RICH Exit Window Assembly

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The exit window of the RICH detector is a Mylar/Tedlar sheet glued to an aluminum frame, which will be attached to the back of the detector shell to make the detector gas-tight. The exit window was assembled in May 2017.

Hall B's Ring Imaging Cherenkov (RICH) detector will be purged with N_2 to reduce humidity absorption by the aerogel tiles. The exit window, Fig. 1, makes the detector volume gas-tight.

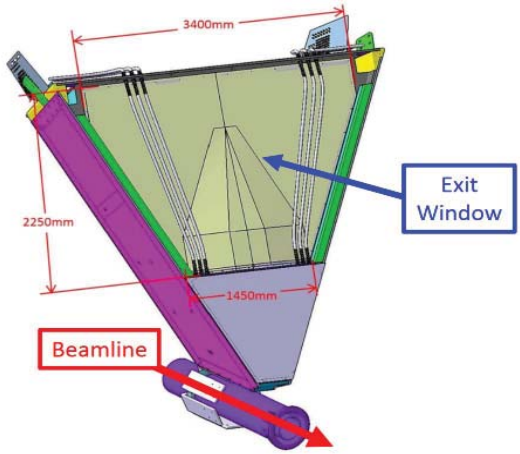

FIG. 1. The exit window is located on back of the detector shell.

The exit window consists of one 0.0762-mm Mylar layer sandwiched between two 0.0381-mm Tedlar layers, the Mylar creating a gas-tight barrier, while the Tedlar adds strength and durability. The window is attached to a frame made of ~7-mm thick aluminum strips glued together with Loctite epoxy. This frame allows for the attachment of a support frame that acts as lift points for the exit window during assembly.

For the exit window assembly, first the aluminum frame was constructed. To ensure proper alignment of screw holes, the strips were laid out on the detector shell and then glued together. The detector shell was protected from excess epoxy by foil and tape placed under the glued joints. After the Loctite cured, the frame was removed from the detector shell using the clean room's gantry crane and placed on the clean-room floor, Fig. 2.

FIG. 2. Exit window frame, with attached support frame.

The Tedlar/Mylar/Tedlar sheet was laid out on the assembled frame, cut to size, and glued to the frame using West System G-Flex epoxy. Due to the geometry of the exit window, there are two creases in the Tedlar/Mylar/Tedlar sheet at the top of the exit window (Fig. 3).

FIG. 3. Tedlar/Mylar/Tedlar sheet glued to aluminum frame and clamped to ensure good contact during curing. Creases in Mylar/Tedlar sheet can be seen on left of exit window.

After each side was glued, it was clamped to ensure a good bond and left to cure overnight. After curing, excess Mylar/Tedlar sheet and cured epoxy were trimmed and the edges covered with Mylar tape. For safe storage, the assembled exit window was placed back onto the RICH detector shell.

Assembly of the exit window occurred in the clean room. Because the air in the clean room recirculates, steps to mitigate a possible outgassing hazard during application and curing of epoxy were required. Mitigations included ventilating the clean room by opening the large roll-up door about 36 inches, limiting working time to an hour at a time, and working with small batches of epoxies.

In conclusion, assembly of the exit window is complete. Proper steps to mitigate any safety hazards were taken. Remaining tasks to attach the exit window to the detector shell include adding a foam gasket between the aluminum frame and the detector shell, adding additional sealant to the exit window to improve gas-tightness, and procuring ~20-mm M5 screws to fasten the exit window to the detector shell.