

Foil Cleaning for the SEC

M. Sivertz

March 2014

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC), Nuclear Physics (NP) (SC-26)

Notice: This technical note has been authored by employees of Brookhaven Science Associates, LLC under Contract No. DE-AC02-98CH10886 with the U.S. Department of Energy. The publisher by accepting the technical note for publication acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this technical note, or allow others to do so, for United States Government purposes.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Foil Cleaning for the SEC

Needed:

- SEC with adjustable leak valve with ¼" Swagelok fitting and cap, roughing vacuum port.
- Roughing pump
- Vacuum gauge (Granville-Phillips Convection gauge)
- Bi-polar HV supply (0-300 V, 0-10mADC, Bertan Model 323)
- Argon cylinder, with regulator, flow meter, and ¼" Swagelok fitting.

Foil Cleaning Procedure

- 1) Connect vacuum pump to SEC and rough down to better than 10 millitorr.
- 2) Open Argon cylinder. Adjust regulator to a few pounds on pressure (>5 psig).
- 3) Verify flow through flow meter and/or gas coming out of tubing to purge line.
- 4) Take cap off leak valve.
- 5) Install Argon tube to needle valve input, purging joint.
- 6) Open leak valve to a setting of 00065.
- 7) Wait for the chamber pressure to stabilize at ~500 millitorr.
- 8) Set HV polarity to POSITIVE (screw on top of module).
- 9) With voltage setting at 0, turn on HV supply.
- 10) Carefully raise the voltage to ~250 volts.
- 11) Check the current delivered. It should be ~4.8mA (current limited).
- 12) Allow it to clean for ~15 minutes.
- 13) Turn off HV.
- 14) Switch polarity to NEGATIVE.
- 15) Repeat steps 9-13.

Observations

- Reducing the Argon pressure causes the current draw to drop until about 60 mTorr when the glow discharge shuts off. At pressures of ~100 mTorr, there is a light bulb-shaped glow that extends all the way up the vacuum pipe.
- Increasing the pressure above 500 mT causes the Bertan HV supply to trip off with an over-current failure. Shutting the supply off and turning it back on resets the failure.

Here are some images of the glow discharges produced in the SEC.



Figure 1: Glow discharge during Argon sputter cleaning of SEC (2 foils only) with positive high voltage applied.



Figure 2: Glow discharge with negative HV.