

Checking for Problems

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Light Leaks:

Scintillators in the detector are wrapped with dark material because the connected photomultiplier should only be detecting the light made by the cosmic rays and not indoor light or sunlight. If the scintillators are exposed to even a small amount of room light, it will cause an increase in both singles and coincidence rates.

To check for light leaks:

Materials:

- Thick, black cloth large enough to cover the detector

Procedure

1. Take a singles count for both the upper and lower paddle. Perform two trials.
2. Cover the detector with the black cloth, only leaving the circuit board visible.
3. Take another singles count for both the upper and lower paddle.
4. If there is a significant discrepancy between the counts for each paddle with and without the cloth, then there is a light leak.

To repair the light leak

Materials

- Thick, black tape
- Scissors
- Screwdriver

Procedure

1. Dismantle the Lucite board.
2. Unplug all wires connected to the circuit board.
3. Dismantle the selected paddle with the light leak.
4. Wrap the scintillator tightly with tape, starting from one end and working towards the other. Add additional tape at the edges and corners.
5. Replace the scintillator into the detector, securing all screws.
6. Repeat the light leak test again and record the data.

Other possible problems to check for:

- Connectors from the photomultipliers are not securely plugged into the circuit board
- Malfunctioning circuit board