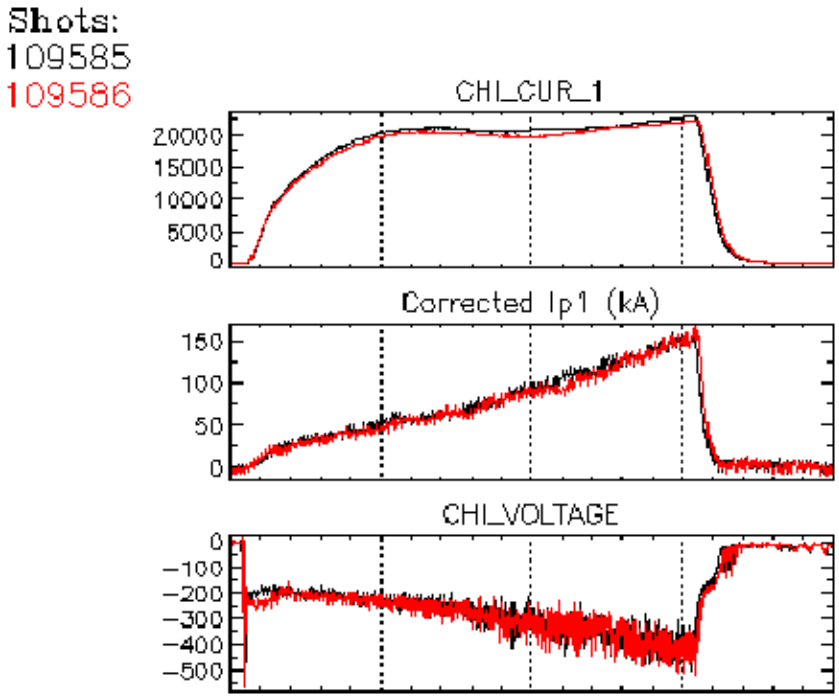
Summary of CHI Experiments on January 15 and 17, 2003

January 15, 2003: XP-29:
Verification of CHI system readiness for experimental operations

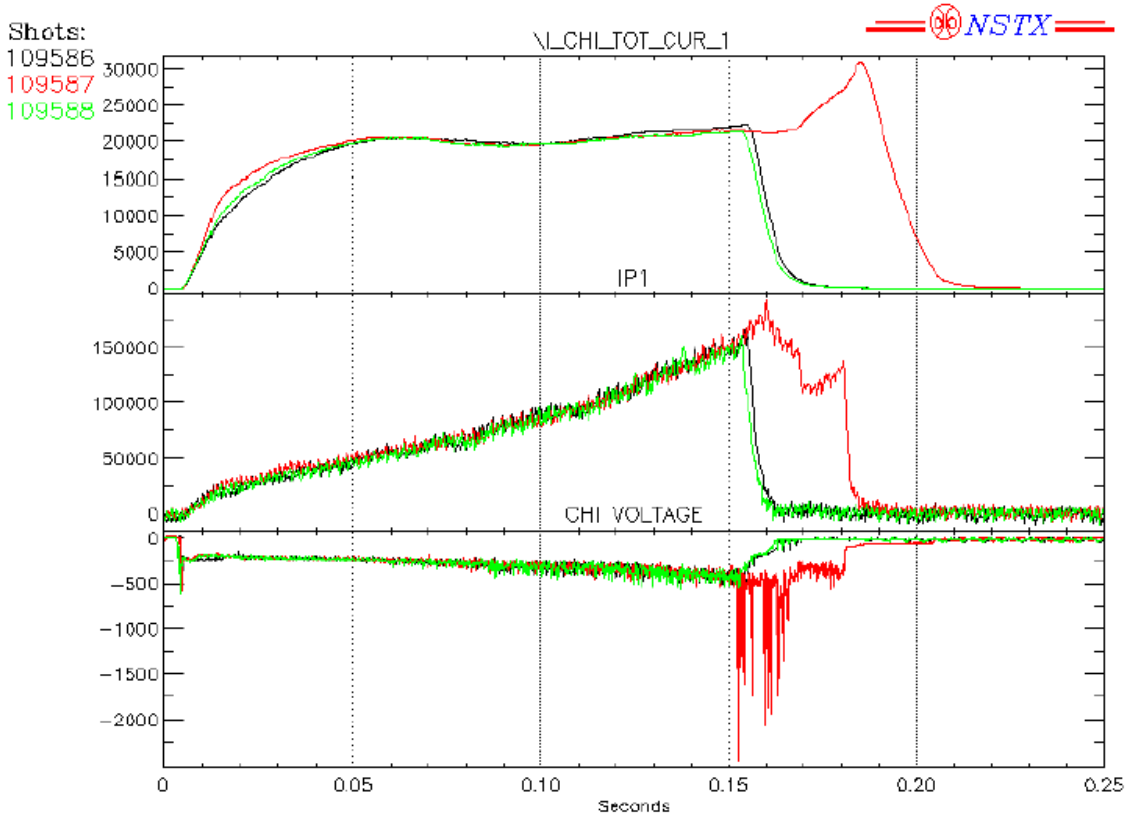
Restored an earlier CHI discharge and reduced voltage and pulse length. Discharge reproduced well (109585) and repeated it a second time for verification (109586).



The voltage was increased to the same level as on the yr 2001 reference shot. Reproduced well (109587).

Increasing the pulse length to 250ms, resulted in the creation of a secondary current path. Diagnostics are being installed to investigate this.

Shot 109586 was repeated to verify system readiness for short pulse CHI discharges. Additional tests are needed before we conduct long pulse CHI discharges.



Initiated XP-301
Goal is to produce a short pulse CHI discharge and to transfer it to the central solenoid.

On the first shot, a plasma discharge was not initiated, however, one of the MOV's conducted and in the process was destroyed. Three other nearby MOV's were also damaged.

Experiments were terminated for the rest of the day to investigate the cause of the MOV failure.

The reason for the MOV failure is not fully understood. A combination of prior stresses from exposure to high voltage and or stresses during the long pulse CHI discharges produced during the XMP are the possible reasons.

XP-301 requires short pulse CHI discharges that imposes reduced stresses on the MOV's. Therefore it was decided to proceed with experiments after the following work was done.

- Test the MOV's at 1kV
- Limit the maximum pulse duration on the power supplies to 25ms

January 17
Several short CHI discharges were produced.

Discharges similar to those from 2000 were reproduced

Persistence of toroidal current after the injector current was reduced to zero was not seen, however, some hardware improvements are needed.

- The reproducibility of the time at which 1kV is applied is not reproducible. A resistor in parallel across the power supply will be added before the next run.

- The size of the plenums on the lower dome gas injection system will be reduced to reduce the amount of gas injected for CHI discharge initiation.

- A capacitor based snubber system may be added.

Development experiments will be conducted to reproducibly initiate the short pulse CHI discharges at the lowest possible gas injection pressure before we proceed with XP-301.