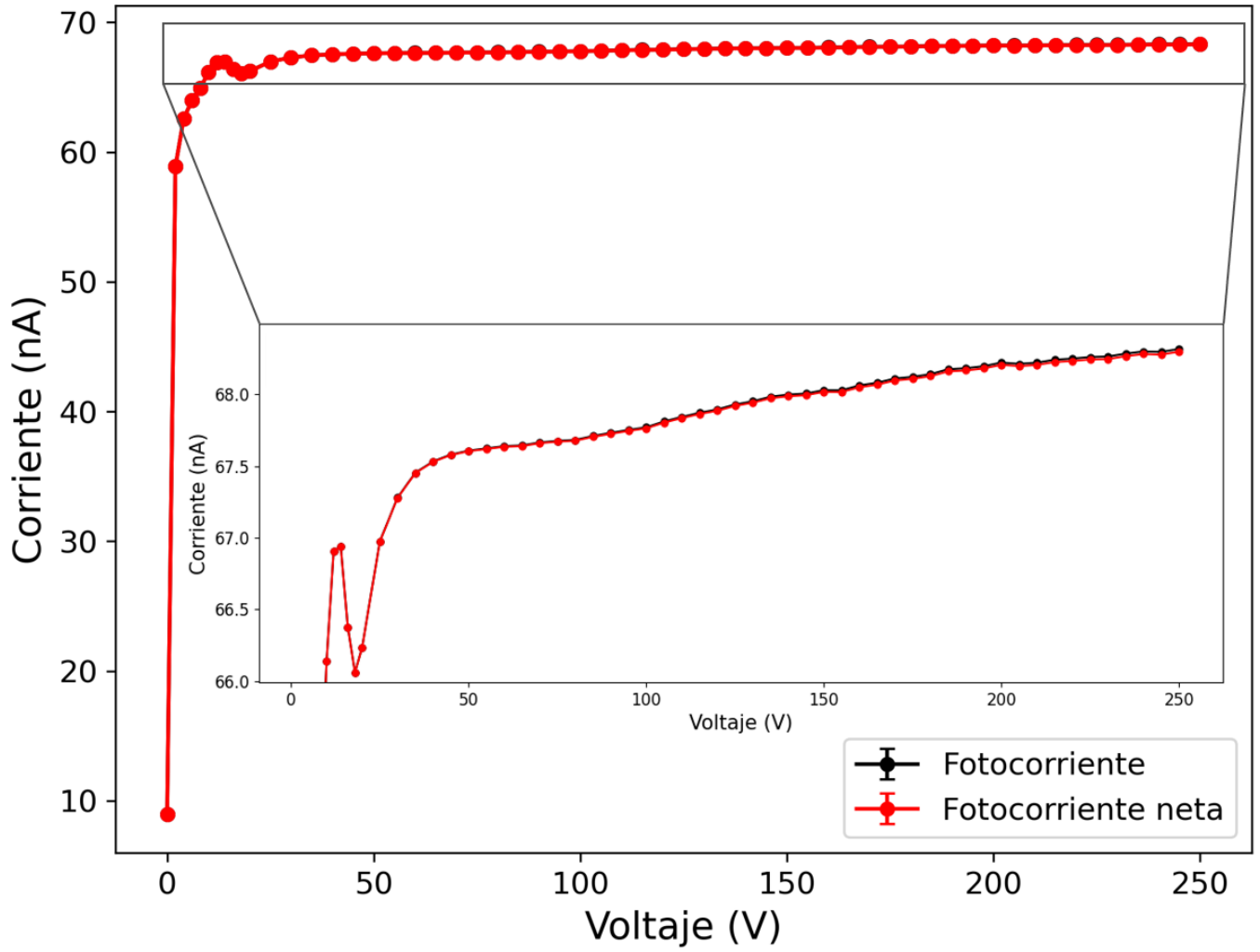
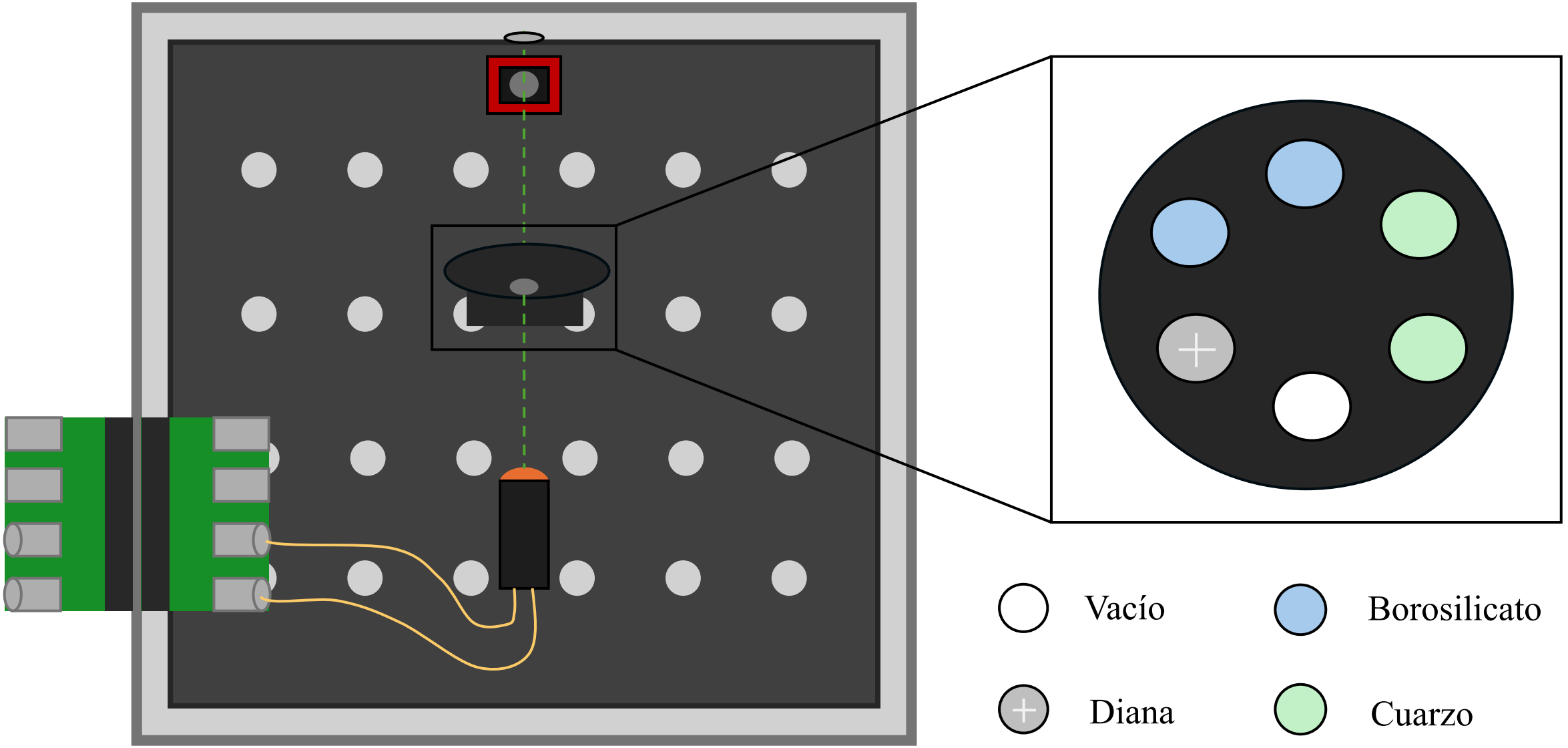
Transmittance measurements

Albert Resta, Andrea Roche, Nadia Yahlali

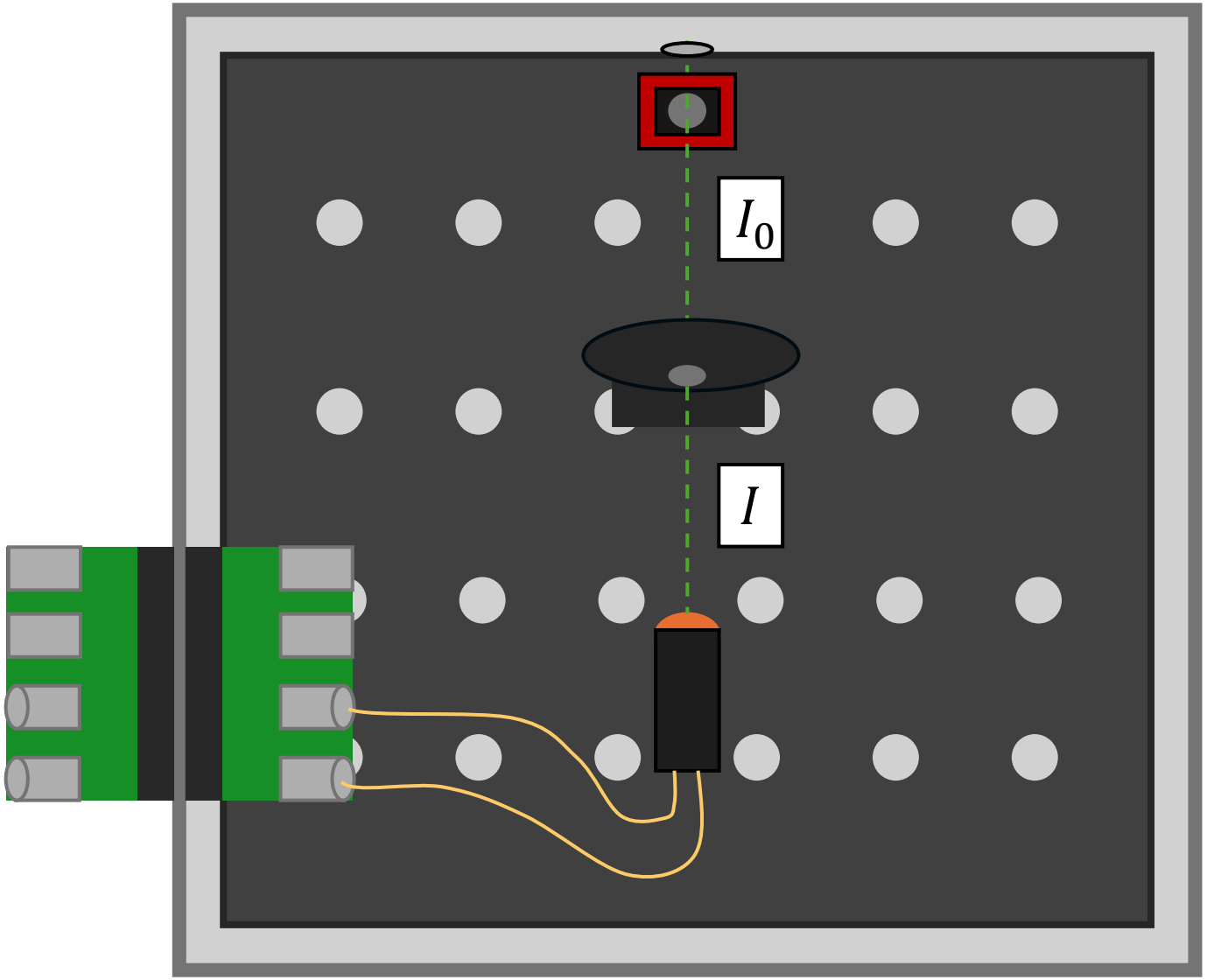
PMT VUV 80 I-V curve



Transmittance setup



Transmittance calculation

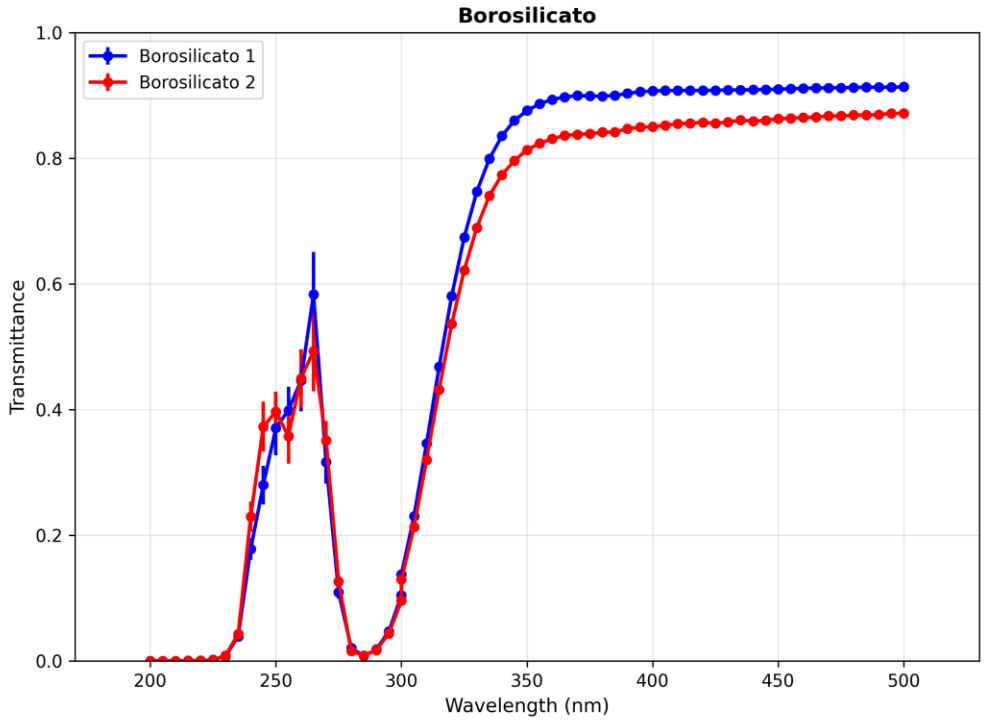


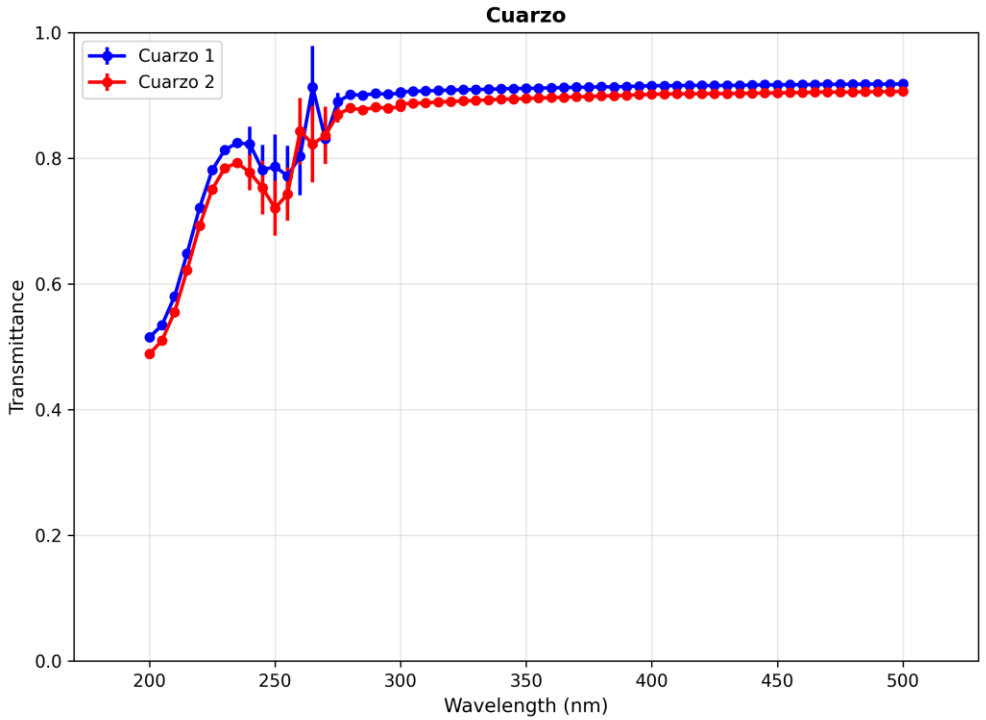
- Iris with diameter of 3 mm to ensure incidence only on the sample
- Direct light I_0 calculated with no sample
- Full revolver spin in ~ 2 min

$$T = \frac{I}{I_0}$$

First measurements: Air atmosphere

- Deuterium lamp (100-300 nm) and tungsten lamp (300-500 nm)
- Light absorption in 230-300 nm region prevents correct transmittance results

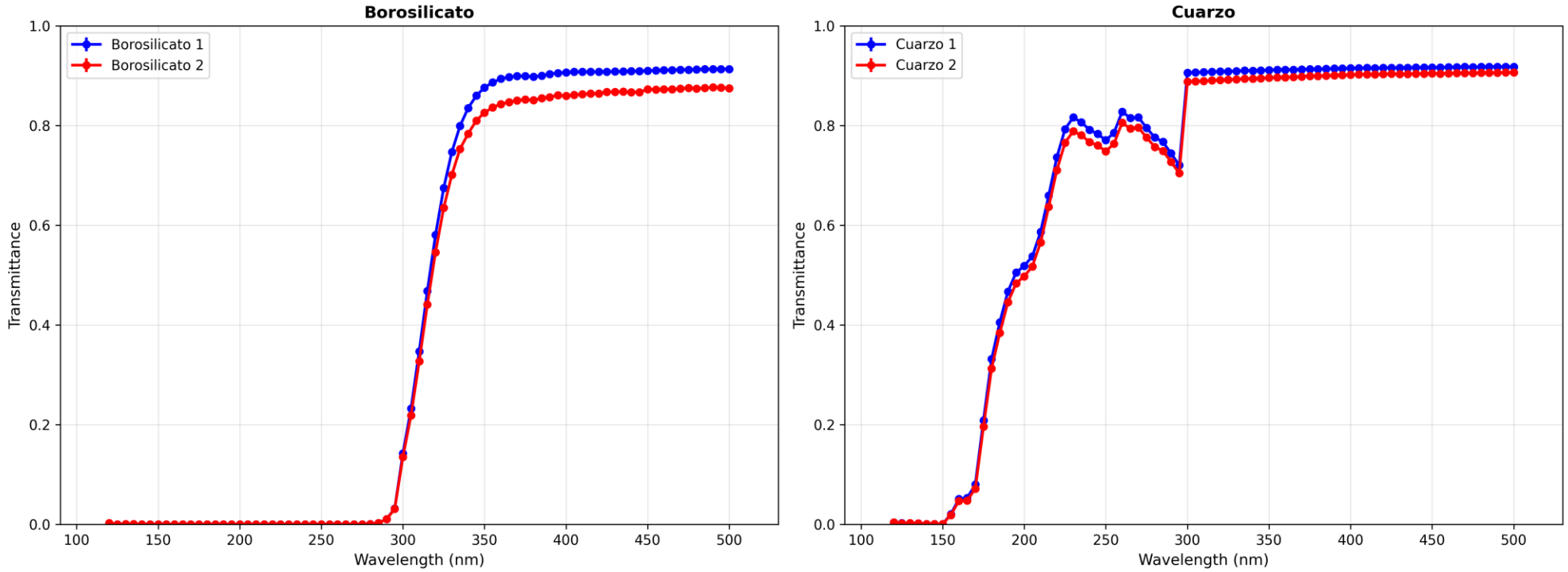




Measurements in GAr atmosphere

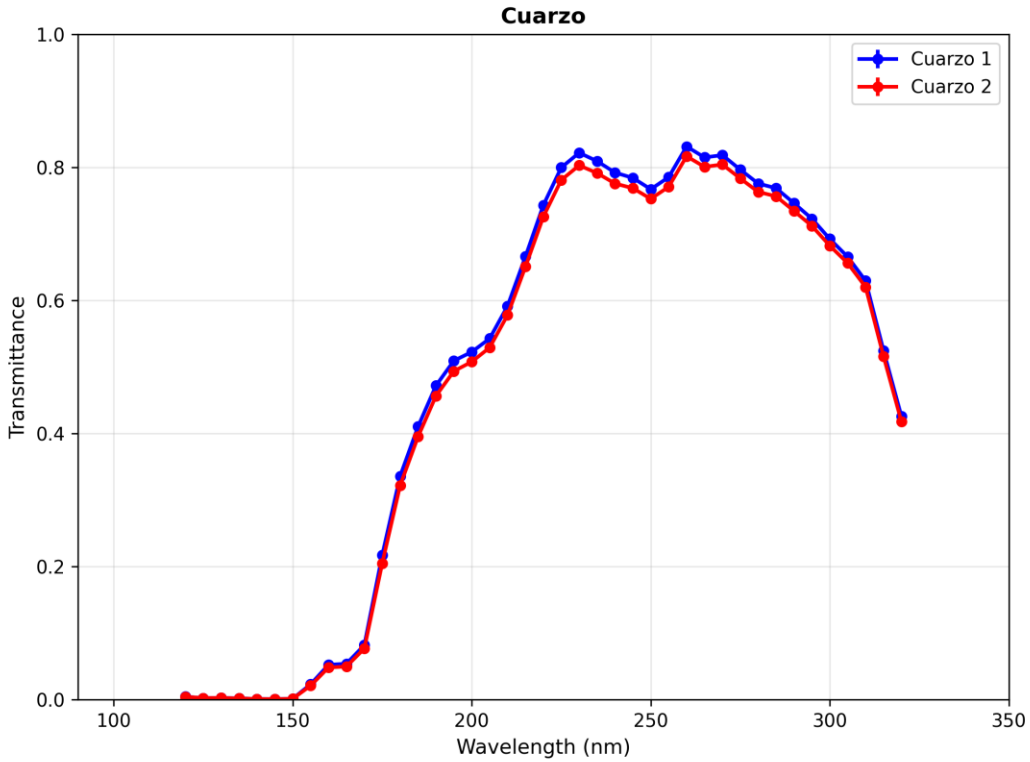
- In the presence of GAr, direct light is detected in the UV and VUV region, so transmittance measurements are successful

- Quartz's transmittance presents a drop and discontinuity in 200-300 nm region



Measurements in GAr atmosphere

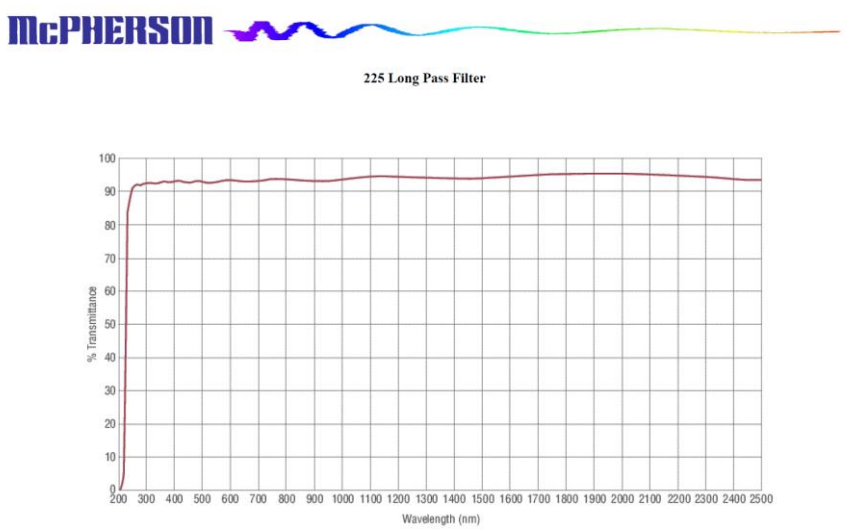
- Several more measurements are taken to analyze Quartz's anomaly
- The results suggest there is a systematic uncontrolled variable: second-order diffraction maxima

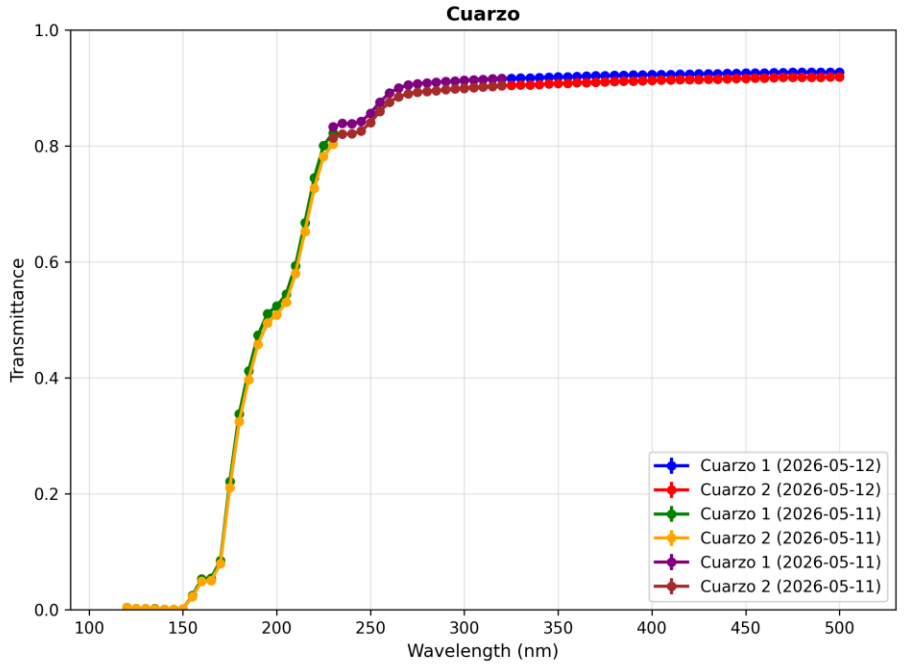


Measurements in GAr atmosphere

- Direct light with 200-300 nm was “contaminated” with 100-150 nm light, where deuterium lamp presents strong emission

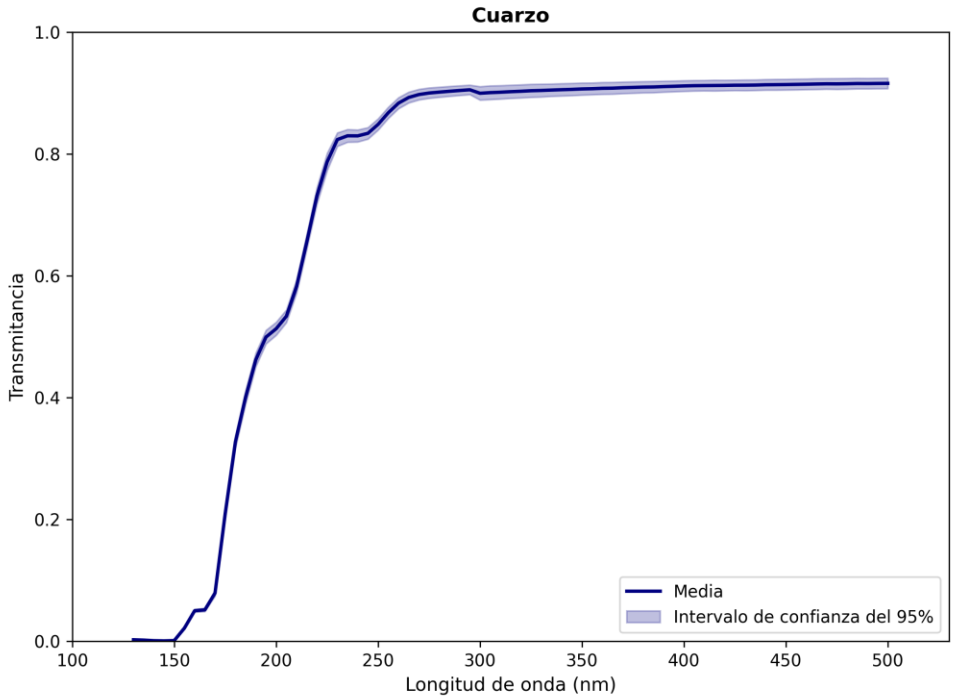
- The solution was to install the McPherson 225 nm cut filter in the monochromator and measure separately the 230-320 nm region

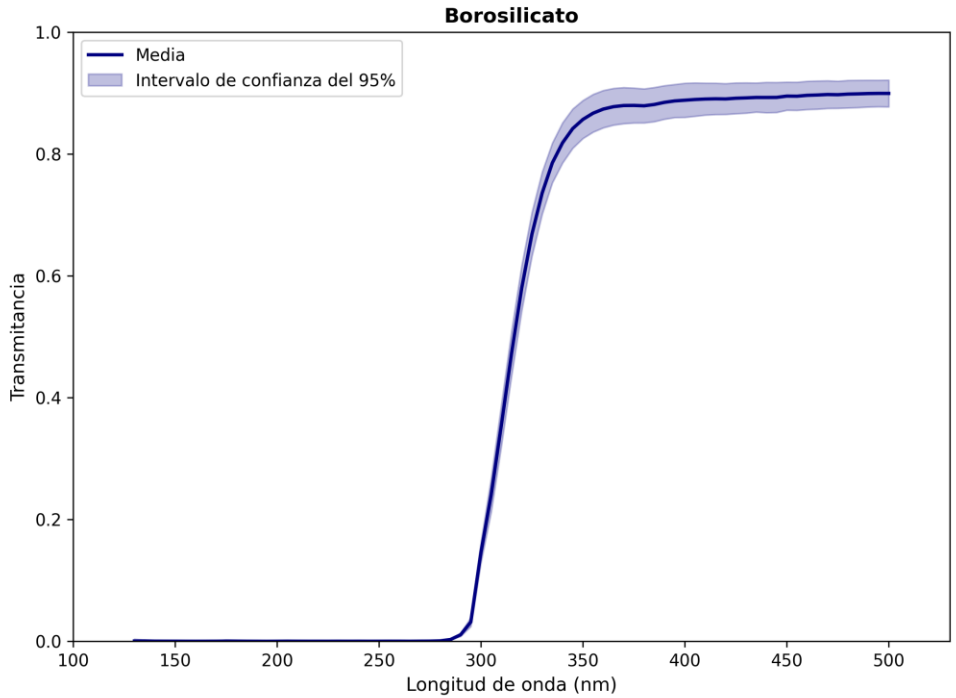




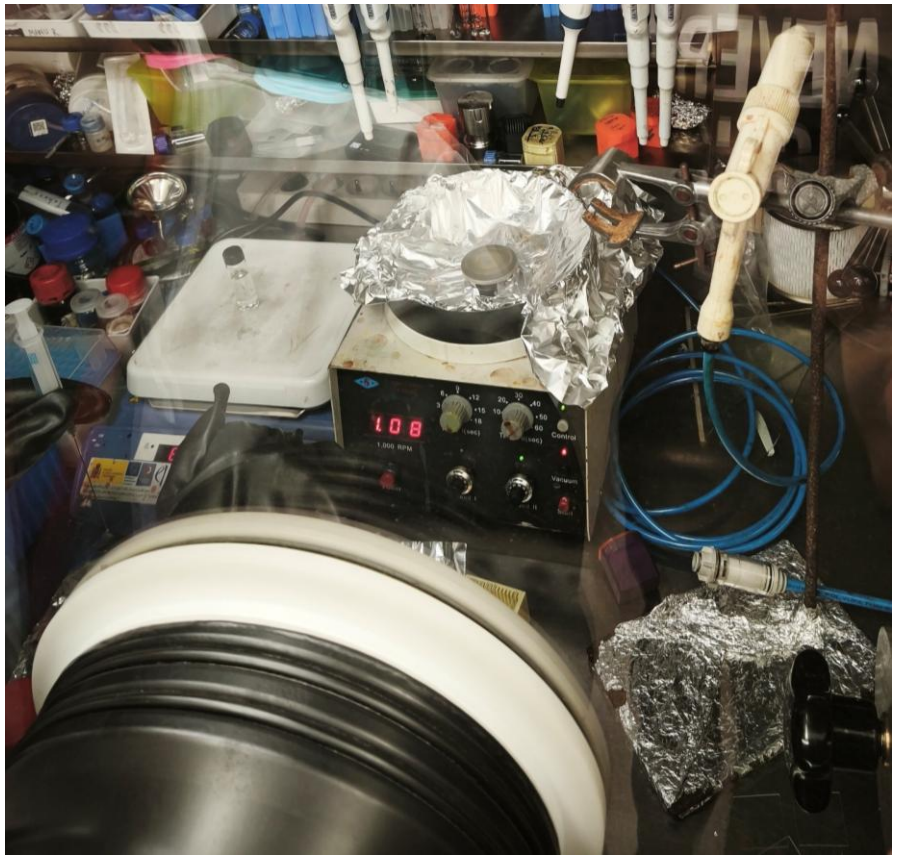
Transmittance results

- Grouped every measurement, also between the two different samples of same material
- Computed the mean and confidence interval of 95% (Student distribution)

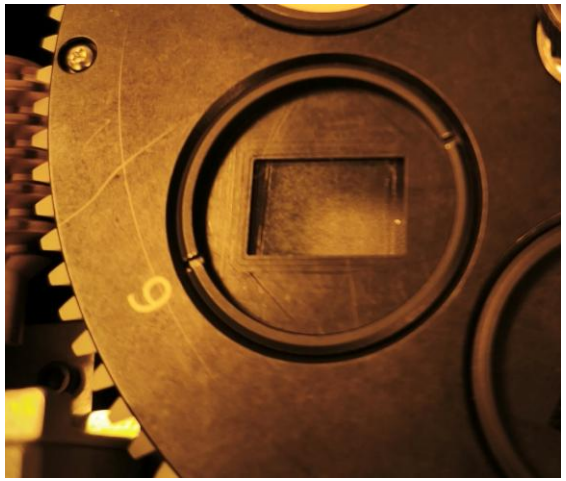




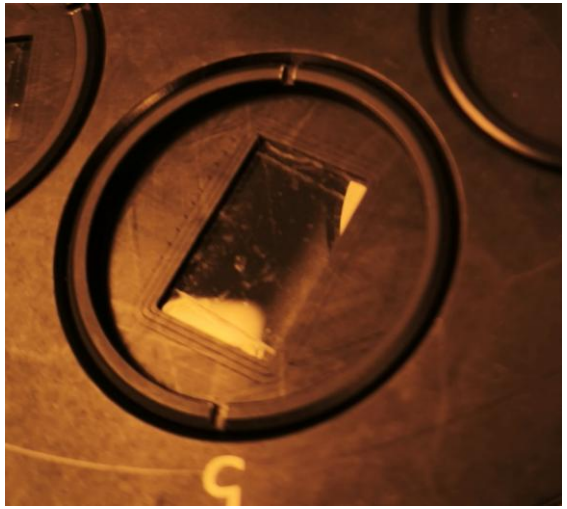
pTP deposition (spin coating)



Good deposition

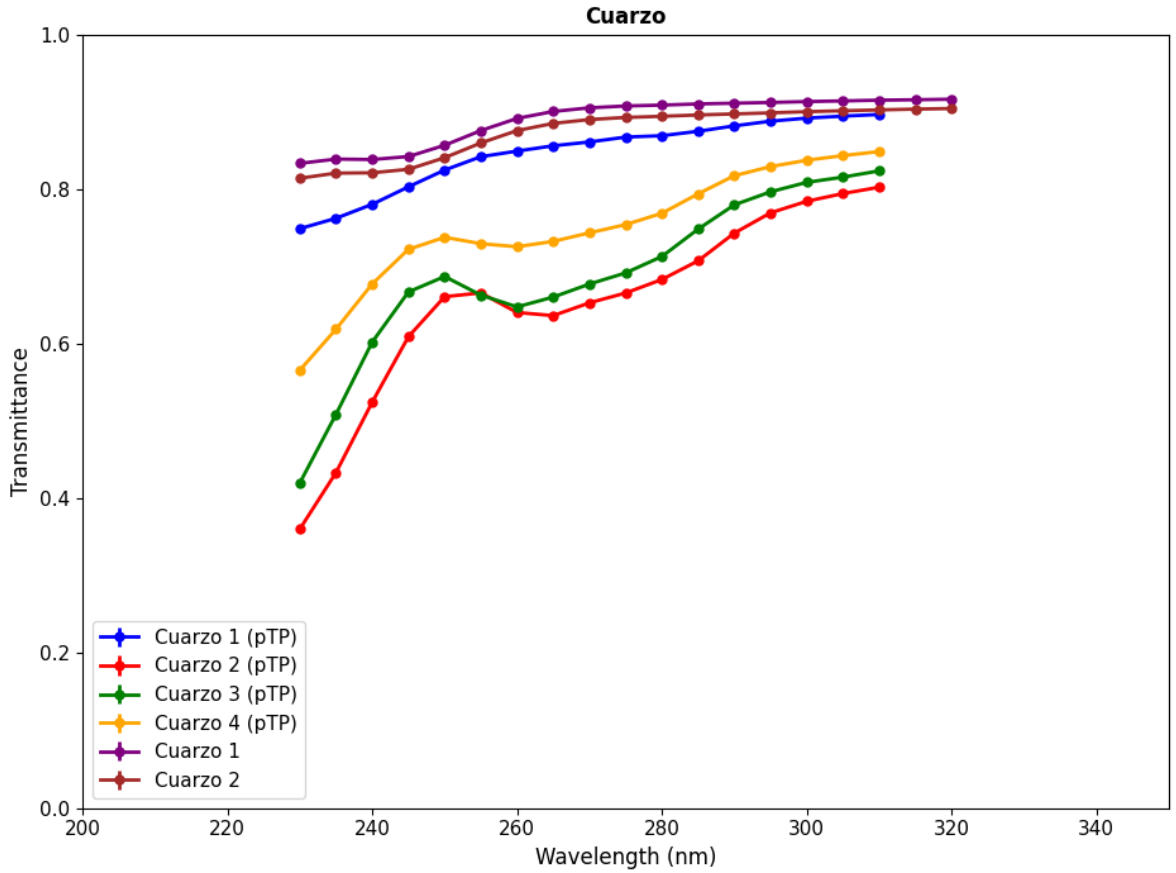


Bad deposition

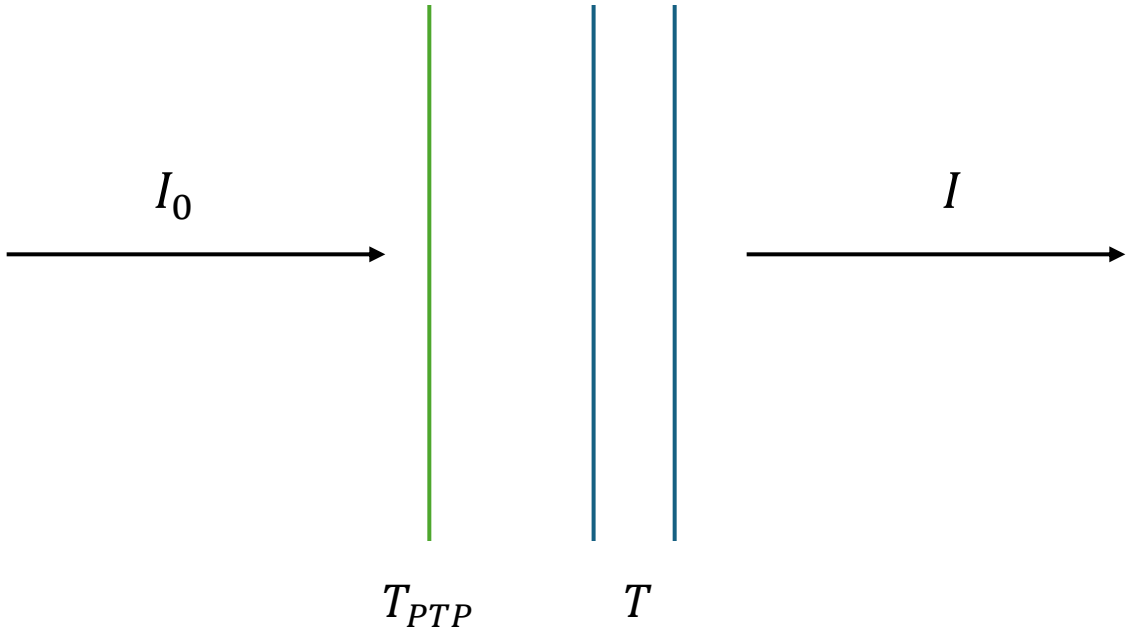


pTP measurements

- Absorption by pTP is observed
- 1 corresponds to a bad deposition and 2 to a good one
- Samples 3 and 4 with pTP were also analyzed



pTP absorption calculation

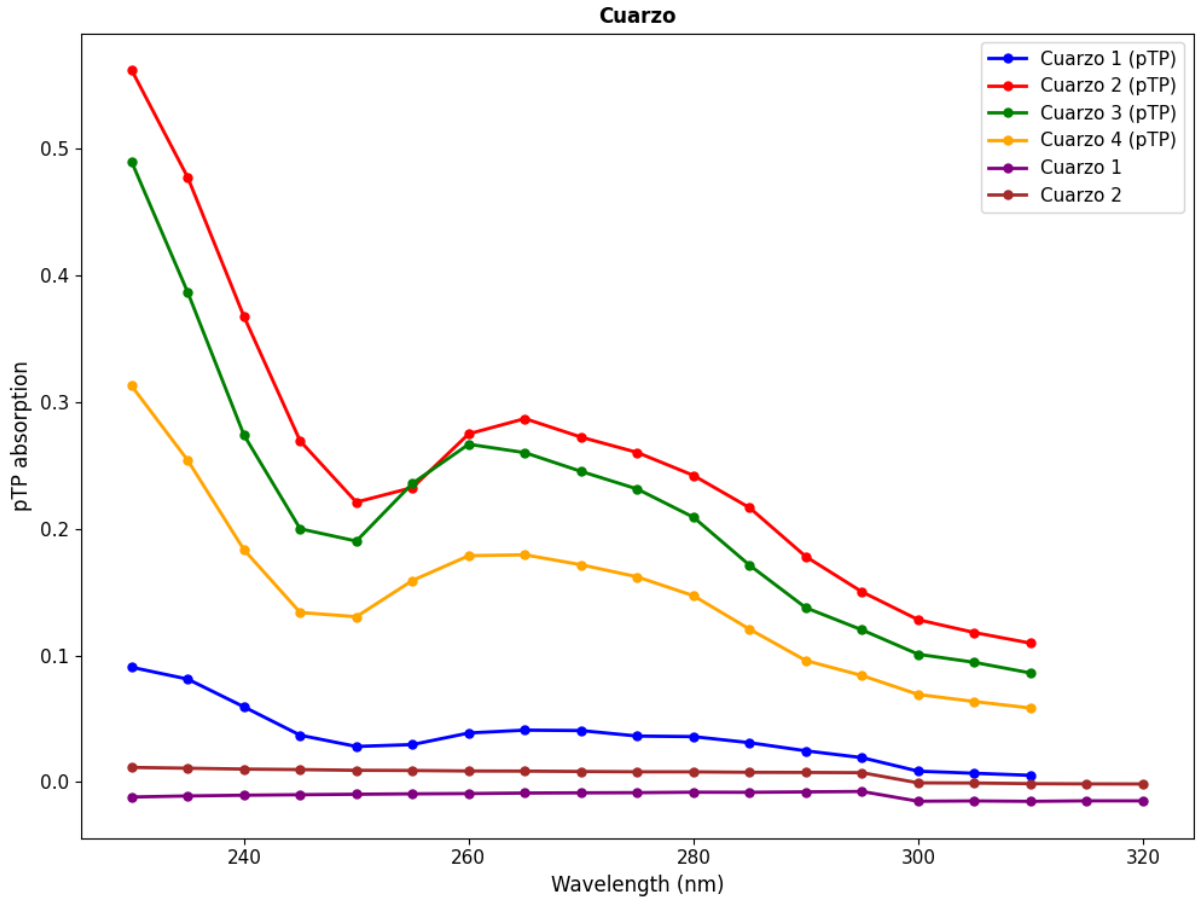


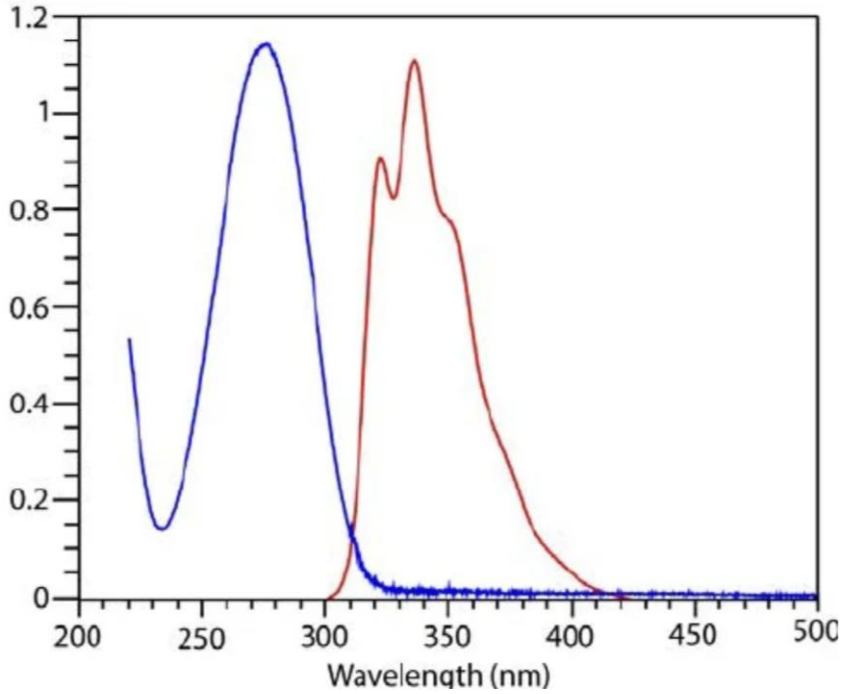
$$I = T_{PTP}\, T\, I_0$$

$$T_{PTP} = \frac{1}{T}\frac{I}{I_0}$$

$$A_{PTP} \approx 1 - T_{PTP}$$

pTP absorption calculation





Absorption and emission spectrums of PTP.

Thank you