

# Experimental Safety Assessment Document (ESAD) for the Test run of the Hall A Experiment E12-10-009 June 14, 2010

The  $A'$ -boson Experiment “APEX” is scheduled to run from June 21 through July 5, 2010. The experiment uses the Hall A base equipment, as well as specialized equipment for the APEX experiment. Specifically, the experiment will use the following items.

## Older, Established Equipment

- The standard Hall A beamline, as described in the Hall A OSP.
- The two High-Resolution Spectrometers (HRS) as described in the Hall A OSP.
- The Standard HRS detector packages, also described in the Hall A OSP.
- In the scattering chamber we will use a PREX target. This target is used for optics calibrations with carbon and low current measurement of pion yield from the lead. It was previously used in Hall A (in 2004 and 2005) and no TOSP is required.

## New or Upgraded Equipment

- The new cryogenically-cooled Lead/Diamond target. Trained target operators (TO) are required for each shift. The TO is trained on safety-related issues. The training is the same training that is taken for the normal cryogenic target, but actually the operation is much simpler. The TO needs to watch the temperature on the return line. If this ever rises above 50K, the TO should request beam off to avoid melting the target, and call the Run Coordinator (RC). The only possible adjustment is on the JT valve, which normally does not need any adjustment. If the target melts, the TO should stop beam and call the RC. To judge if the target has melted, the TO should run spot++ to observe the profile; detailed instructions will be posted in the counting room.

- The new Septum Magnets, located between the target and the HRS, have an OSP for their operation. The initial set-up of the septa will be the same as for PREX, and will allow us to detect electrons in HRS-L. After that, the polarity of both septa will be flipped (together with the polarity of HRS-L). This will have a negligible effect on the beam, and will allow us to study positively charged particles in HRS-L. This will complete the single-arm running. The second part of the test run requires two-arm running with the opposite polarity in the two arms. The reason is that we plan to detect electrons in HRS-L and positrons in HRS-R. This will require that the polarity of the right septum magnet be flipped, which results in a significant magnetic field on the beam line. A permanent magnet will be installed in the sieve box to compensate the effect of the septum magnets. An additional corrector magnet will be installed upstream of the scattering chamber to allow the compensation to be fine-tuned. The second part of the test run requires a new TOSP for commissioning and operation of the beam line, which is being prepared by Y. Roblin.
- The solid target, constructed by the SLAC group, will be installed instead of the PREX target towards the end of the test run. This target will be cooled by nitrogen gas flow. The TO is required to monitor the temperature during beam operation. The TO must stop the beam if the temperature of the alignment platform of the cryogenic target lifter is above 50°C.