

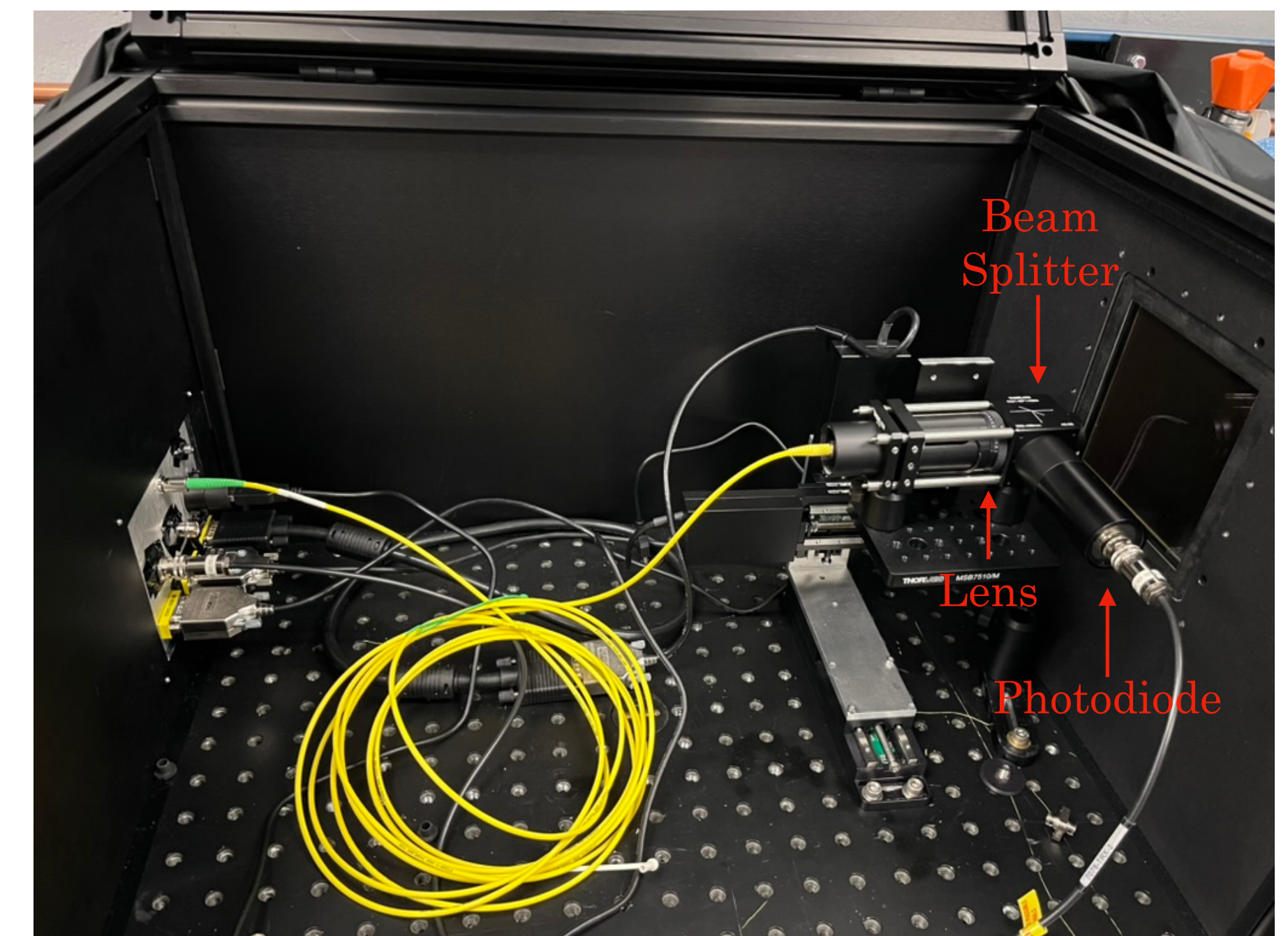
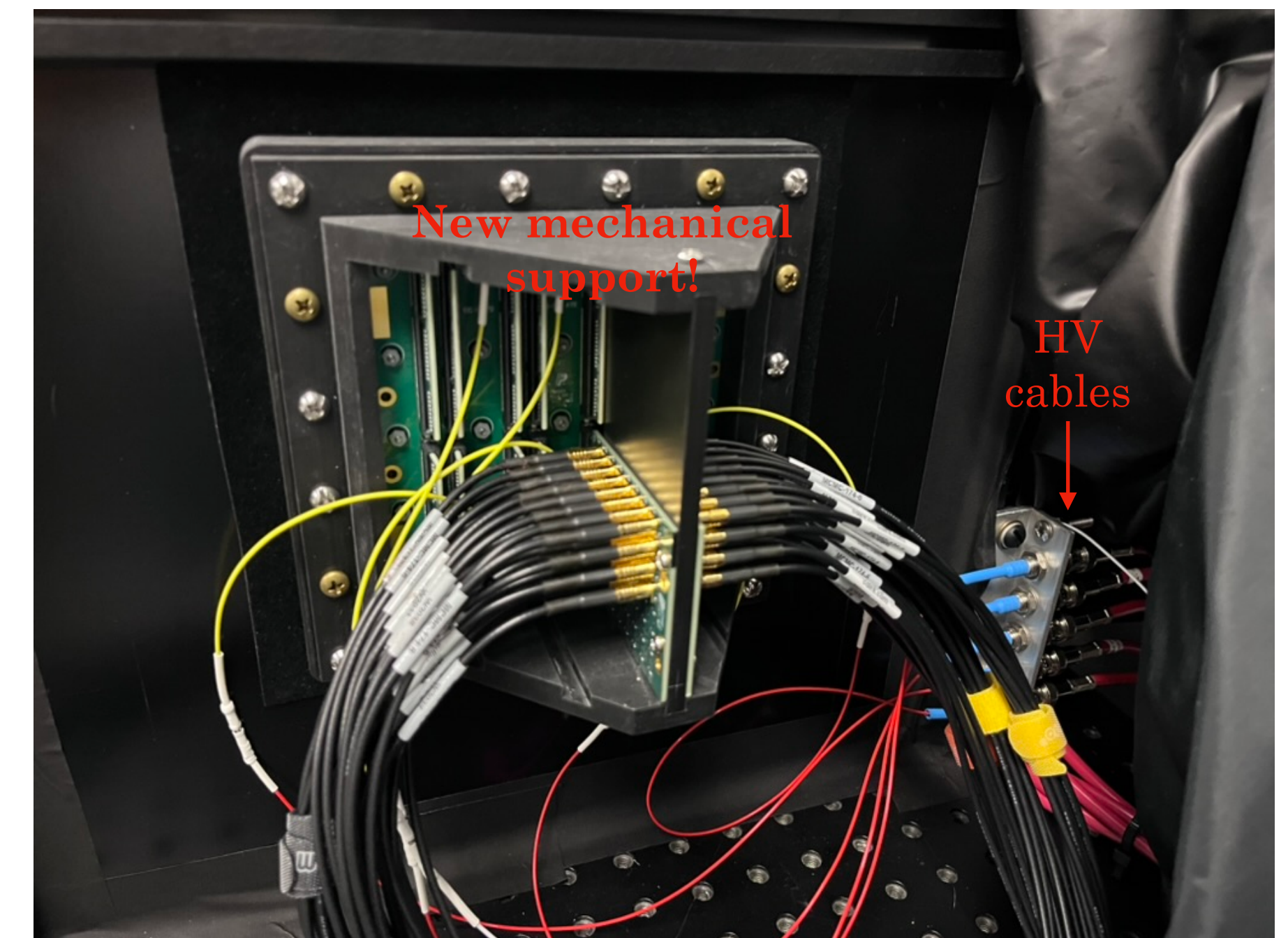
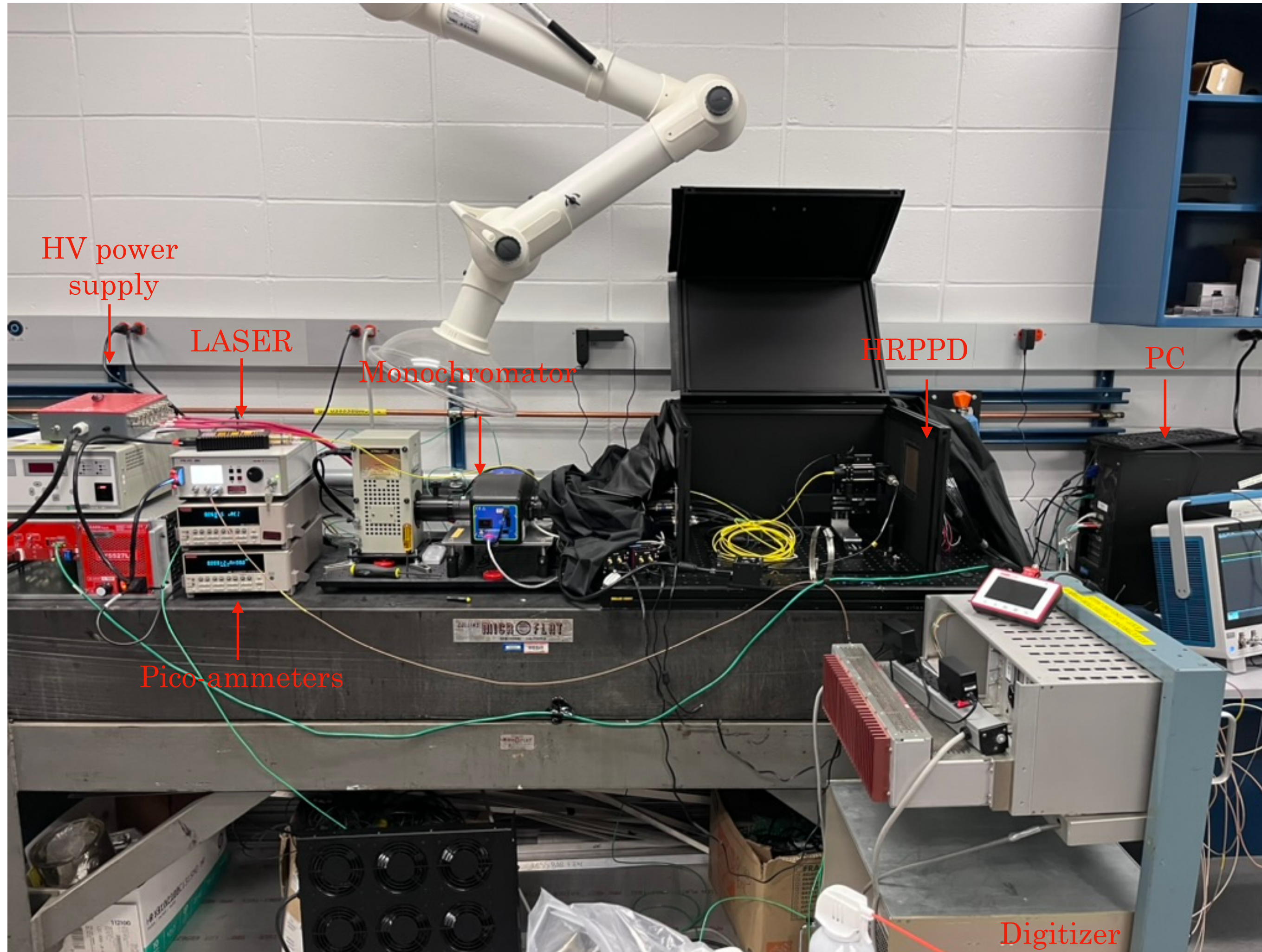
Aging test stand at BNL

Yifan Jin, Alexander Kiselev, Bob Azmoun, Sean Stoll

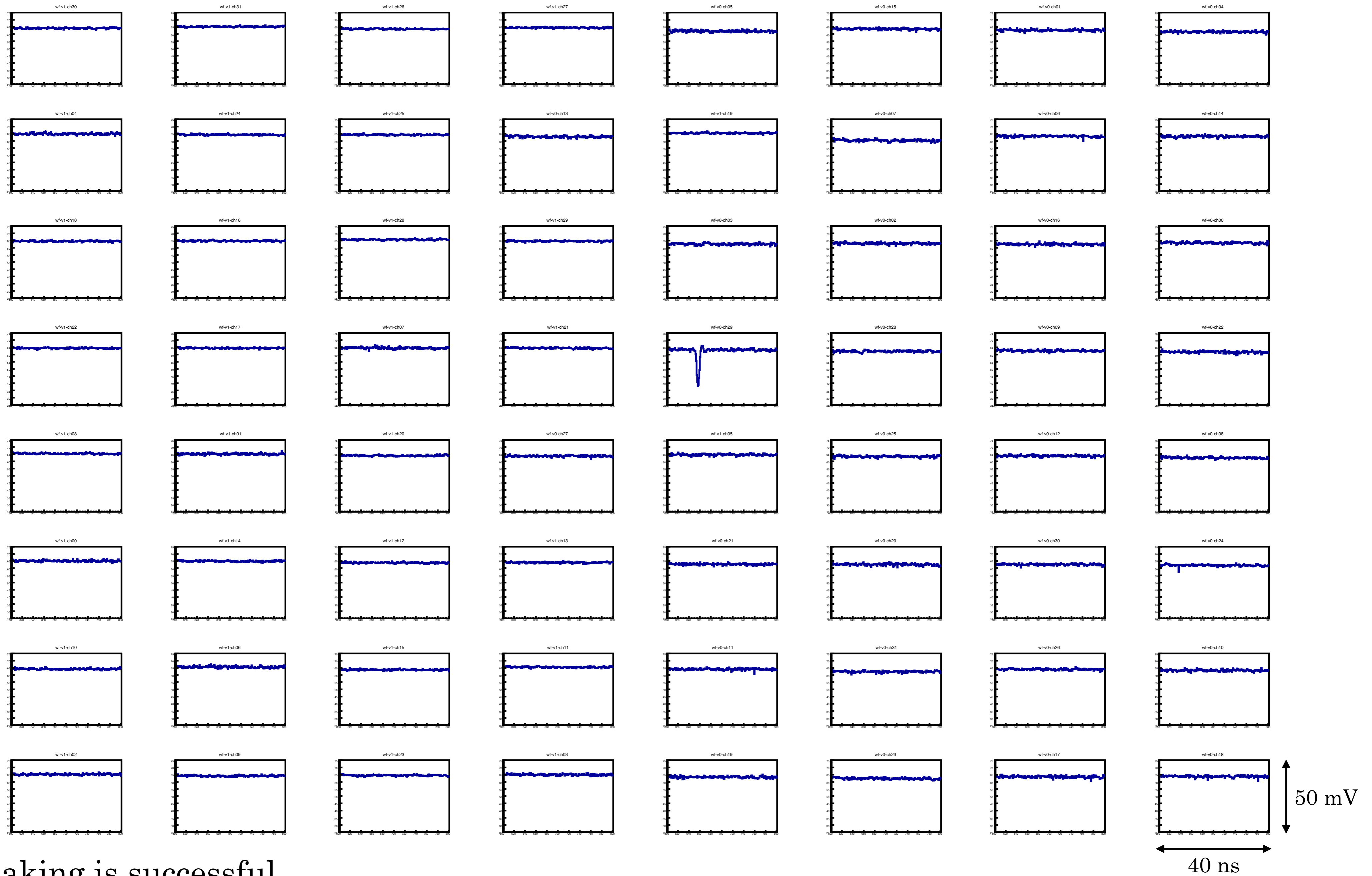
Brookhaven National Lab

April 30th, 2025

Test-stand

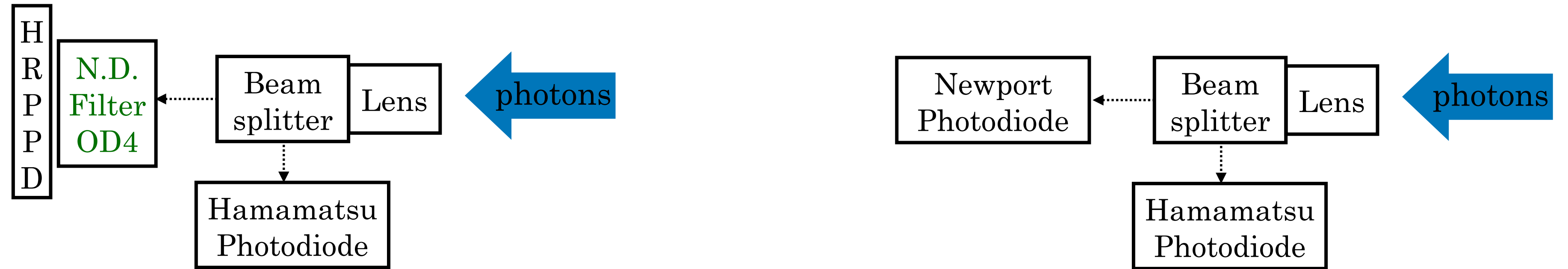


The setup is further optimized.



- Data taking is successful.

PDE



- The key of obtaining an absolute value of PDE is to know the number of photons in one pulse precisely, i.e., the OD of filter should be calibrated to good precision.
- Suppose the number of photons hitting HRPPD follows Poisson distribution with mean λ , and each photon is detected independently with probability p (PDE):

• Then, no signal rate is $P(\text{no signal}) = \sum_{n=0}^{\infty} P(n)(1-p)^n$, where $P(n) = \frac{\lambda^n e^{-\lambda}}{n!}$.

$$P(\text{no signal}) = \sum_{n=0}^{\infty} \frac{(\lambda(1-p))^n e^{-\lambda}}{n!} = e^{\lambda(1-p)} \times e^{-\lambda} = e^{-\lambda p}. \text{ (note that } \lambda \text{ doesn't have to be very small.)}$$

- λ is measured from: current of Newport photodiode, its QE 56%, and laser frequency 1 kHz, and $P(\text{no signal})$ is measured by fitting the spectrum of data, then p (PDE) can be derived.

QE

- Monochromator is in place, but not approved yet...
- Equipment and script are ready.