

## Preliminary List and Cost Estimate of Equipments for an Optics Lab/Dark Room at SiDet

For absolute measurement of photon detection efficiency using Parametric Down Conversion (PDC):

### **Light Source:**

-Ideally a laser at a short wavelength (350nm):  
Argon-ion lasers-too expensive (60-80k\$)

-He-Cd lasers (325nm, tens of mW): operation safety issues, unpolarized light (basic laser).

-Alternative: GaN diode laser:  $\lambda \sim 375\text{nm}$  (low power, few mW) or  $\lambda \sim 405\text{nm}$  (higher power - do not need more than  $\sim 20\text{mW}$  power): \$2,600.00  
*We have one available at SiDet.*

### **Alignment Laser:**

Diode laser at 635nm, 3mW plugged to the wall: \$ 175.00

or

HeNe laser at  $\sim 600\text{nm}$  (there are several at Fermilab-lab6)

### **Nonlinear Crystal:**

Beta-barium-borate (BBO), 5x5x3 mm with AR coating: \$2,000.00

There is one at SiDet (3x3x3mm)

### **Rotation Stage:**

Used to mount the BBO crystal, allowing orientation of its optic axis (OA)  
\$ 360.00

**Crossed polarizers:**

Blocks the pump beam after the crystal (better than using absorptive red filters):  $\$456.00 \times 2 = \$912.00$

**Filters:**

Band pass filters to be put in front of the detectors:

CWL=810nm, FWHM=10nm:  $\$55.00 \times 2 = \$110.00$

**Lenses:**

Focus light onto the detectors.

AR coated-mounted on translation stage:  $\$150.00 \times 2 = \$300.00$

**Beam splitter:**

Useful for select geometric configuration.

Plate beam splitter for NIR/Visible:  $\$80.00 \times 2 = \$160.00$

**Iris:**

several apertures: average cost:  $\$60.00 \times 4 = \$240.00$

zero aperture diaphragm(useful for dark pulse measurements):  $\$80.00$

**Total cost: \$6,937.00**

If the BBO crystal at SiDet can be used as well as the lasers:

**Cost goes down to: \$2,300.00**

**This assumes that we do not need to buy the SiPM plus electronics and the optical table (there are a couple of tables at SiDet)**

**Technician time: 0.2 FTE**