

Laser Cutting Foils and Painted Cells

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Introduction

ESR Foil is a reflective material that is placed between scintillating material so that any escaping light will reflect back into SiPM.

A hole must be made on one side to fit a SiPM into the dimple of the scintillator.

Before having the laser cuts were made on to the foil using a hole puncher and a razor blade.

This created too much dead area. No reflective area.

Old method

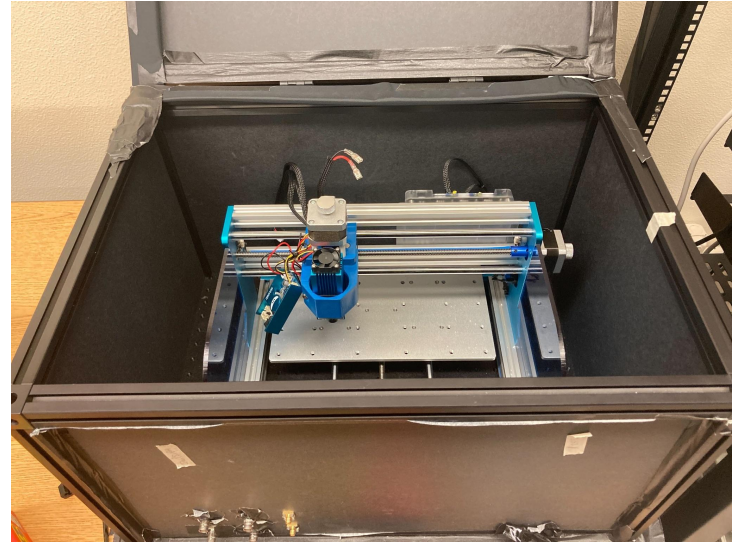
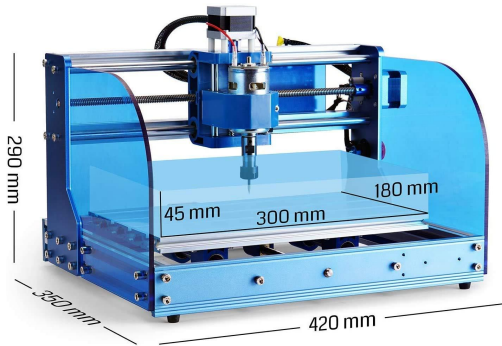


Materials

Genmitsu Prover 3018.

CFL55P Compressed Spot Fixed Focus Laser Module.

ESR Reflective Foil.



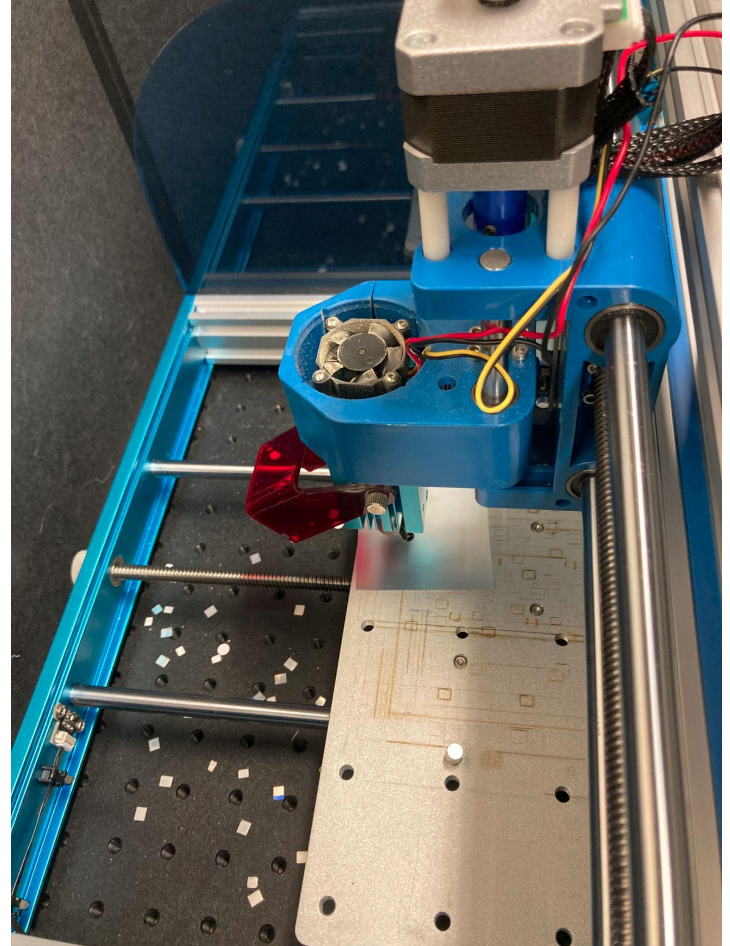
Procedure

Ensure that the foil is flat as possible.

Place the foil down so that the non-reflective part is facing down.

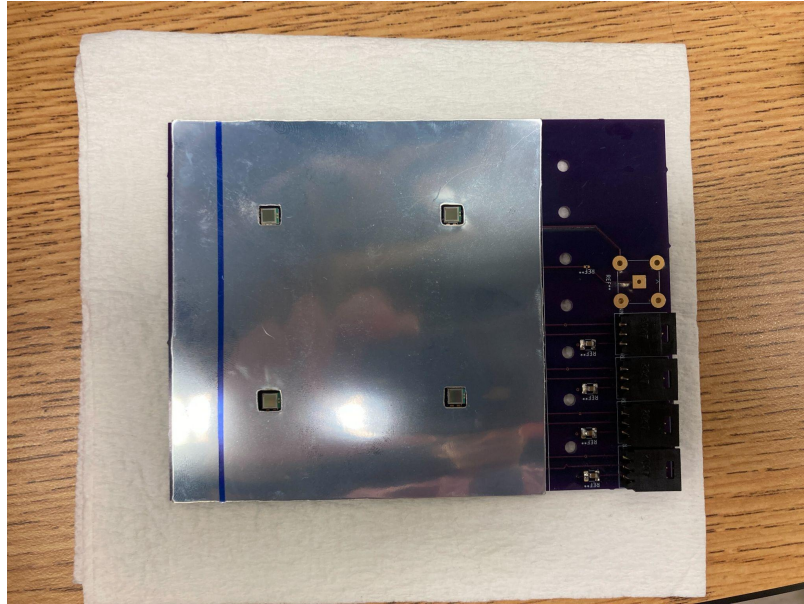
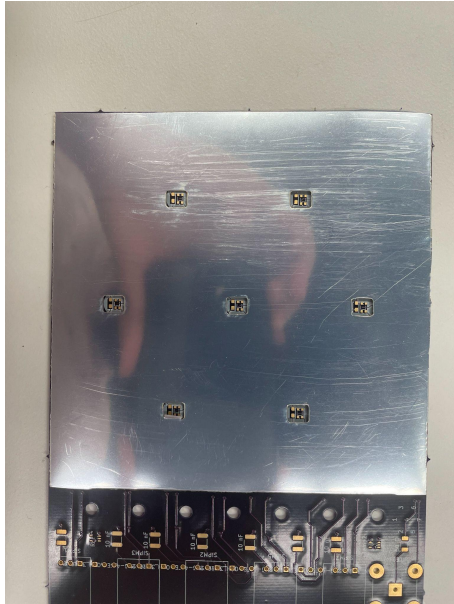
Increase the laser power to 2x and lower speed to 0.47x.

Make the laser loop through the design six times.



Results

Using the laser creates a more fitted hole in the foil for where the SiPM can be placed through.



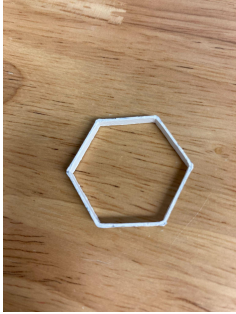
Painted Frames:

Recently an experiment was done between the frames that house the scintillating cells.

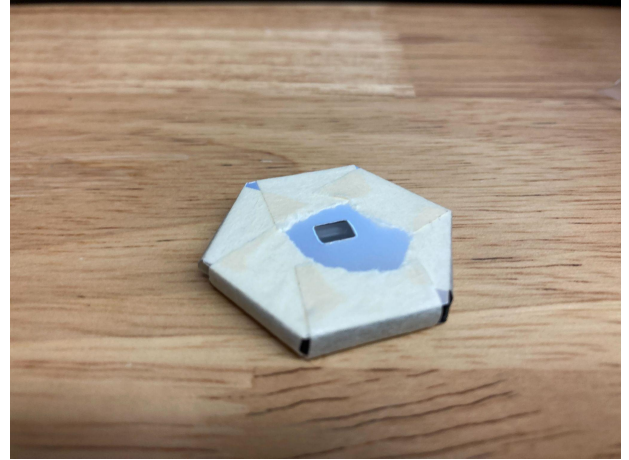
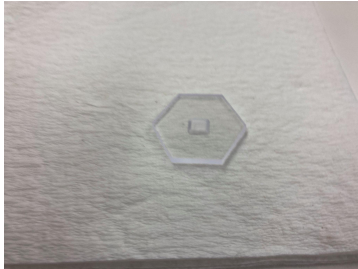
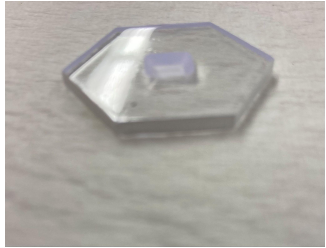
The experiment was to see if painting the frames instead of the scintillating cells would provide equal amount of light yield.

Painted Frames

Multiple Combinations were tested.



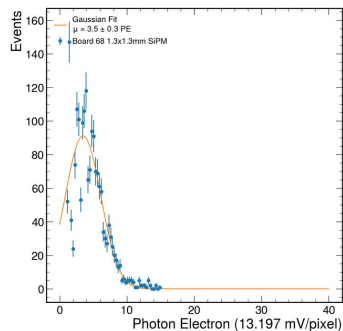
Frame painted with
reflective paint



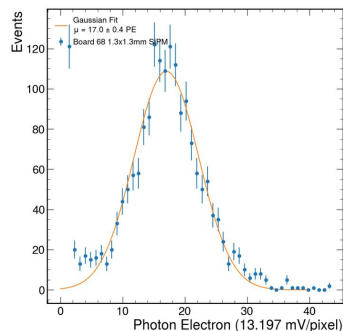
Painted Frames

Sr-90 results show that painting the frame will be beneficial for increasing light yield.

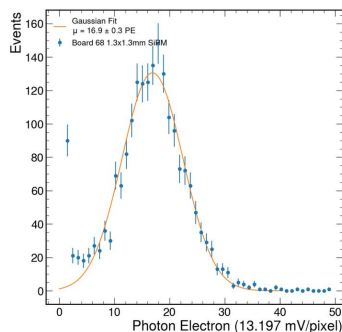
Non-Painted Cell with Non-Painted Frame +2V
Sr-90 Source
Rectangular Dimple



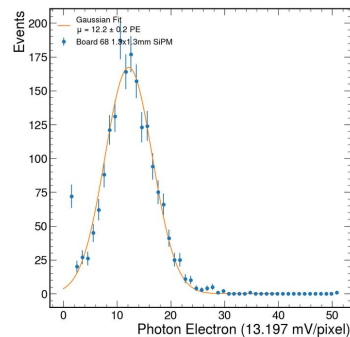
Non-Painted Cell with Painted Frame +2V
Sr-90 Source
Rectangular Dimple



Painted Cell with Painted Frame +2V
Sr-90 Source
Rectangular Dimple



Painted Cell with Non-Painted Frame +2V
Sr-90 Source
Rectangular Dimple



Summary

Cutting foils with a laser provides precise cuts to decrease dead area.

Painting frames shows positive results for light yield, without need to paint cell themselves.

New default: painted frame + unpainted cell.

This would work nicely with injection molded cells since they need no polish