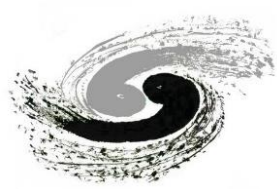


Development of test stands for SiPMs and scintillating crystals: latest status

Yong Liu (IHEP)

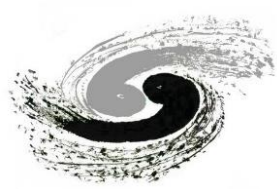
Dec. 2, 2020



Lab and infrastructure

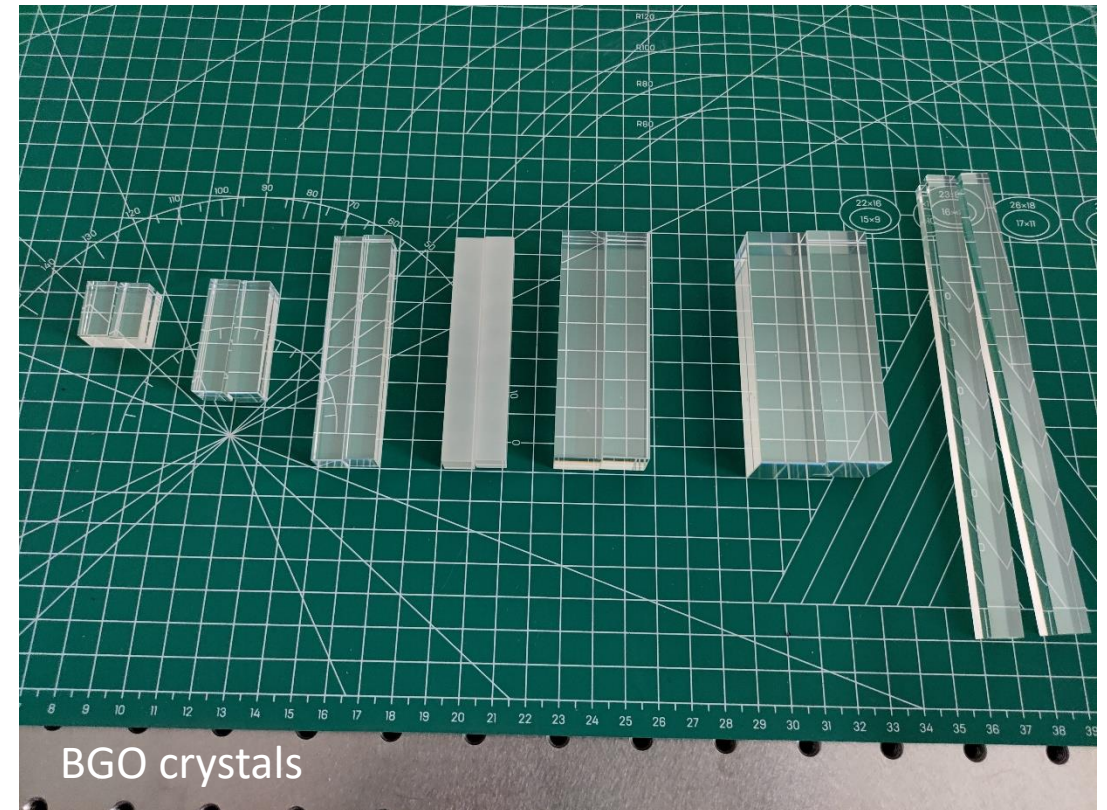
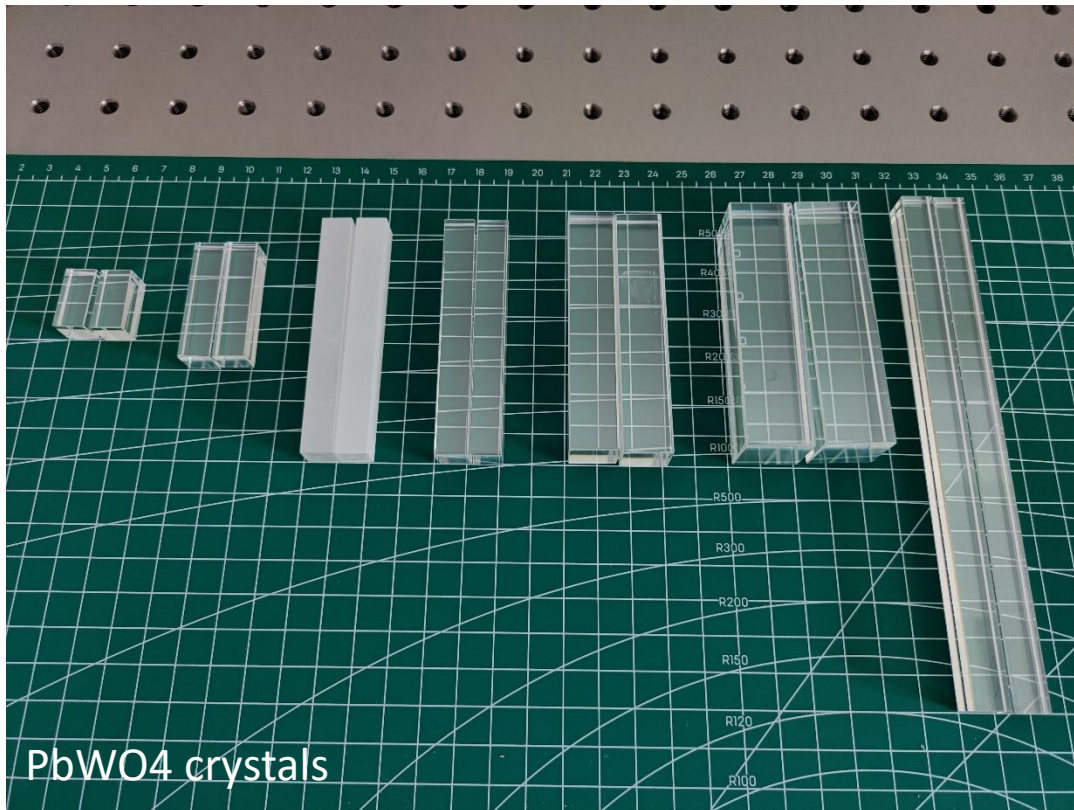
- Infrastructure in the lab 104 (Hall-3)
 - Optical table (200x100 cm): ready
 - XYZ translation stage and controllers: delivered, to be commissioned
 - DC power supplies (for SiPM bias, preamps): ready
 - Oscilloscopes: ready



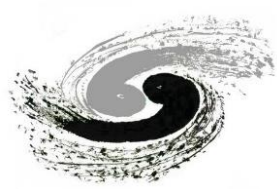


Scintillating crystals

- Crystal samples from SIC
 - Various: lengths, transverse sizes, surface treatments
 - Wrapping foil: specular (ESR), diffuse (Teflon, Tyvek)

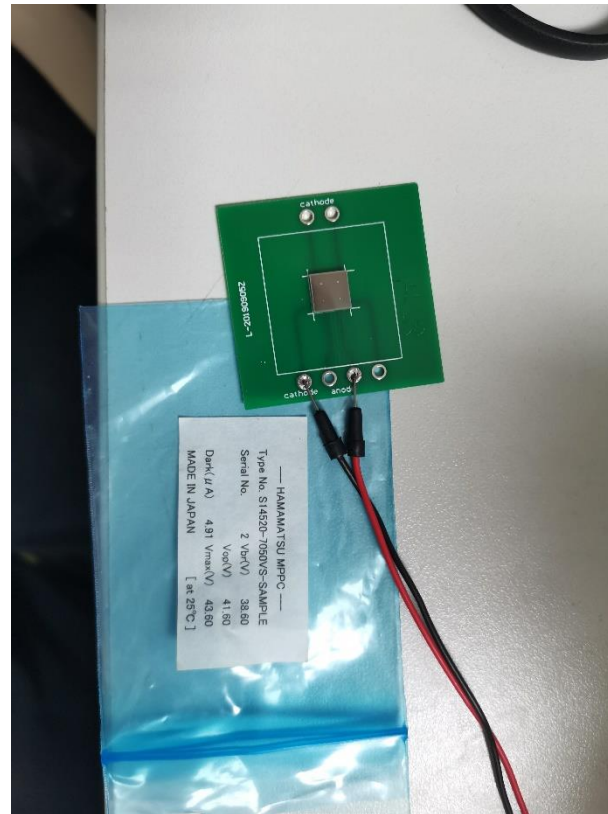


Photos taken by Baohua Qi

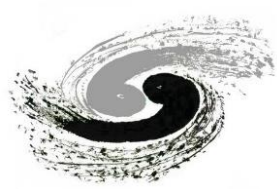


Silicon photomultipliers

- SiPM samples
 - From NDL: $6 \times 6 \text{mm}^2$ sensitive area, $15 \mu\text{m}$ pixel pitch
 - From HPK: $3 \times 3 \text{mm}^2$ and $7 \times 7 \text{mm}^2$ sensitive area, $50 \mu\text{m}$ pixel (not ideal)



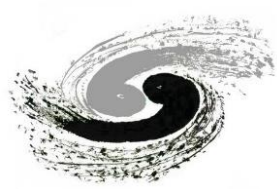
Photos taken by
Jiechen Jiang



Further equipment: status

- High power LED
 - Power supply delivered; fiber-coupled diodes pending
- Spectrometer: delivered
- Light shielding box: design finished, pending for the details of patch panels
- PXI crate/controller ready; high sampling-rate PXI modules (custom, 16-ch) pending





Major tasks and R&D studies

- Crystal-SiPM readout
 - Timing resolution versus hitting positions
 - MIP response: cosmic muons
 - Response with radioactive sources: energy spectrum
 - LED calibration
- SiPM characterization
 - Key parameters from different SiPM vendors
 - Dark-count rate, crosstalk, gain, breakdown voltage, Photon Detection Efficiency (PDE), temperature dependency, etc.
- Crystal properties
 - Intrinsic scintillation: spectrum, transmission (attenuation), etc.
 - Cherenkov photons: waveform, timing, etc.
 - Readout schemes: to distinguish scintillation and Cherenkov photons