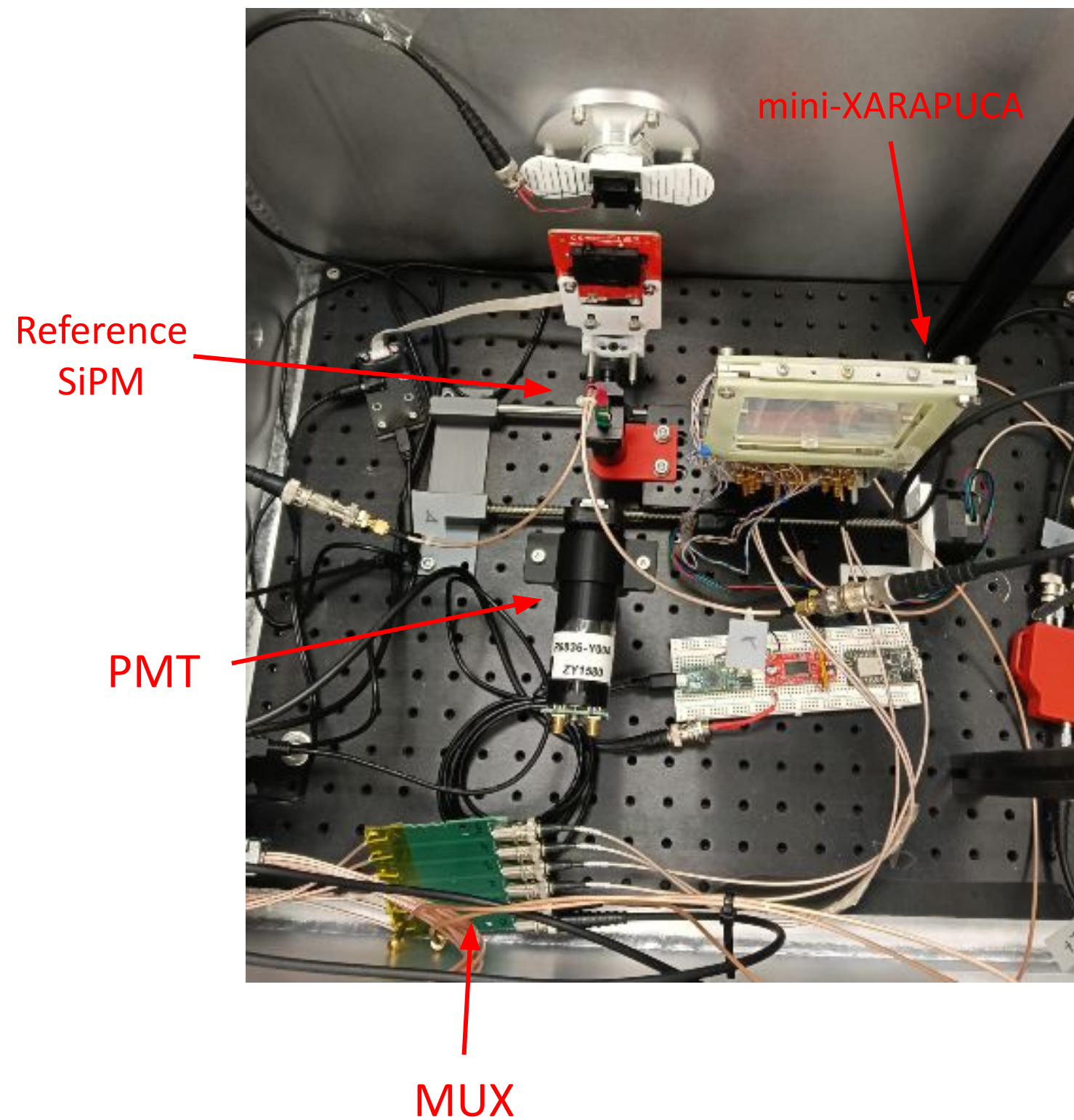


Updates on mini-ARAPUCA efficiency measurements

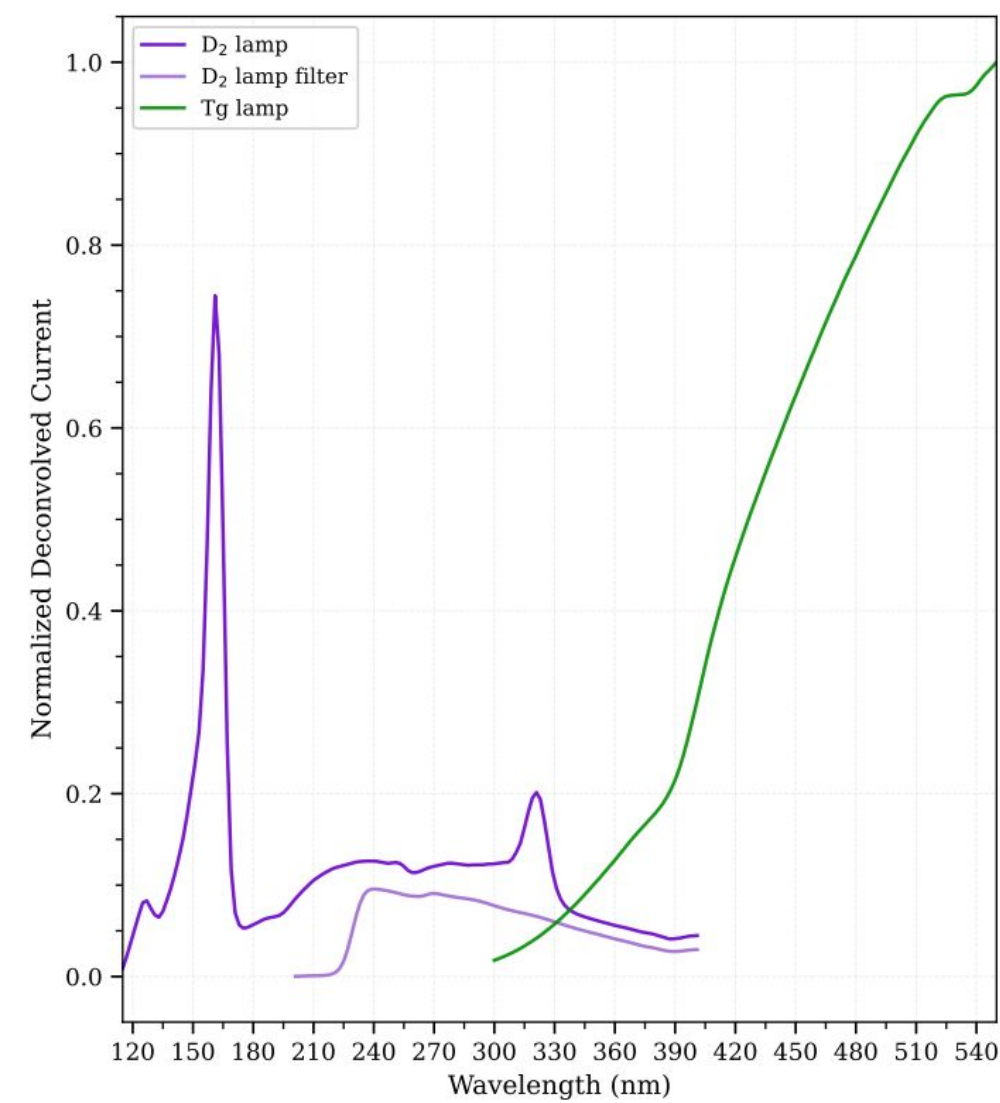
Xabier Arrue, Anselmo Cervera

Group Meeting 30 June 2026

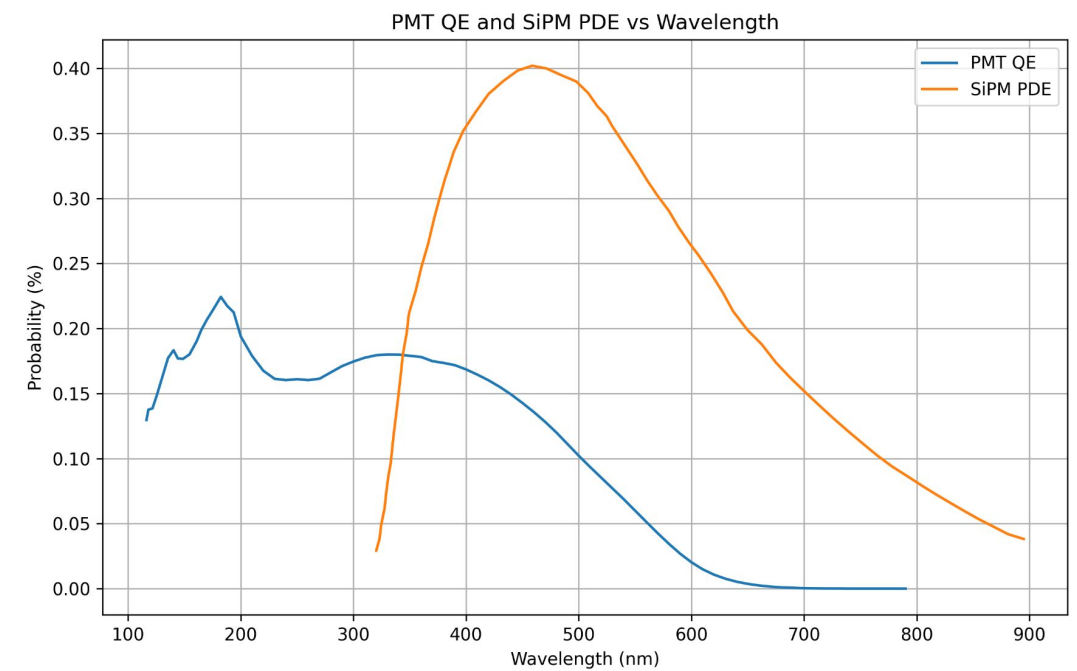
Efficiency measurement setup



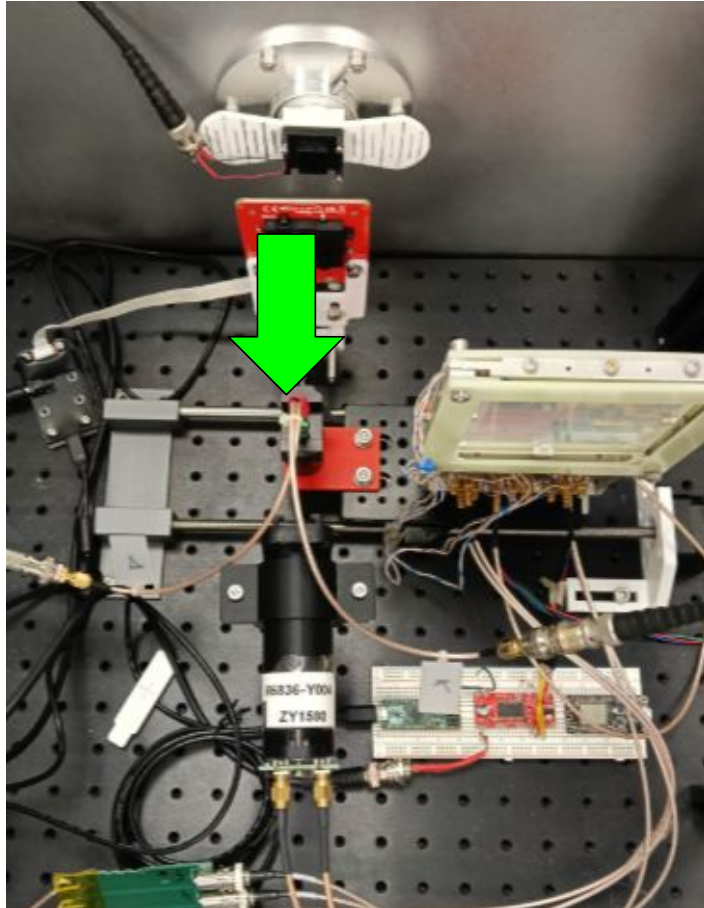
Lamp spectrum



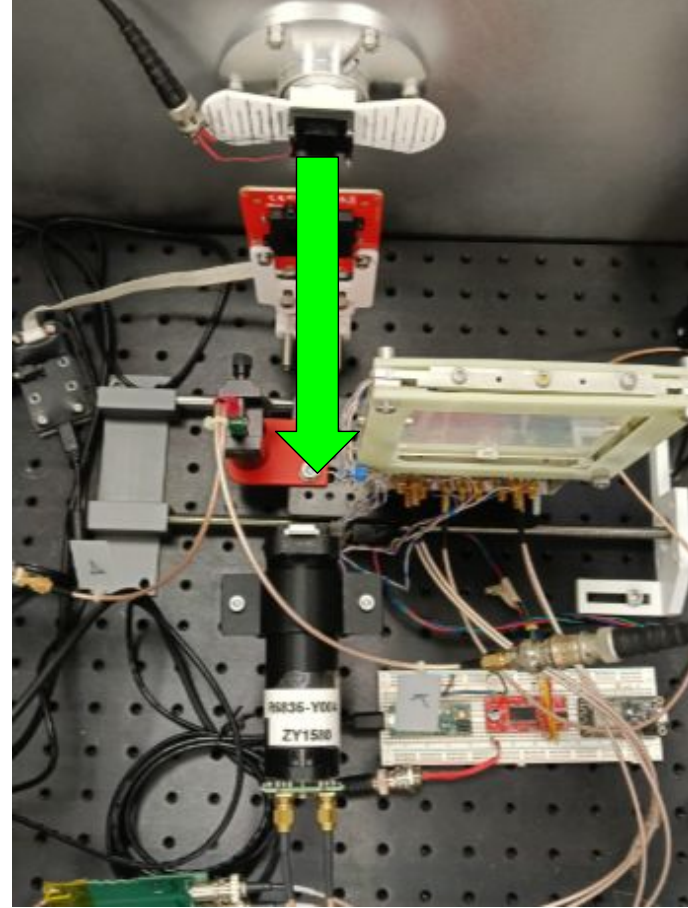
Reference sensors



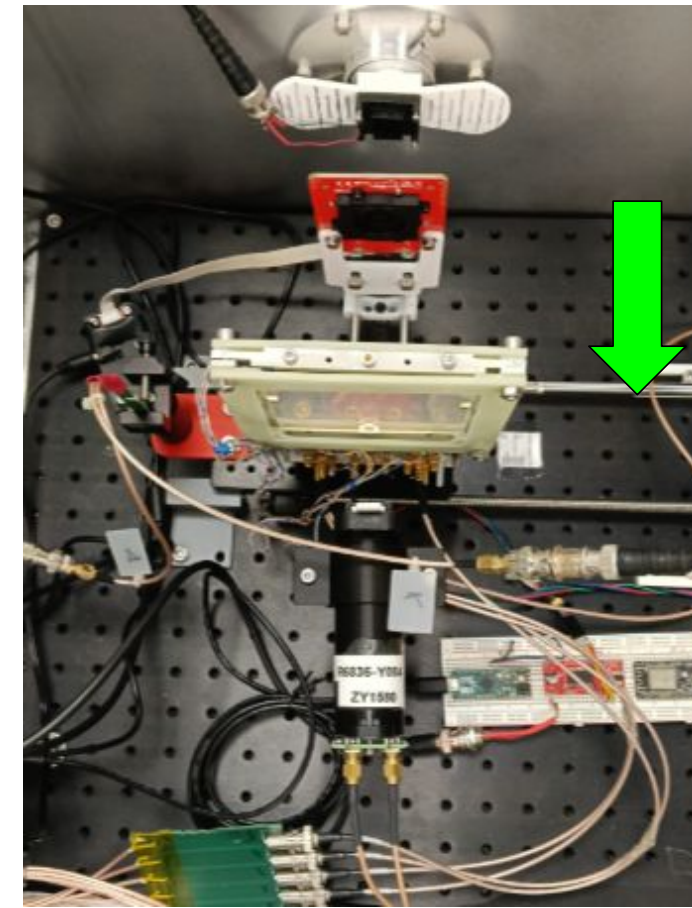
Efficiency measurement setup: Photocurrent method



Reference SiPM



Reference PMT

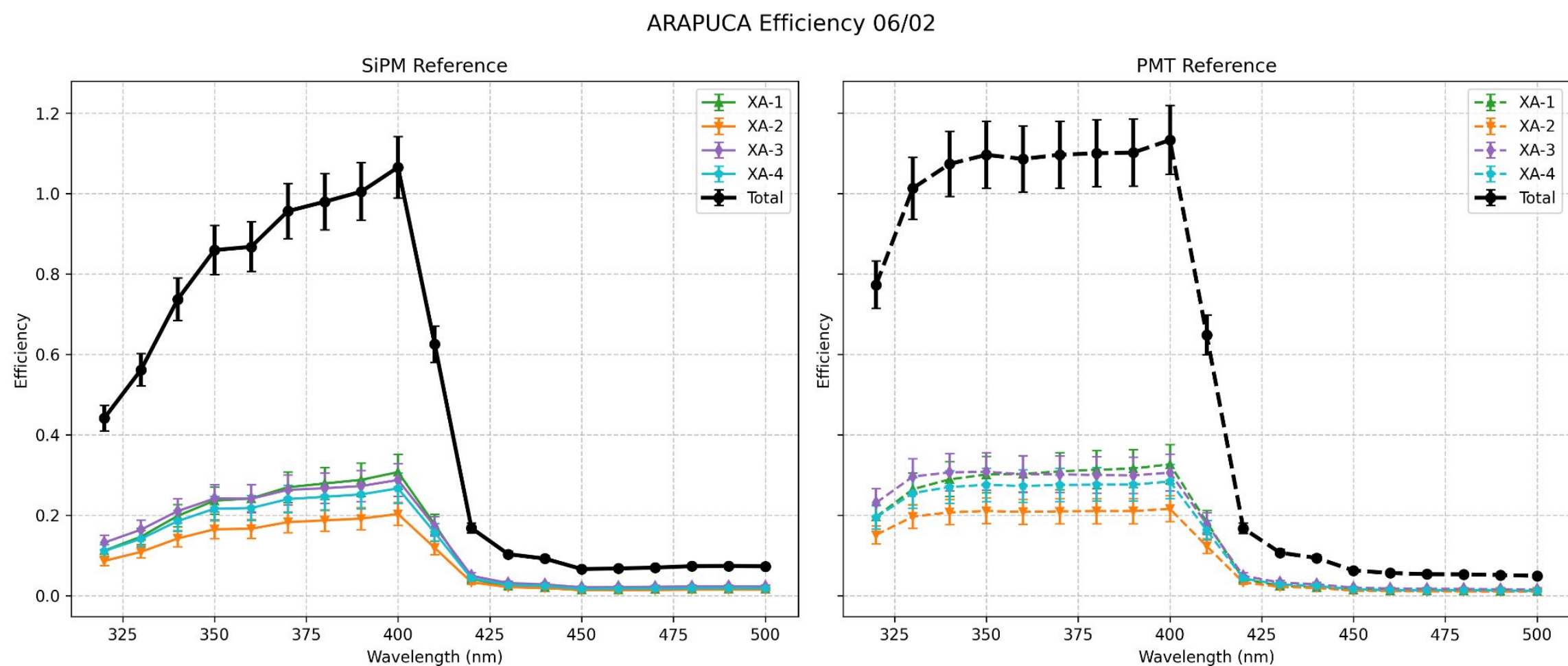
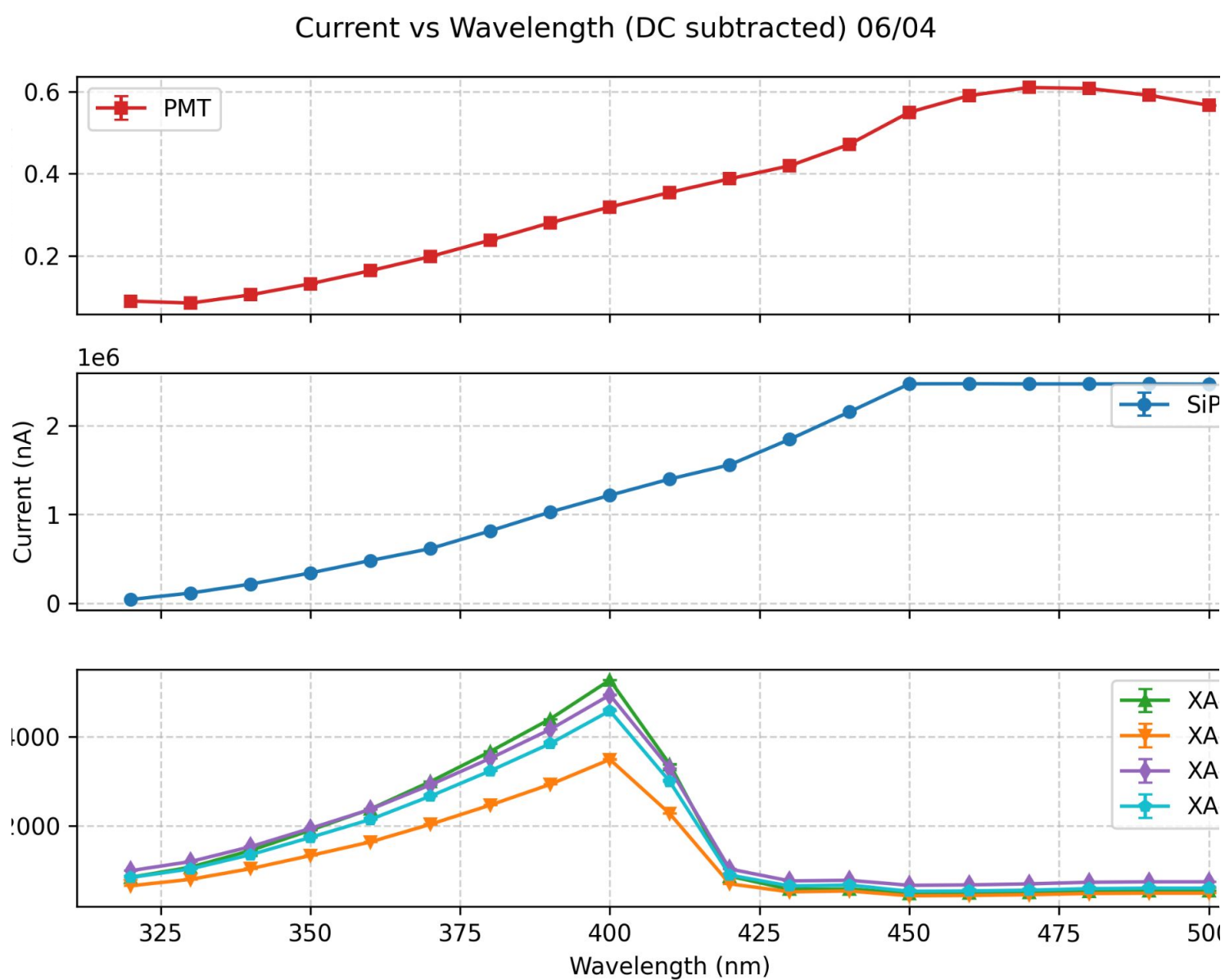


mini-XARAPUCA

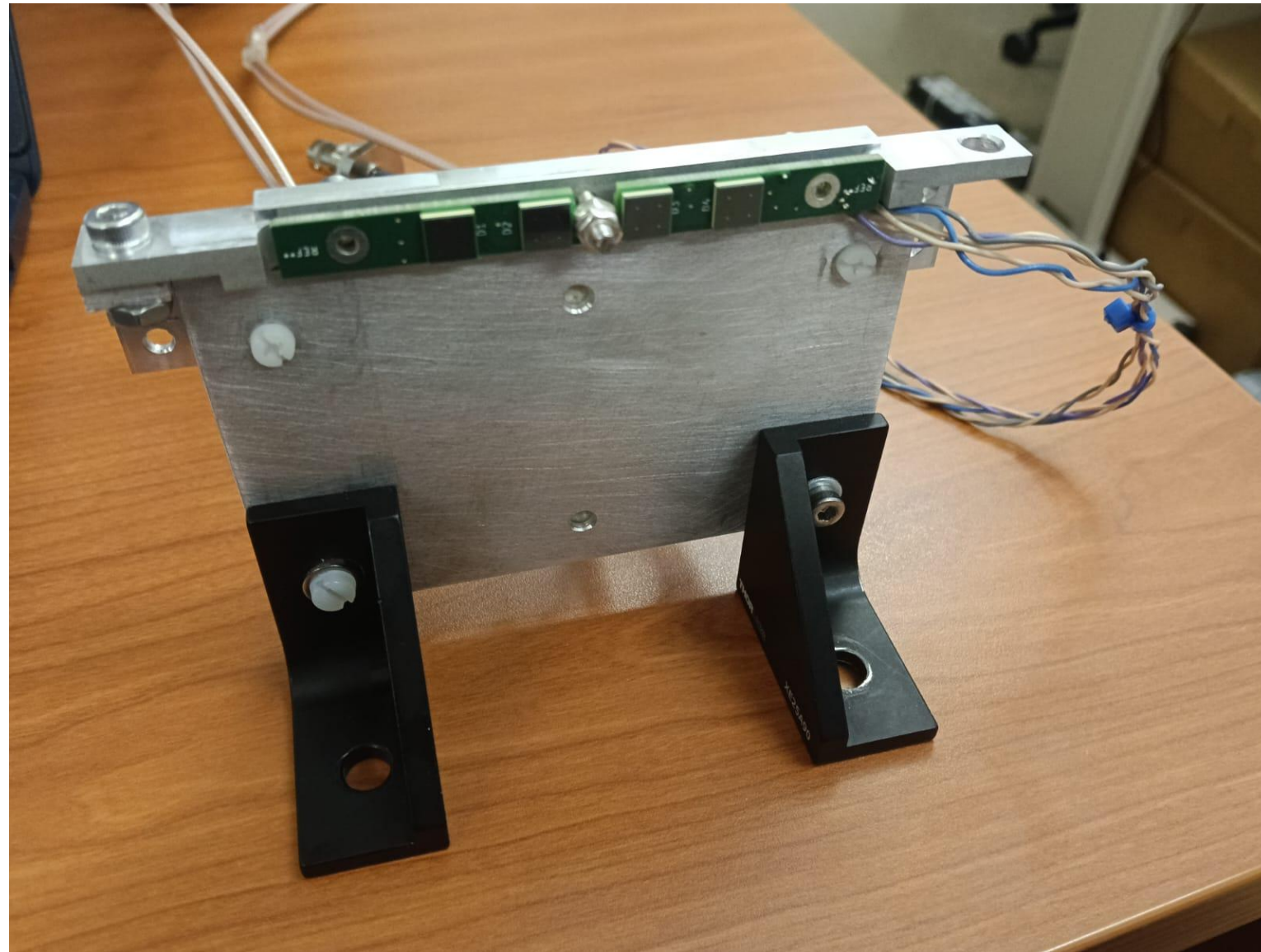
$$\text{PMT reference: } N_{\text{inc}} = \frac{I_{\text{PMT}}}{G_{\text{PMT}} Q E_{\text{PMT}} e^{-}}, \quad N_{\text{rec}} = \frac{I_{\text{ARA}}}{G_{\text{SiPM}} e^{-}}, \quad \varepsilon = \frac{N_{\text{rec}}}{N_{\text{inc}}} \times 100\%$$

$$\text{SiPM reference: } N_{\text{inc}} = \frac{I_{\text{SiPM}}}{G_{\text{SiPM}} PDE_{\text{SiPM}} e^{-}}, \quad N_{\text{rec}} = \frac{I_{\text{ARA}}}{G_{\text{SiPM}} e^{-}}, \quad \varepsilon = \frac{N_{\text{rec}}}{N_{\text{inc}}} \times 100\%$$

Efficiency results: Tg lamp ($V_{op} = 54.5$ V, $IS=OS=0.5$)



PMT-SiPM cross-calibration



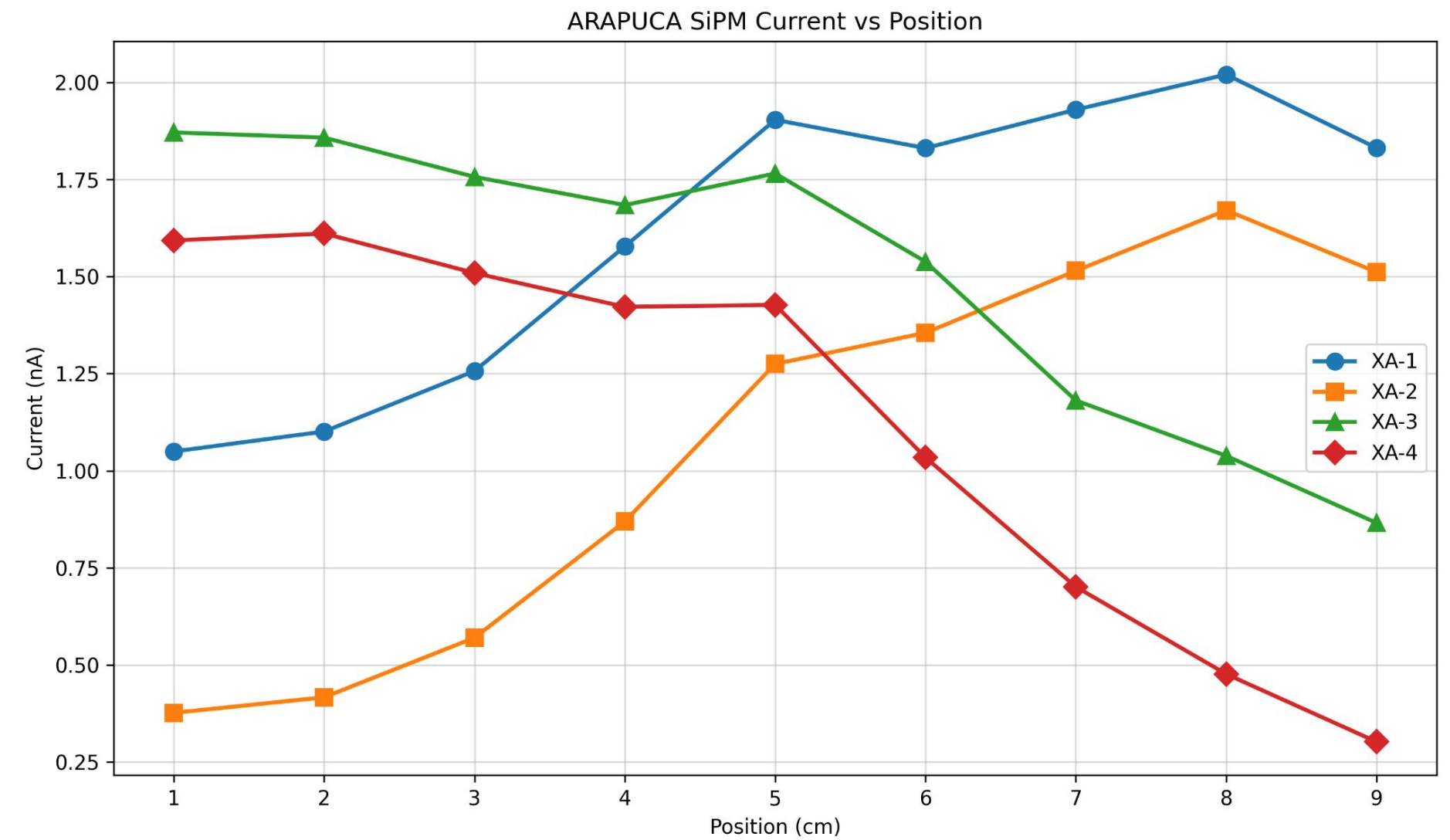
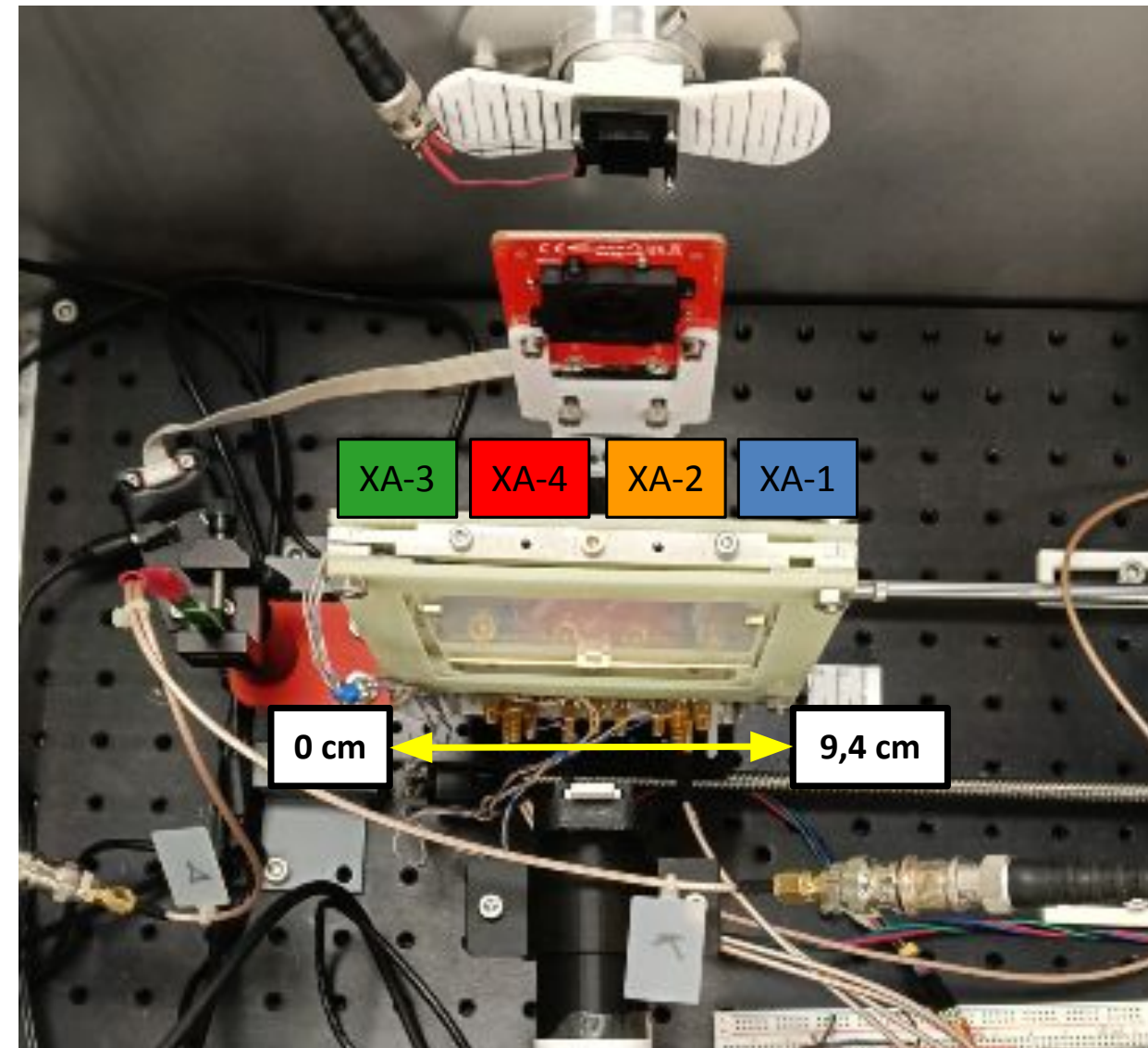
Detach SiPM from
mini-ARAPUCA



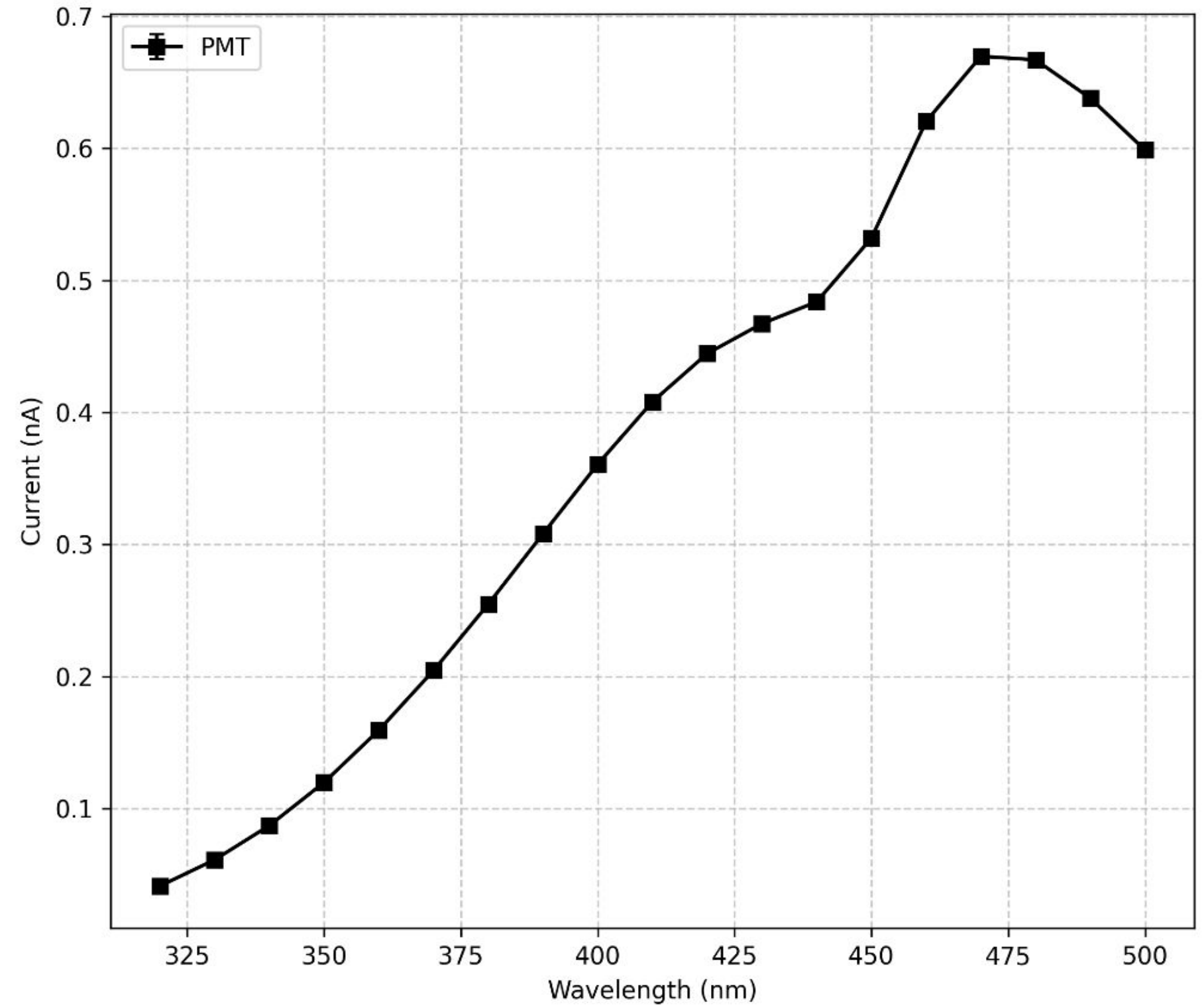
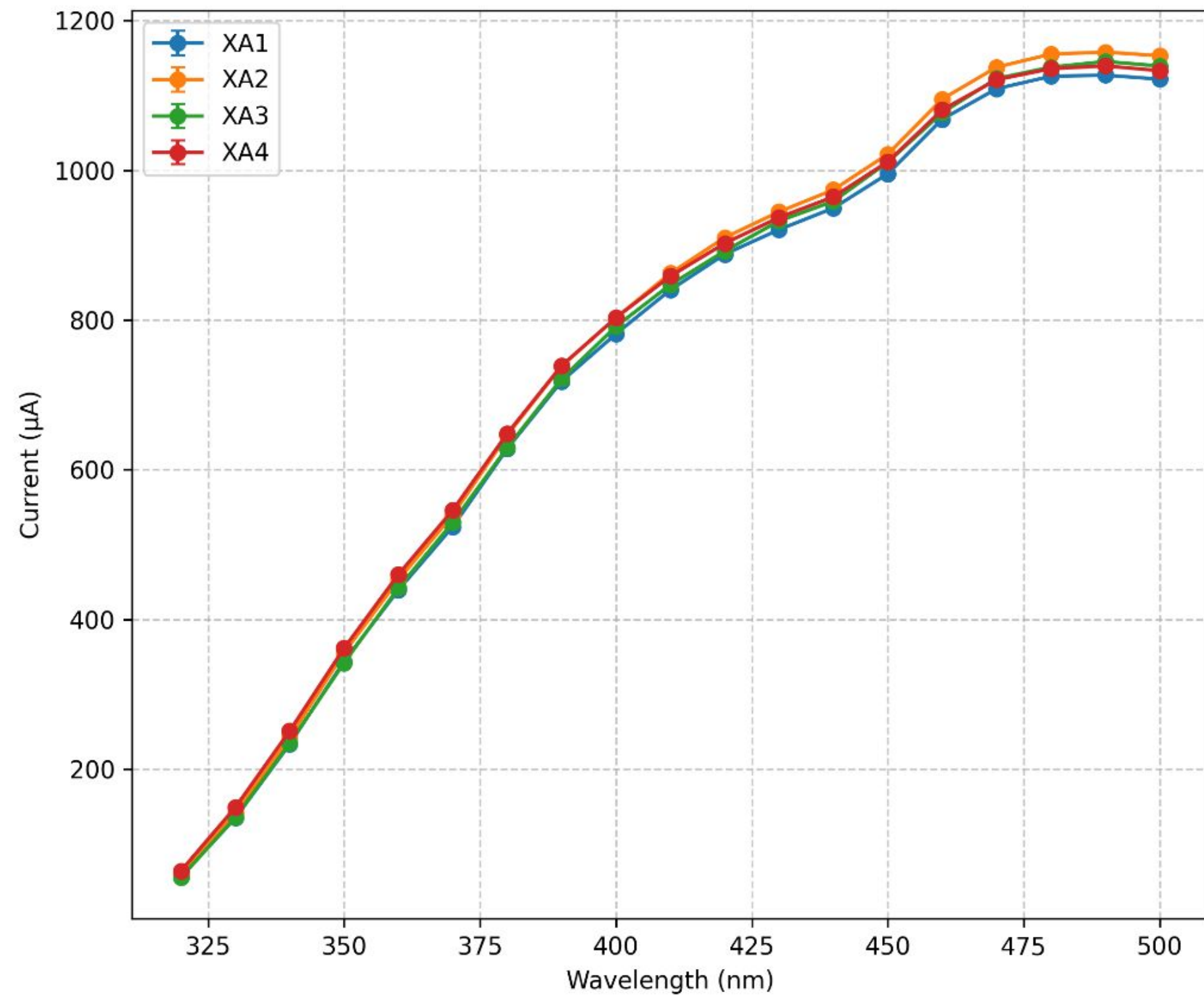
Manual alignment of beam:

- $IS=OS=2$
- iris 1 mm aperture

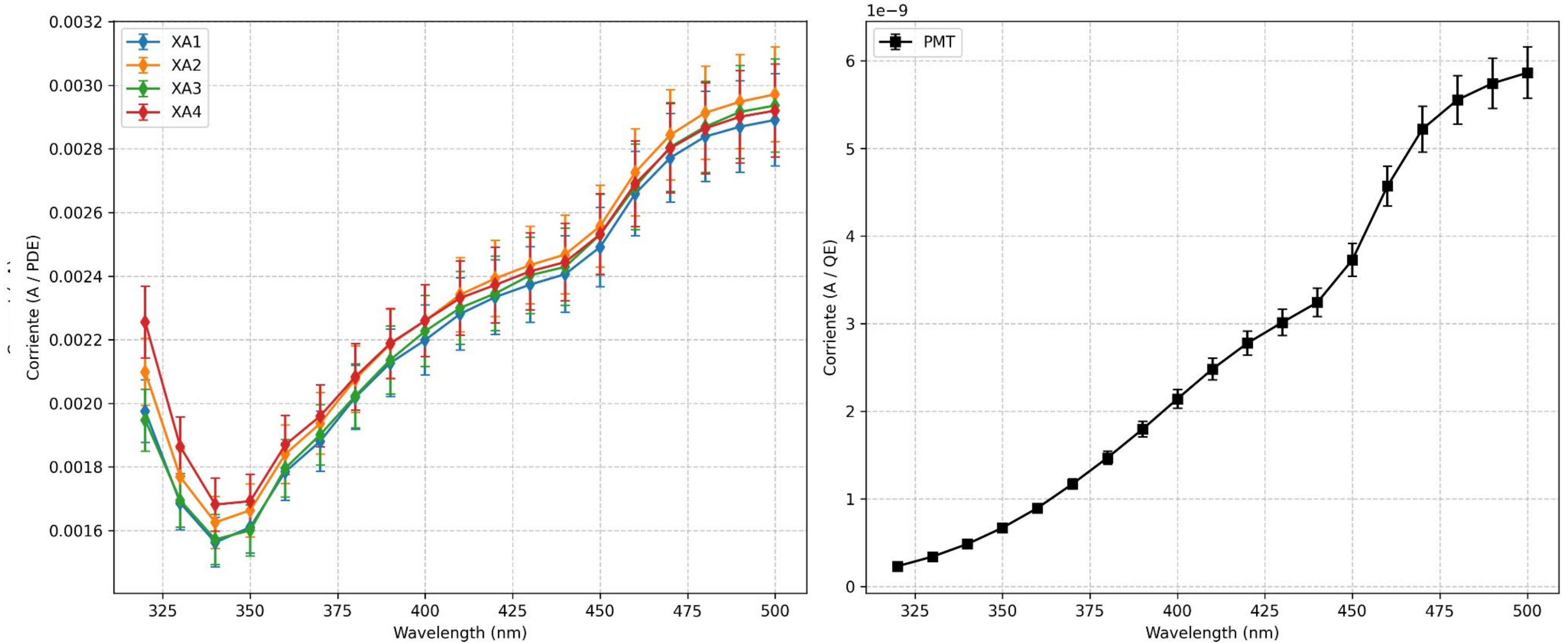
ARAPUCA SiPM labels



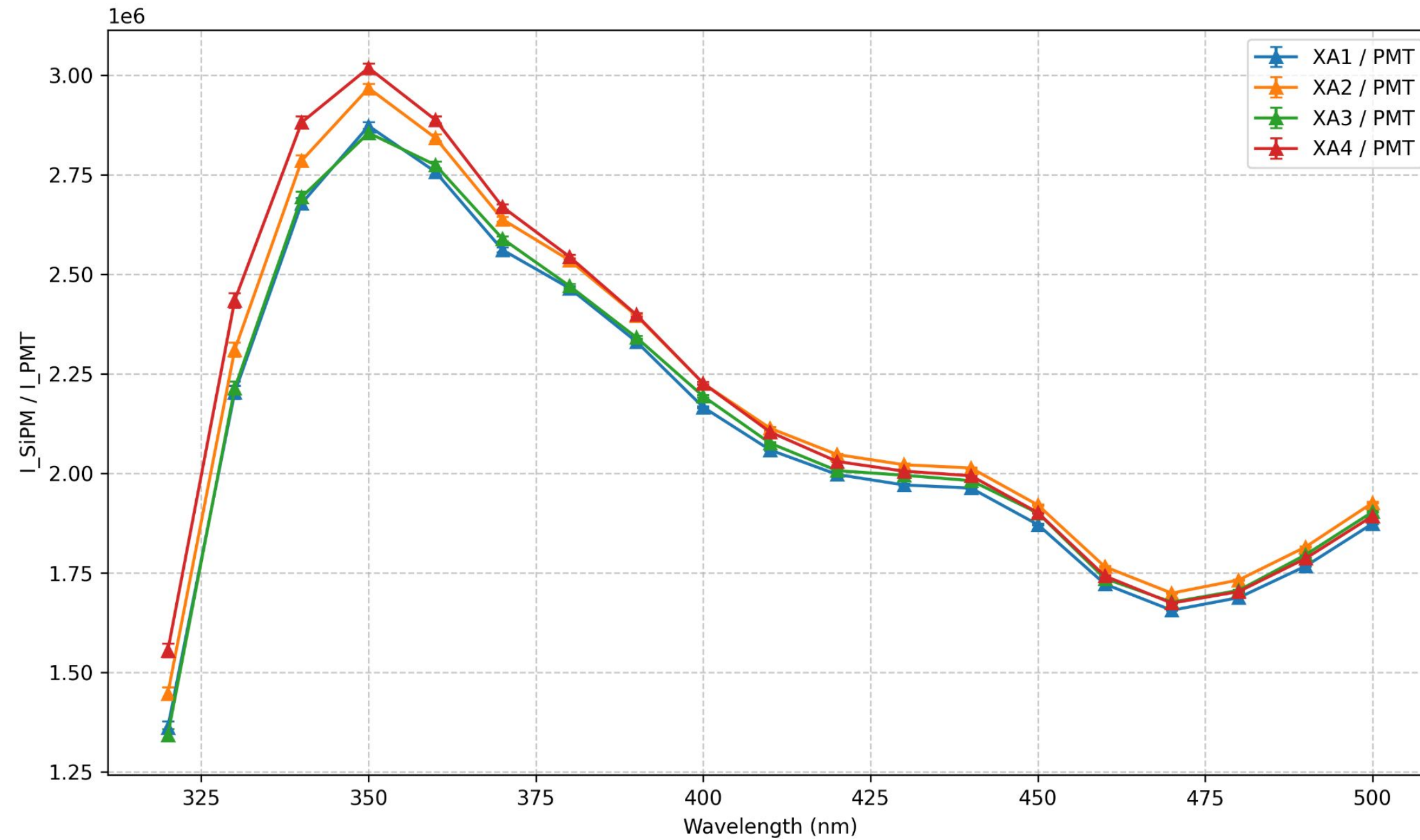
PMT-SiPM cross-calibration



PMT-SiPM cross-calibration: QE/PDE corrected



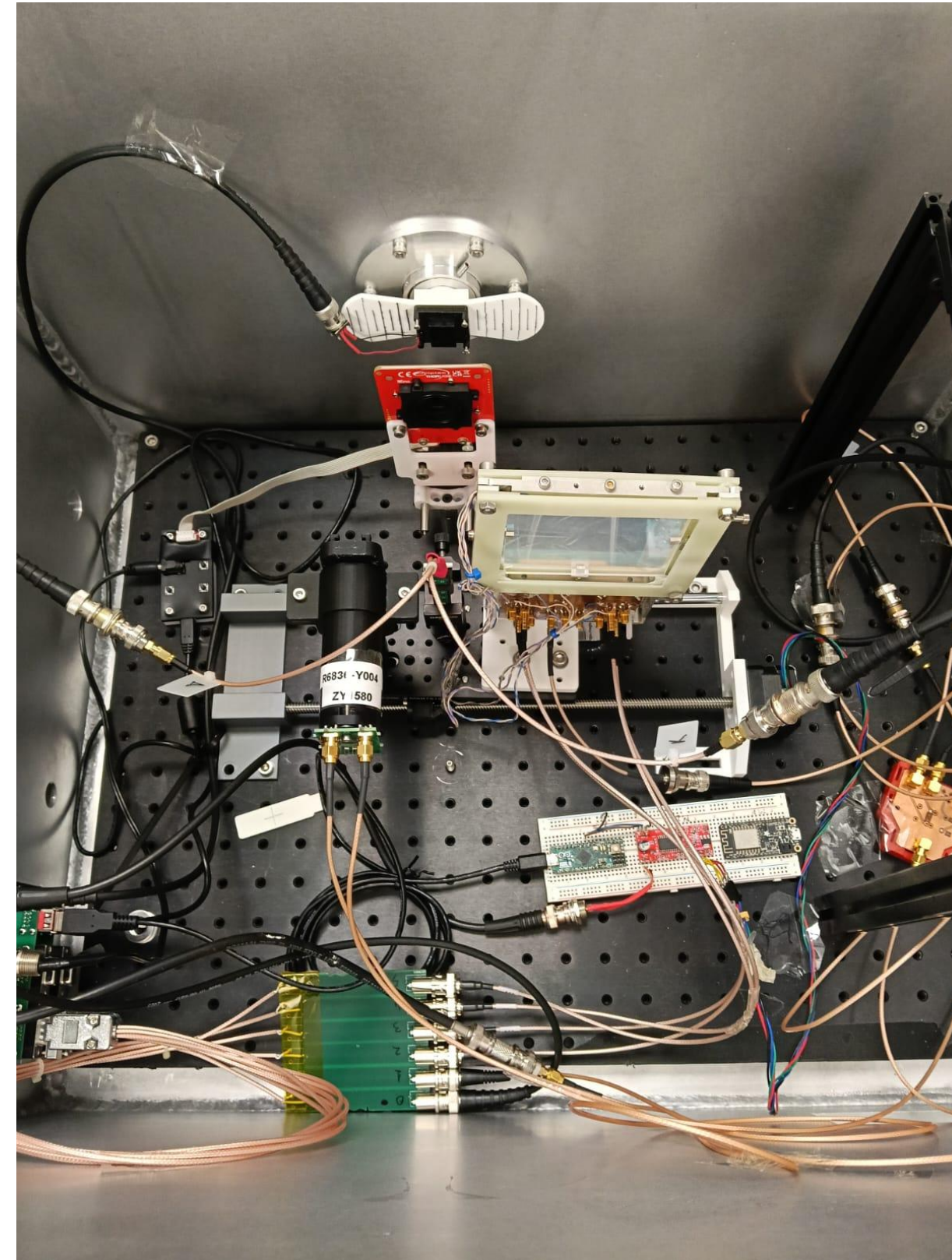
PMT-SiPM cross-calibration



$$\frac{I_{\text{SiPM}}}{I_{\text{PMT}}} = \frac{G_{\text{SiPM}} \cdot PDE_{\text{SiPM}}}{G_{\text{PMT}} \cdot QE_{\text{PMT}}}$$

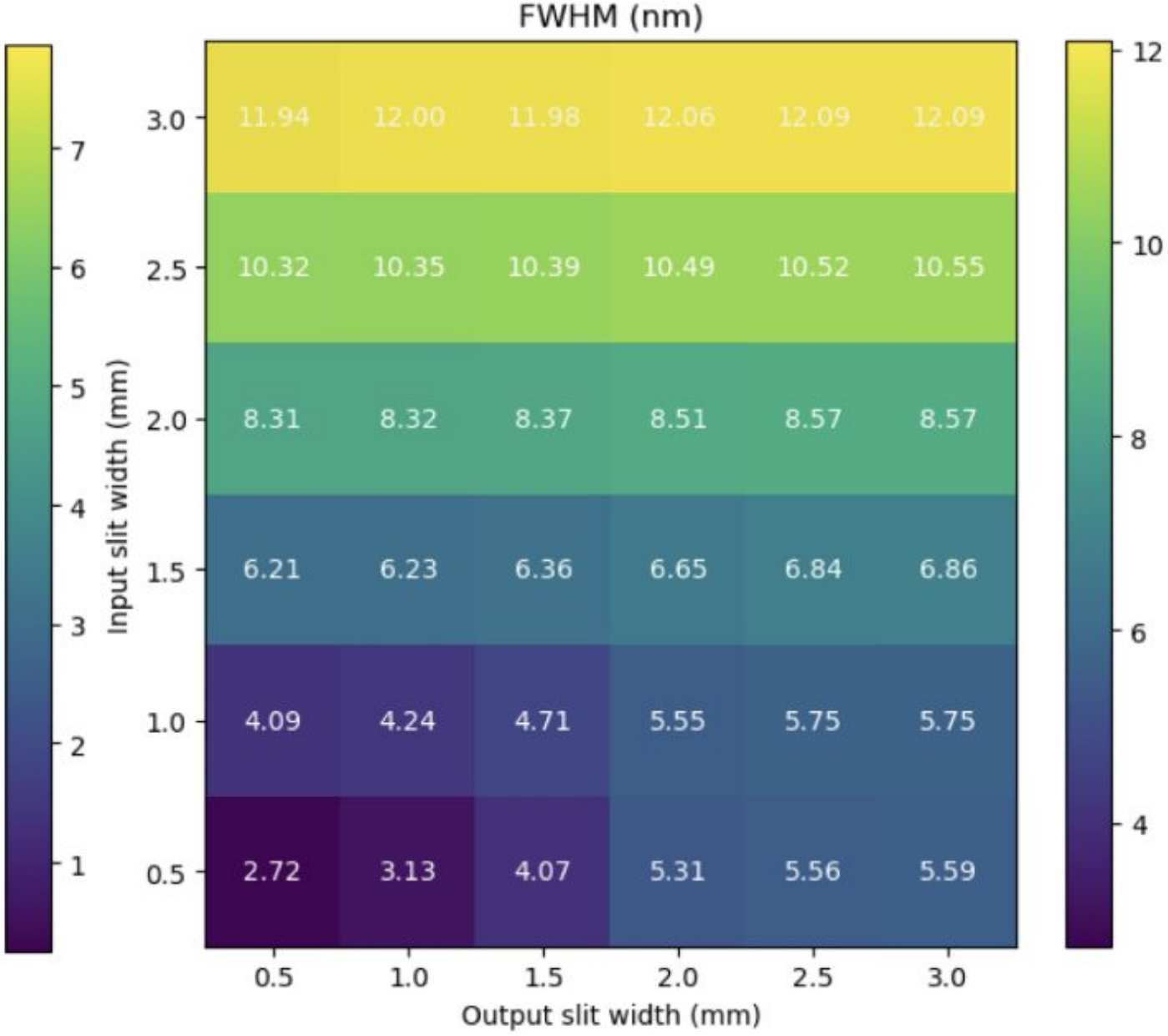
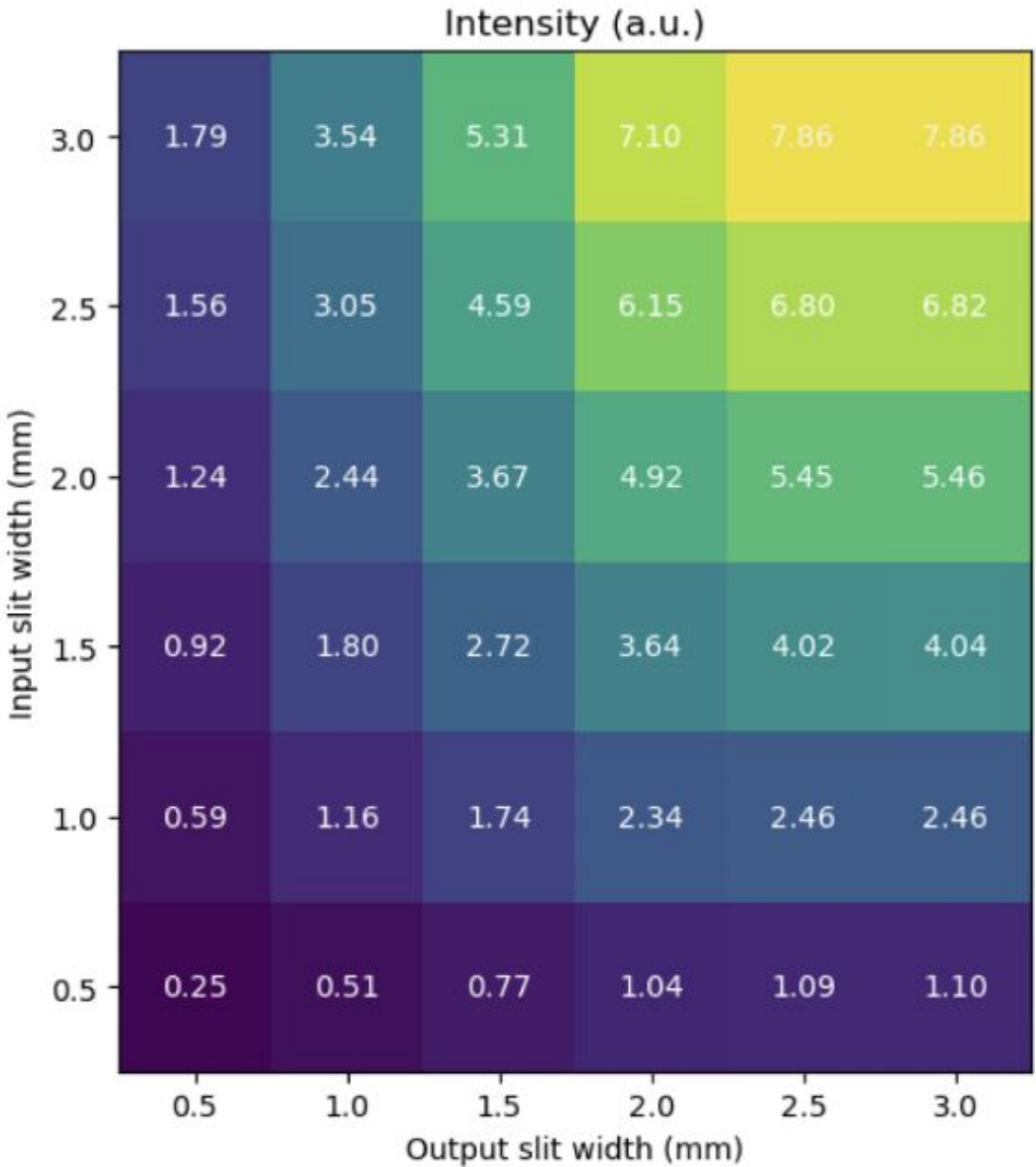
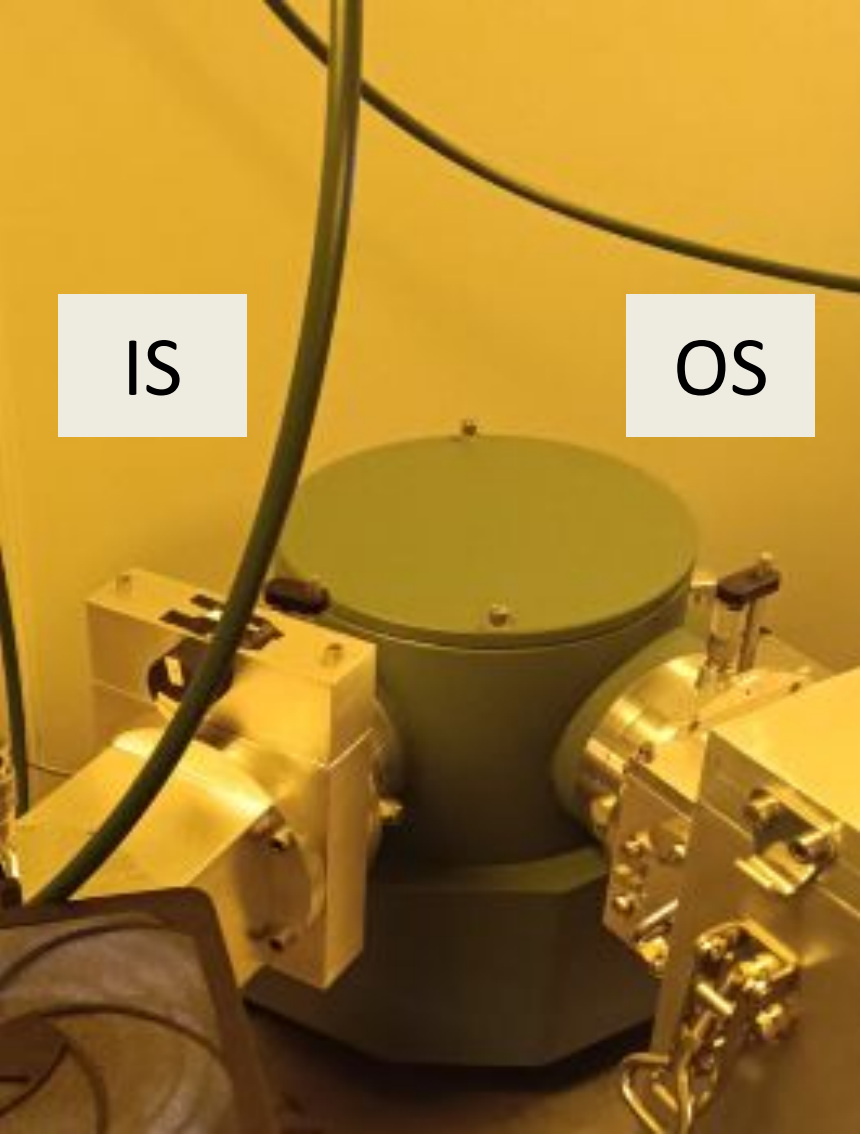
Next steps

- Optical setup characterization: IV curve, lamp stability, GAr atmosphere
- Ptp window for ARAPUCA and GAr measurement in VUV



THANK YOU FOR LISTENING!

Efficiency results: closing slits



Credit: Fabian and Pokhee