

# How to Build a Scintillation Probe

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Scintillation probes are relatively easy to build for experimentation. If on a budget, a one inch NaI probe is usually the most economical. Alternatively, a one inch NaI detector can be coupled to a larger photomultiplier tube for greater resolution.

Parts required:

25mm NaI or CsI(Tl) detector. For low energy xrf or gamma work, a 25mmx6mm NaI or 25mmx1mm CsI (TI) works well. For gamma spectroscopy, a 25mmx25mm NaI or 25mmx25mm CsI (TI) works well.

25mm or 38mm Photomultiplier Tube, preferably with a standard 12 pin base, needs to have at least 10 stage amplification and be sensitive in the UV-Blue region (420nm). Also needs to be a flat end window tube.

Standard 12 pin photomultiplier socket. These can be purchased fully assembled on eBay or it is relatively easy to build your own voltage divider. Instructions can be found in the Theramino Help File.

DC4 optical grease

Electrical tape

Aluminium Foil

Mu Metal Foil

BNC cable

Foam tape

Multichannel Analyzer

Firstly, the detector and pmt are cleaned with isopropyl alcohol solution. A dab of optical grease is put on the detector with the polished face. Attach the detector to the face of the photomultiplier tube and gently move back and forth. Use electrical tape to fasten the detector to the photomultiplier tube, making sure it is centered and firmly attached.

Attach the 12 pin photomultiplier socket to the photomultiplier tube. Wrap the tube in Mu metal foil. The foil acts as a magnetic shield to the tube. Ground the cathode to the Mu metal shield. The entire assembly can be wrapped in aluminium foil, or placed in a box, to shield from light. At this point, the probe can be tested by connecting to a HV supply and multichannel analyzer. If the probe is only for experimentation, it is essentially complete; however you may want to construct an aluminum or PVC housing for the probe. Use the foam to fill the gap between detector and tube. Glue the tube end caps,

allowing a center hole in one for the bnc socket. Thin acrylic and aluminum sheet works well for end caps.