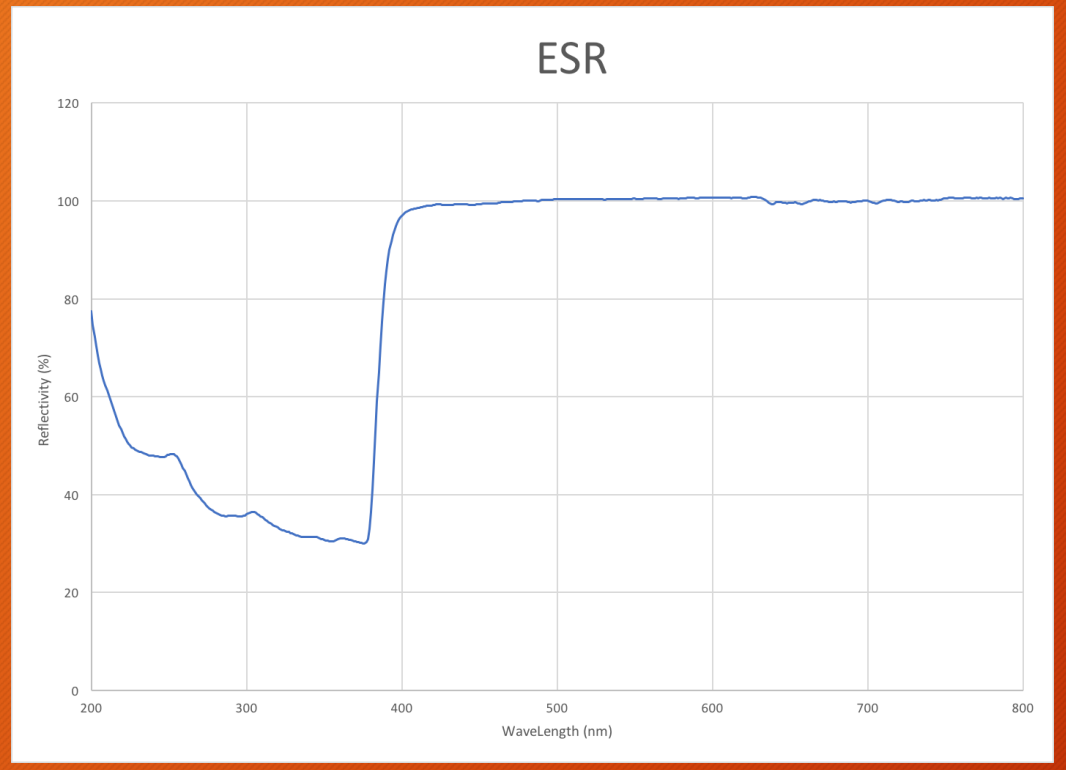
Week 6 Update

Casey Lauer

Identified Mystery Materials

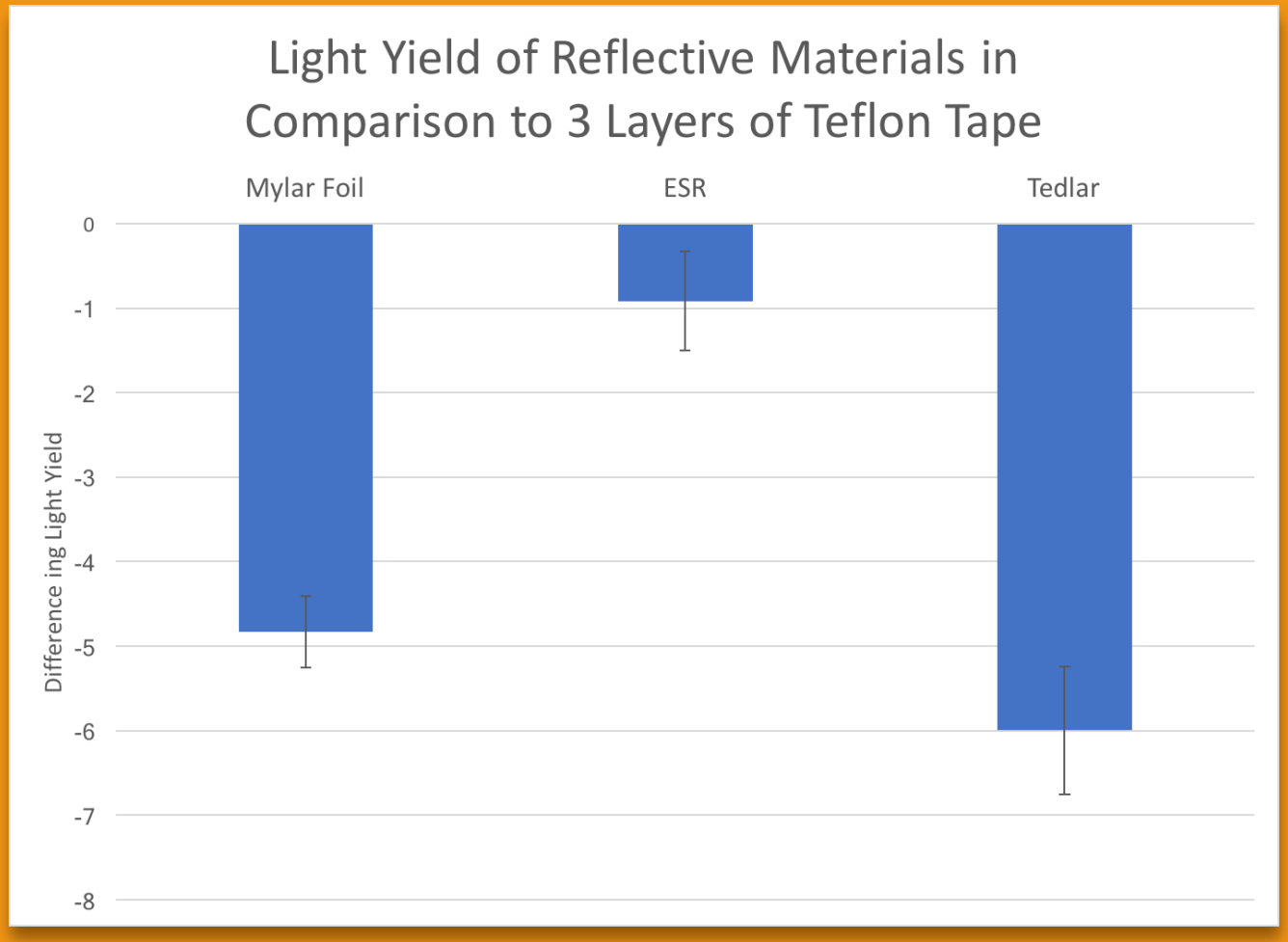
Material from JLab



Material from CUA

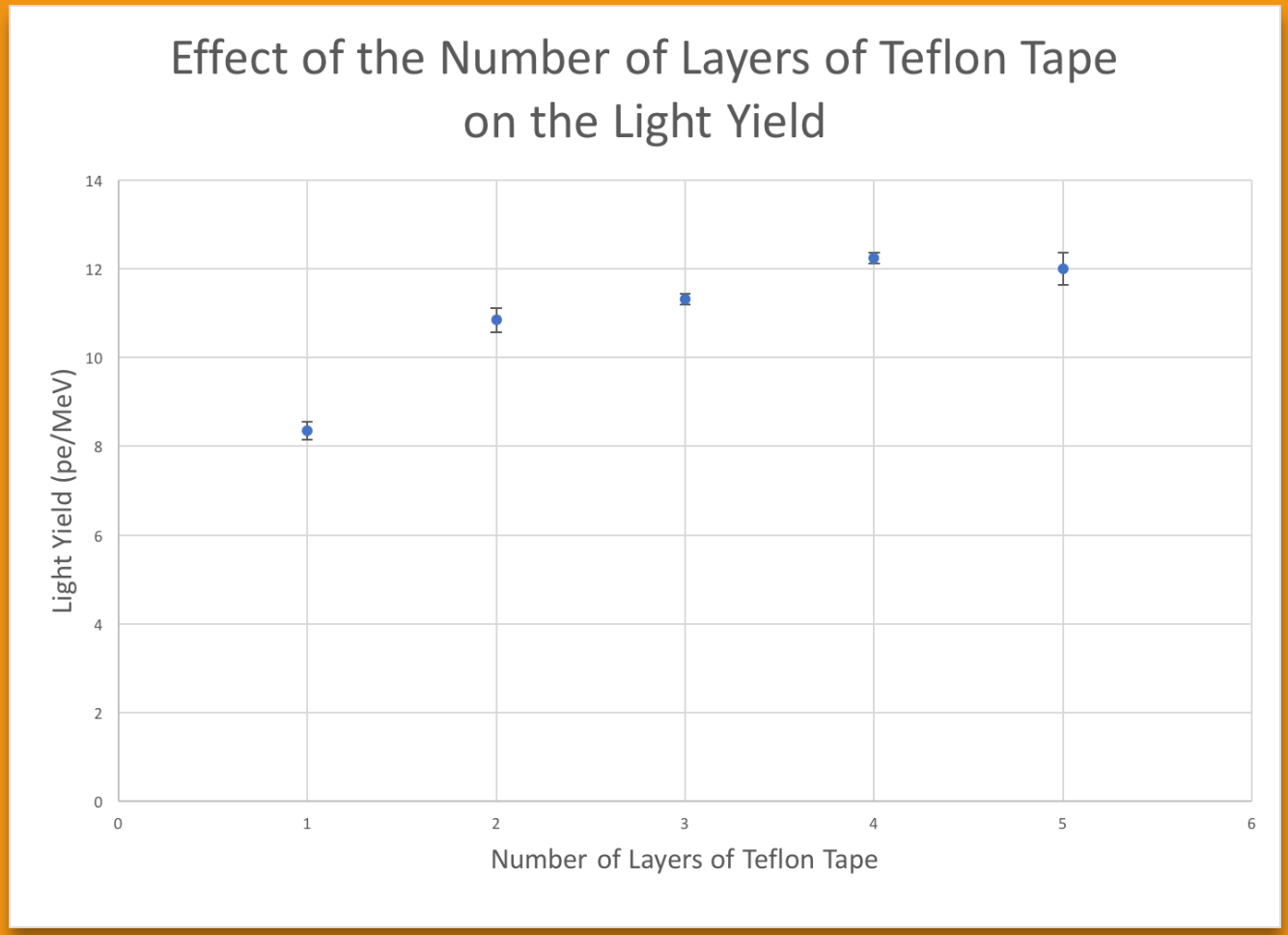
New Reflectors

- Light Yield compared to results when using 3 layers of Teflon Tape
- All reflectors had lower average light yields than when 3 layers of Teflon Tape are used
- Despite Mylar foil's high reflectivity when put in the spectrometer, the light yield results were very low
  - I am currently researching why Mylar Foil is not effective when used with these crystals



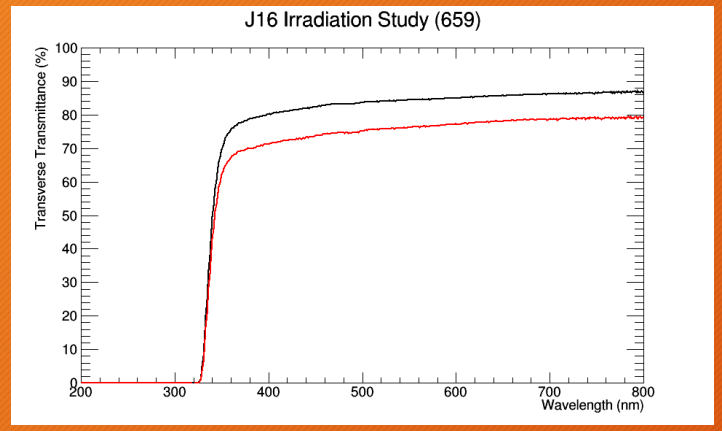
Multiple Layers of Teflon Tape Light Yield

- As the number of layers increases, the light yield also increases
- At higher number of layers, there appears to be a plateau
- 5 layers of teflon tape resulted in a slightly lower light yield than 4 layers
  - Test 6+ layers to see if trend continues



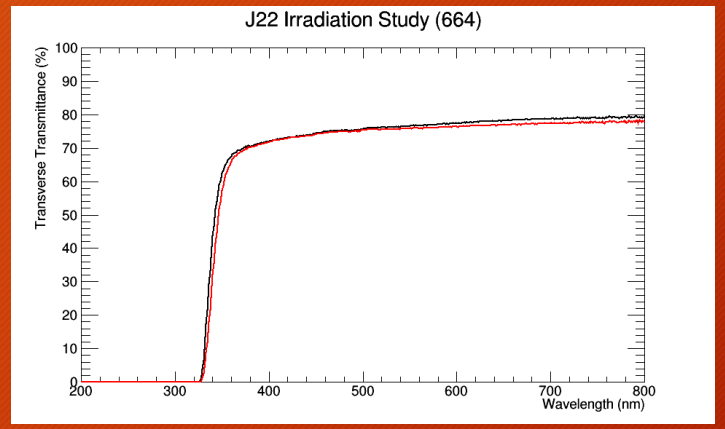
Impact of the Reflector at Different Locations on the Crystal

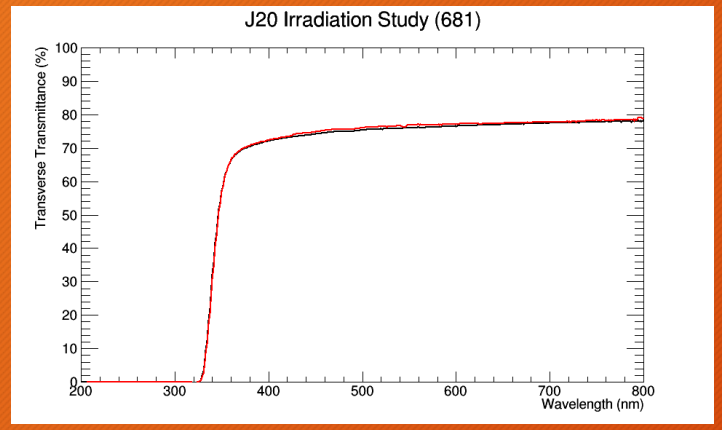
- The tedlar had the greatest negative impact on the light yield results when it was placed on the top half of the crystal
  - The majority of photon multiplication and reflection occurs in the top half of the crystal
- A significant amount of reflection occurs at the covered end of the crystal

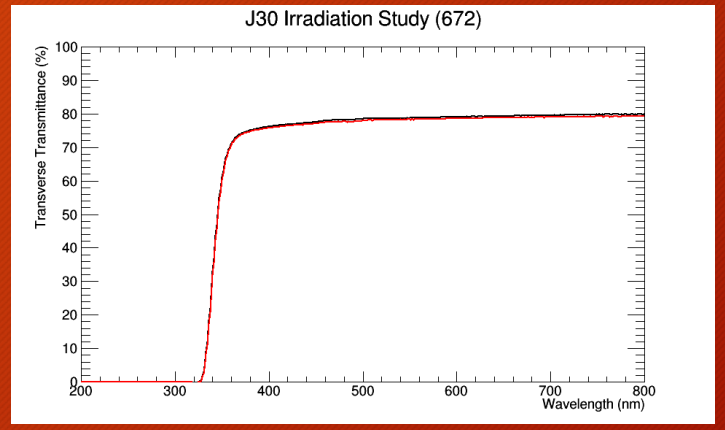


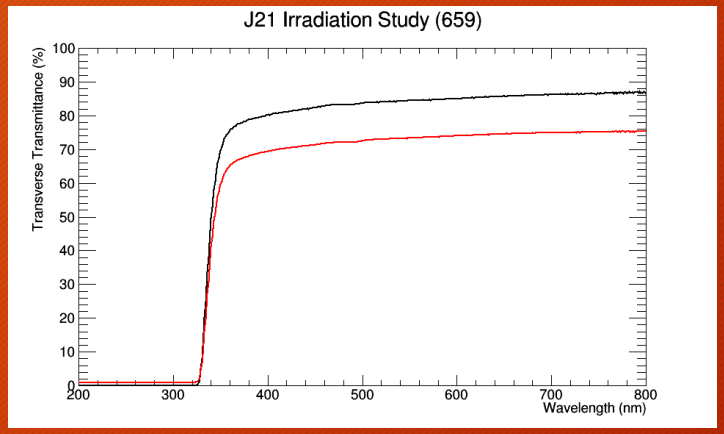
*Black= before radiation

*Red= after radiation







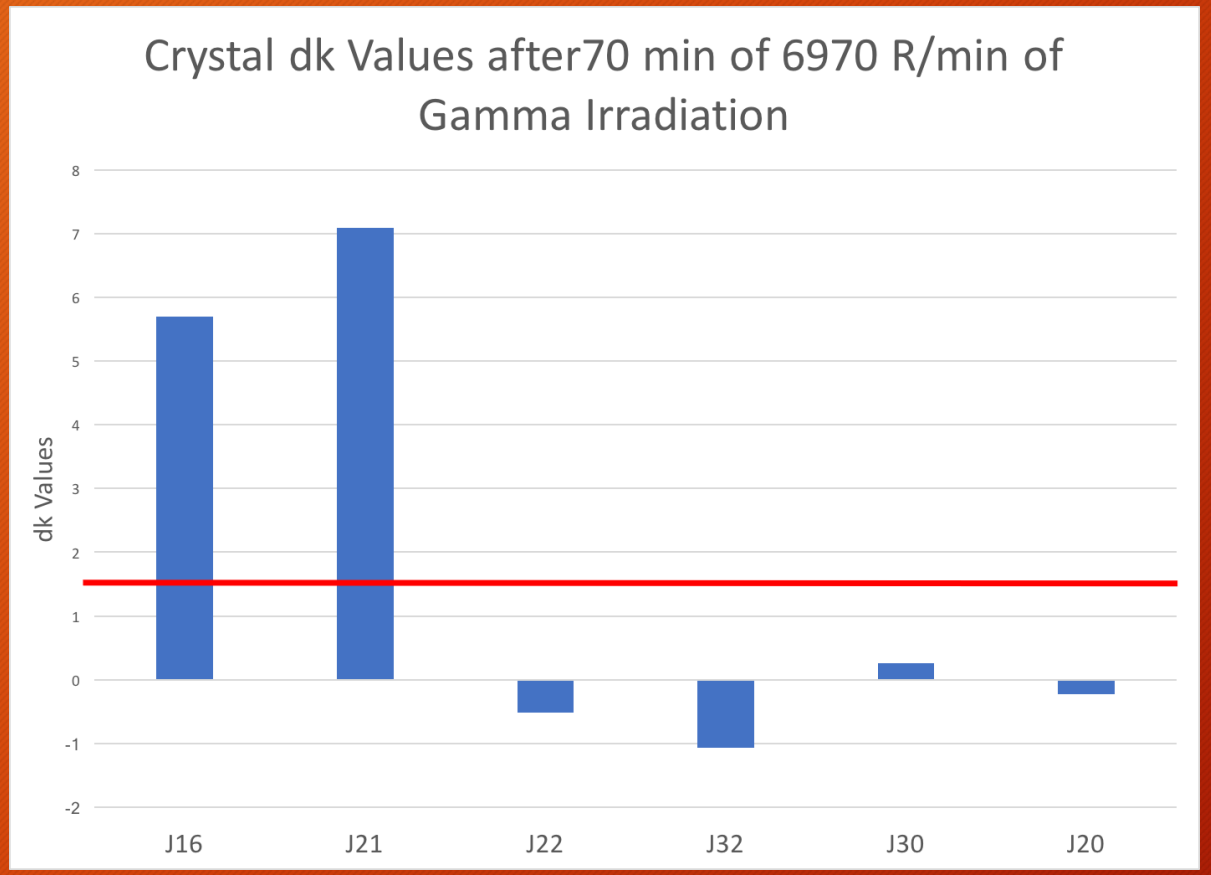


Variation in Radiation Hardness

Quantification of Radiation Hardness: dk at 420 nm

$$dk = \frac{1}{\text{length}} \ln\left(\frac{T_{bef}}{T_{irr}}\right)$$

- Closer to 0 = better radiation hardness



Next

- Test more layers of Teflon Tape
- Test the new materials we got from Jlab
- Continue testing radiation hardness of crystals