

DESY Beamtest Data Analysis for BGO Long Crystal Bars

Zhiyu Zhao



李政道研究所

TSUNG-DAO LEE INSTITUTE

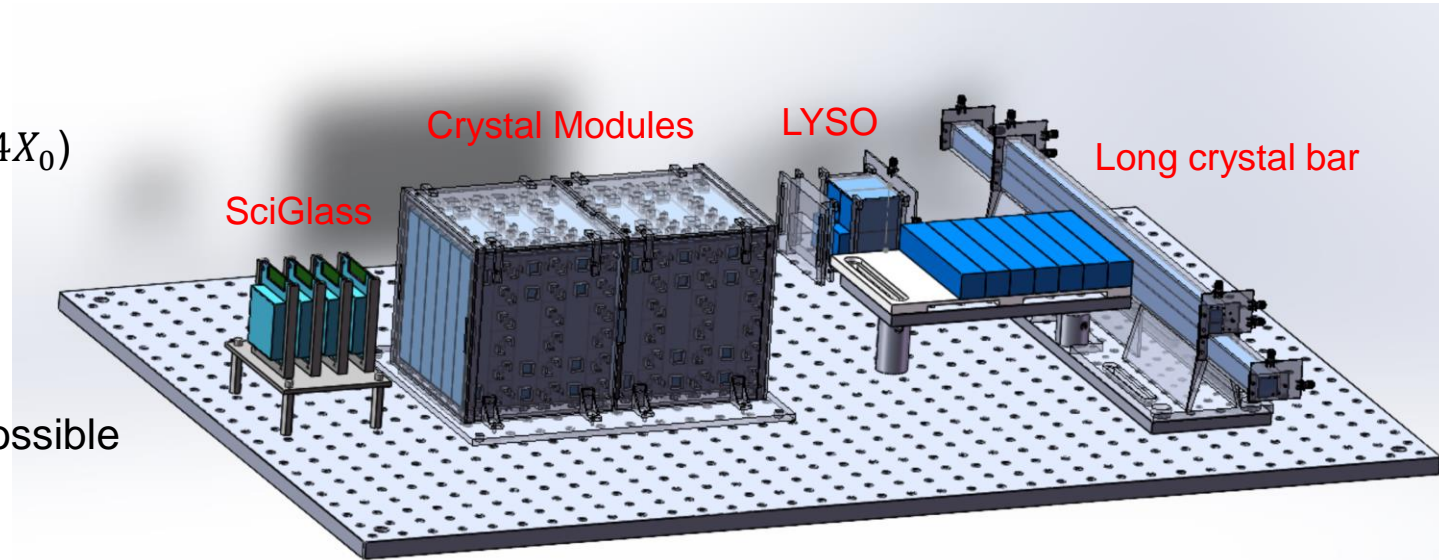
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DESY Beamtest: Setup and Tasks



Second Crystal Module: EM performances

- More channels: 72ch – 144ch ($10.7X_0 \rightarrow 21.4X_0$)
- New mechanics structure
- New PCBs: reduce noise and crosstalk
- Dark box: light and electromagnetic shielding
- Evaluate EM performance and understand possible limitations of existing ASICs
- **Long crystal bars: time resolution**
 - 40/60 cm
 - Time resolution with crystal bars and position dependence
 - Time resolution at different shower depths
- New ASIC(MPT2321) for 32-ch SiPM readout
 - Large dynamic range
 - Good S/N for single photon calibration
- Scintillating glass tiles



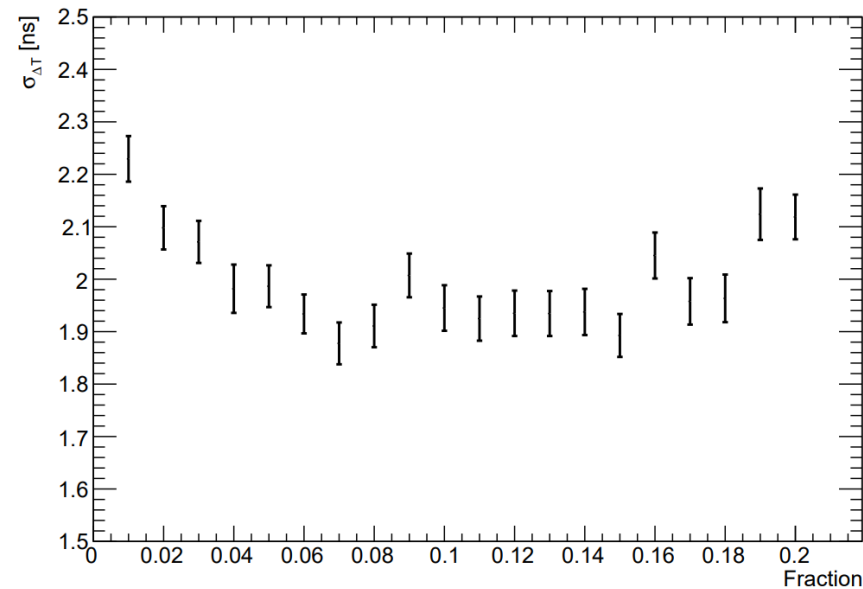
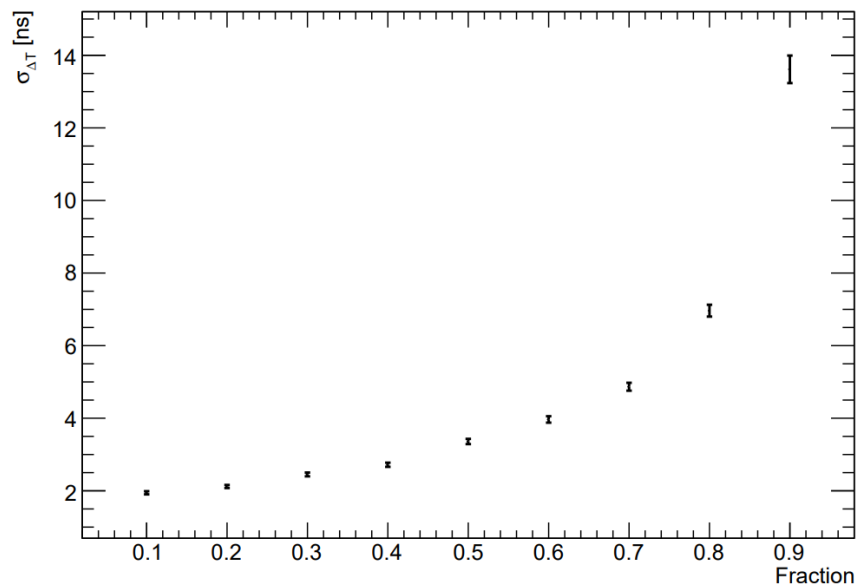
DESY TB22 beam condition

- 1~6GeV single electron beam, a few multi-particle events
- ~10kHz maximum repetition rate
- Adjustable spot size, momentum divergence

Fraction of CFD

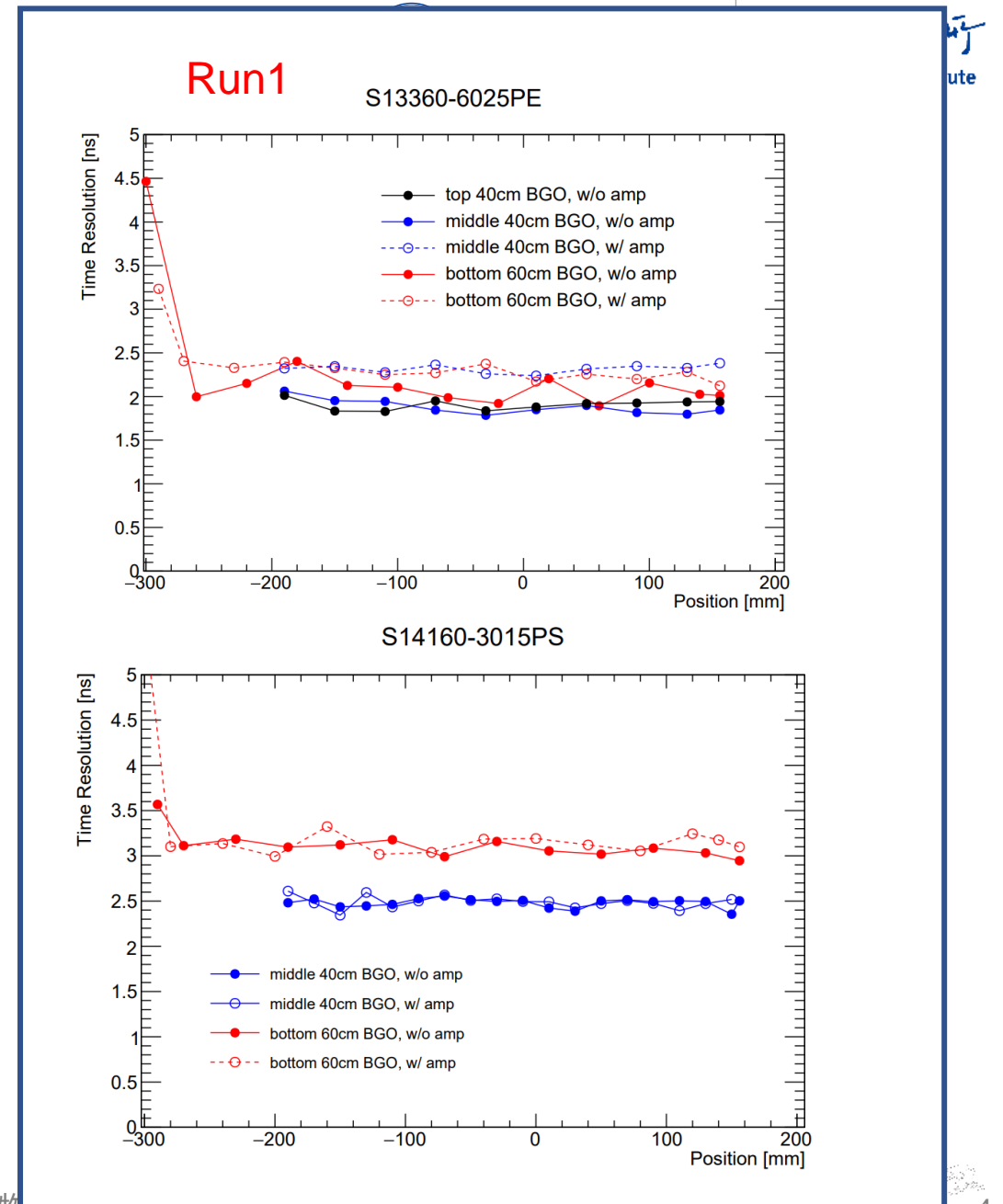
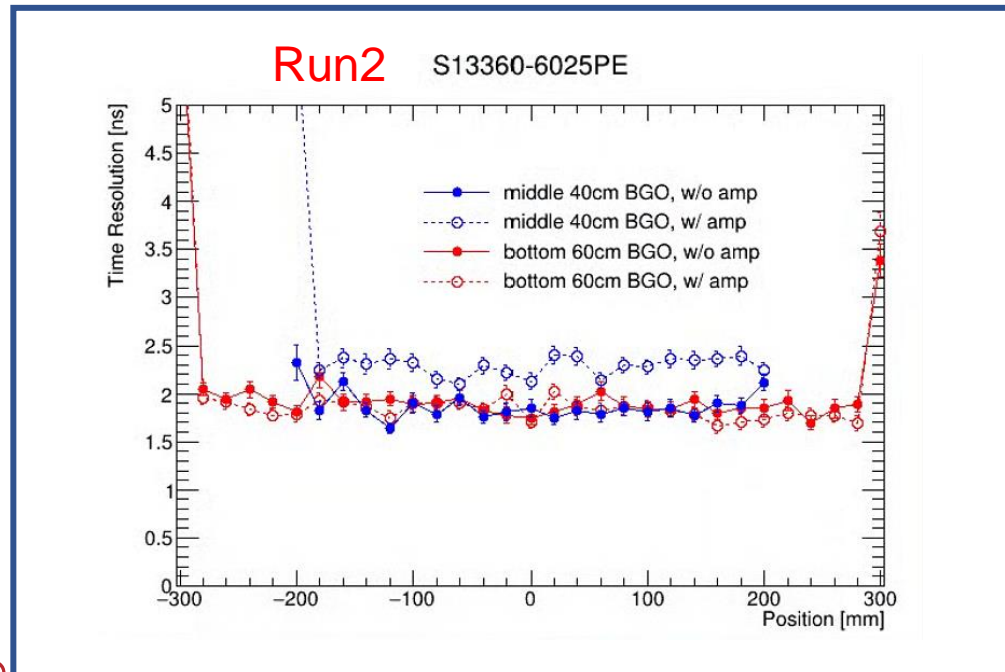


- 5GeV e-, ± 10 mm beam spot
- Middle 40cm BGO bar, readout with S13360-6025PE
- 0.1 fraction looks better



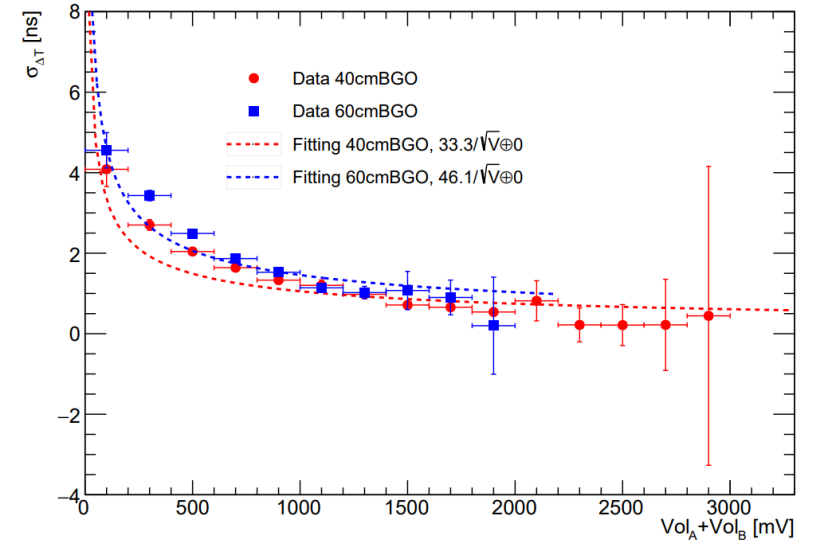
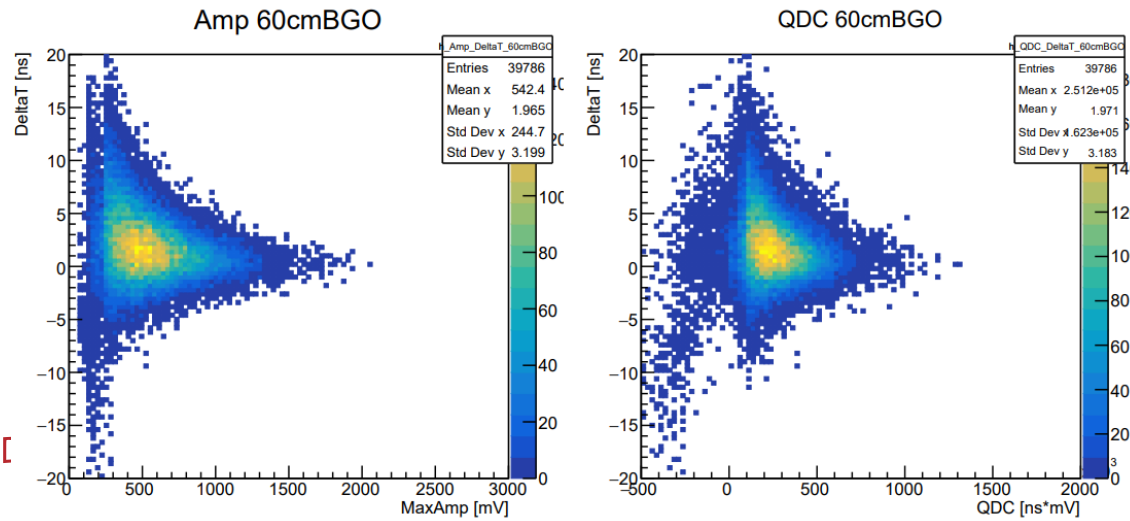
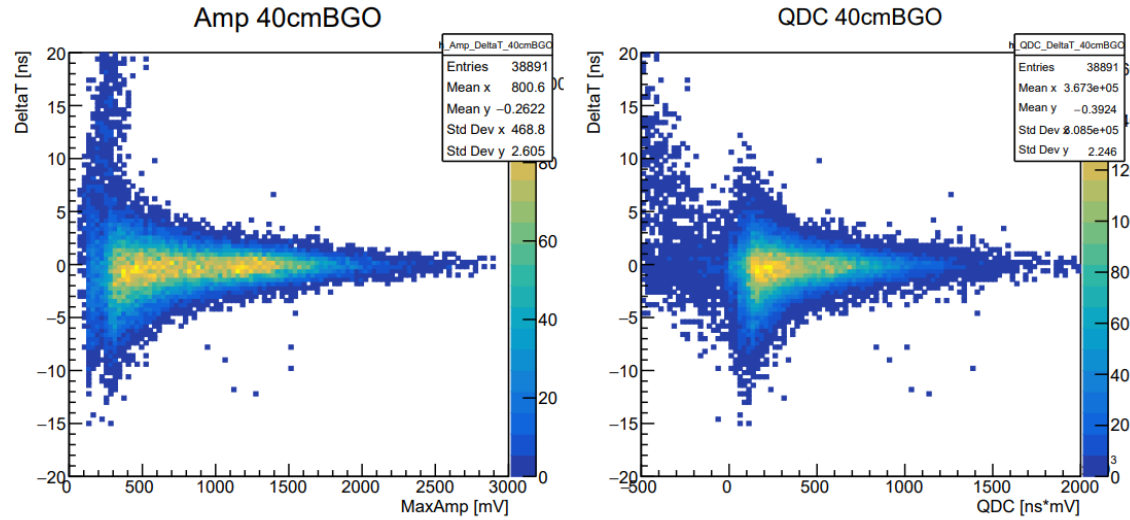
Time Resolution of BGO Crystal Bar

- 5GeV e-, ± 10 mm beam spot, 10%CFD
- No obvious difference along crystal bar
- S13360-6025PE is better than S14160-3015PS

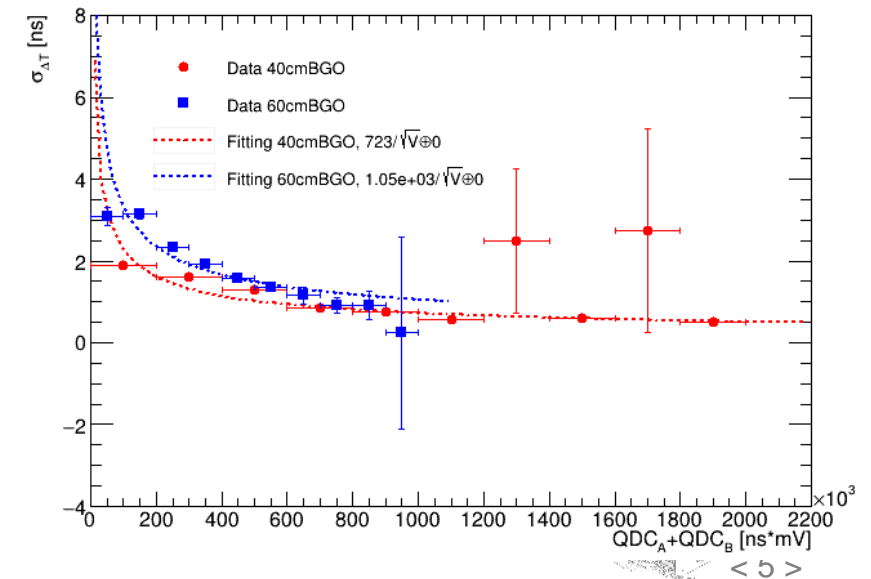


Time Resolution with Pre-shower

- Readout with S13360-6025PE
- Preshower BGO thickness: 1, 3, 5, 6, 7cm (combine all samples)



Time Resolution vs. QDC





- Try different timing resolution
- Compare self-trigger and external-trigger
- Energy response uniformity