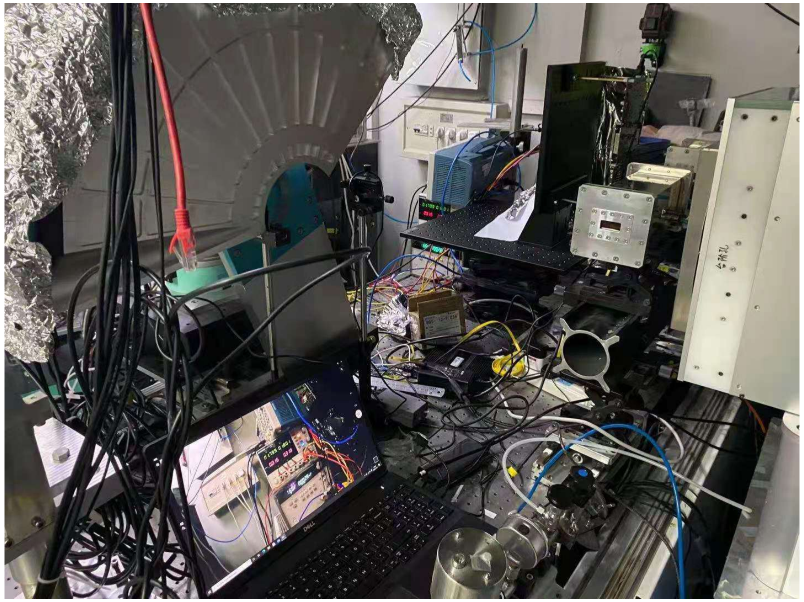
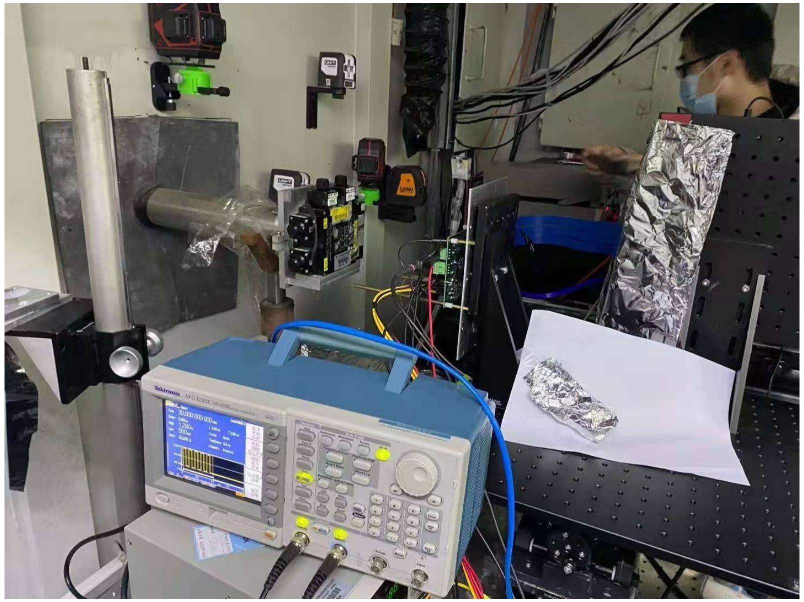
Tcpx2 TID test

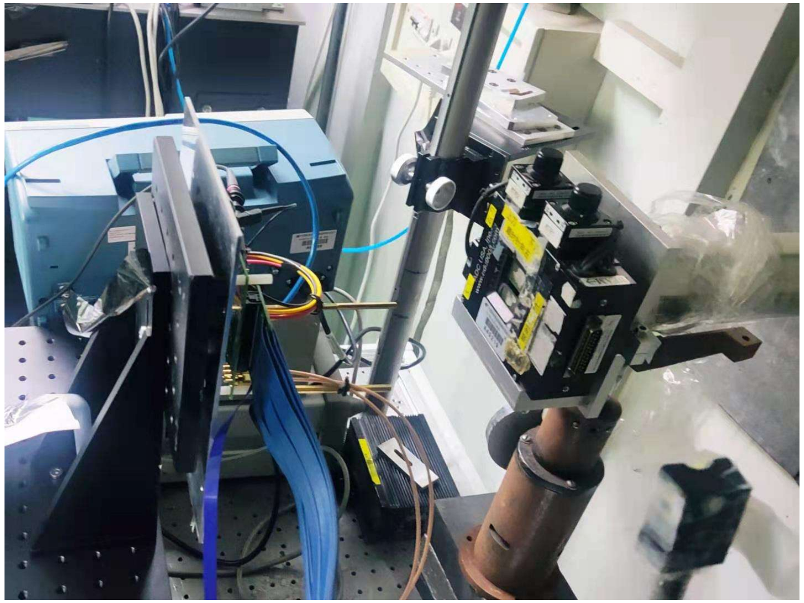
Wei Wei

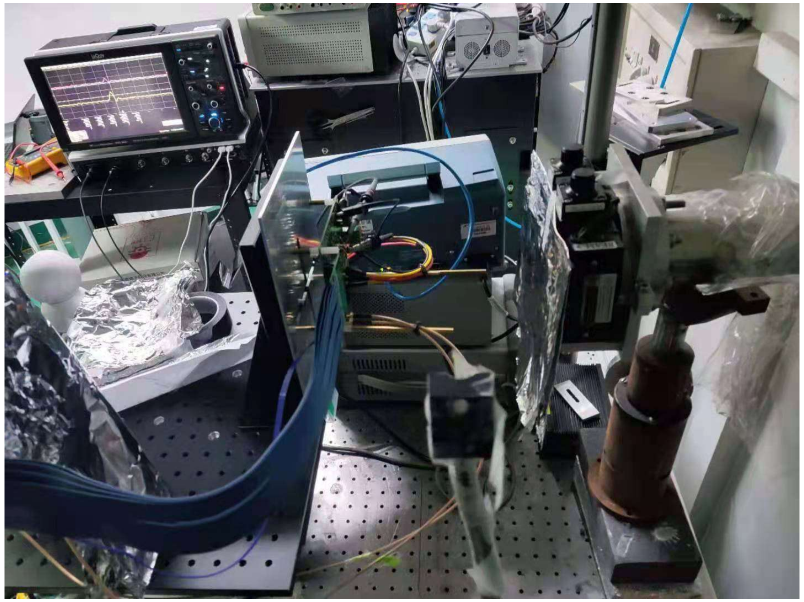
2020-12-14

TID test setup





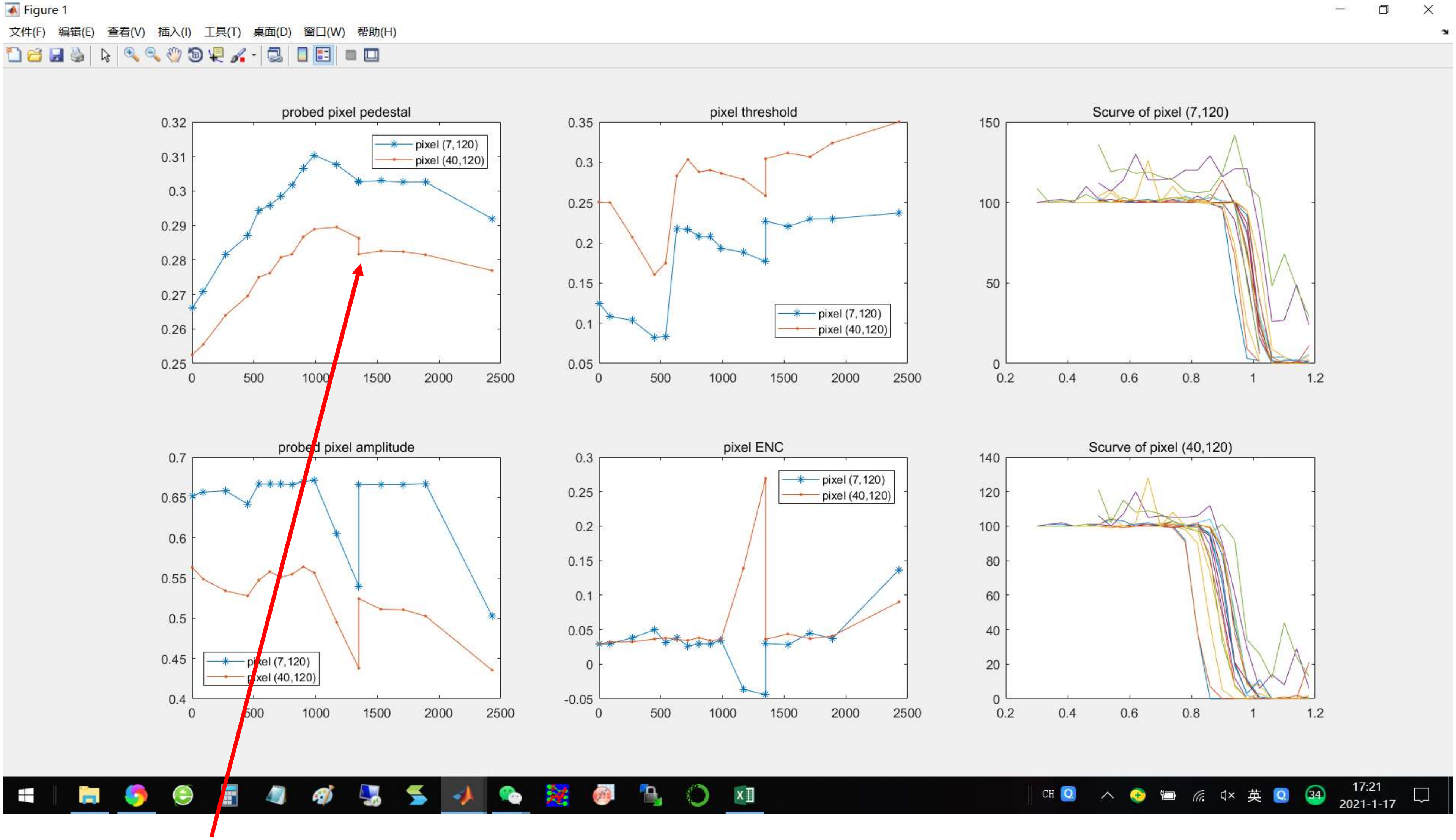




TID test setup

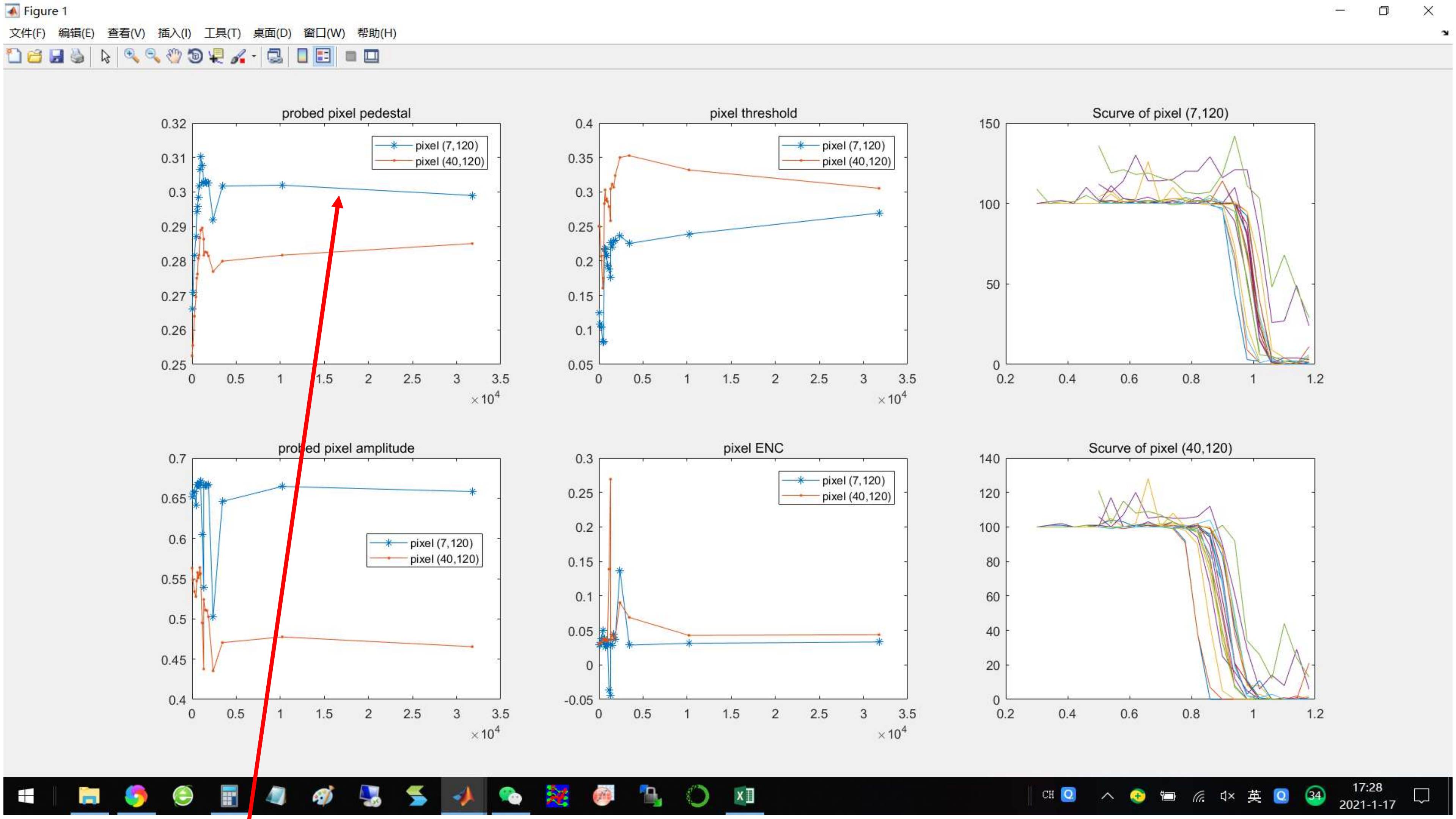
- Tcpx2 irradiated at BSRF 1W2B beamline
- Dose rate ~17.63krad/min for the first 2.5Mrad, then 211.56krad/min for 51min, then 1.24Mrad/min
- Chip was exposed with full working condition: bias, clk, …
  - Only the col 7 & and col 40 were cal-enabled and dismasked
- Chip was first exposed to some dose for 5~10 min, then scanned for Scurve without X-ray
- The threshold was initially set at the minimum level. After about 1Mrad, it was found the pedestal level was shifted to see noise floor in Scurves, so the threshold level was set higher
  - Bias bits ITHR 1010 -> 1110
- OUTA0 & OUTA9 was monitored by ocsi., corresponding to col 7 and col40

TID results within 2.5Mrad, linearly



ITHR 1010 -> 1110

TID results till 30Mrad, global



Dose rate was changed from 211krad/s to 1.2Mrad/s somewhere,
However, no data before taking the action to reveal the effect, unfortunately

Preliminary conclusion & questions

- **Chip survived after 30Mrad irradiation dose**
- **In the linear experiment region till 2.5Mrad, it seems all the observed effects can be explained**
- **Questions:**
  - **Was the dose rate correctly calibrated?**
    - **Need a standard device to calibrate the dose at the same condition**
  - **Was the dose rate correctly calculated?**
    - **17.63krad/min with 4 layers of Al foils**
    - **211.56krad/min with 2 layers**
    - **1.24Mrad/min with 0 layers**