

How to set up properly the box in order to avoid electronic noise both on the top detector and on the bottom detector.

1) The flash lamp :

- The front of the flash lamp should be set at 5 cm of the wall
- Add the black cage around the flash lamp.
- Add the three pieces of metal and an aluminum foil to cover entirely the first part of the box. The piece of metal will absorb the wavelength coming from the flash lamp.

2) For the top detector :

- Align the SIPM detector with the hole.
- Put the SIPM detector as close as possible of the hole. In that way we are pretty sure that the surface of the detector can see photons coming through the hole.
- DO NOT TOUCH the surface of the detector with fingers or anything else.
- Ground the detector with a piece of copper.
- Put the cage around this top detector.
- Create a Faraday cage around the protected cage
- Roll the wire in aluminum foil

3) For the bottom detector :

- Put a piece of copper on the back side of the detector. Take care of the ground pin on the back side.
- Put the detector on the shock
- Put the copper cage above the detector. Take care of the wires. The four holes of this copper cage should be aligned with the four holes of the detector board. You should also see just one of the four parts of the detector through the central hole of the box. No crossing region.
- Check if the bottom detector is properly grounding. If not do the four previous points again until succeeding.
- Only one of the four wires will be plugged to the amplifier board. The three other wires should stay in the box. Put aluminum paper around the piece of metal and then try to lay down these three wires inside the box. The aluminum foil should touch the copper. In that way you will create a Faraday cage properly grounded. The three wires would not act as antennas.
- Put an aluminum foil above the copper cage. This helps to reduce electronic noise.
- Screw the board on the bottom of the box
- Ground the board on the bottom of the box with a screw.
- Plug the wire of the bottom detector board to the amplifier.
- Put aluminum foil around the connector in order to create a Faraday cage around it. It seems that this piece of metal acts as an antenna when the flash lamp is on.

4) The box :

- Close the box. Pay attention to the letter A
- cover it with the black cape

5) Check the electronic noise :

- switch on the amplifier
- switch on the lamp
- check the electronic noise on the screen of the scope.

6) Start :

- If the electronic noise is good, you are ready to begin the measurement
- If the electronic noise seems to be too much important, the issue comes from the piece of metal connected to the amplifier box. This last one act as an antenna. Create a good Faraday cage.

7) How to take some measures

- The box should be closed with a black cap above. The electronic noise should be acceptable.
- Fill the box with N₂ (coming from the bigger bottle)
- Turn on the lamp. You will have to wait 20 min before using it.
- Cool down to -100 °C the bottom detector
- Measures :
- turn off the lamp
- turn off the cooling system
- wait until “warm”
- Turn off N₂.

Estimation time :

to cool down from a room temperature (22°C) to -100 °C : 20 min + 5 min of temperature stabilisation

One measure will last between 9 min and 10 min

to warm up the bottom detector until a room temperature will last around 1 hour.