

*EIC Asia Workshop,
RIKEN/University of Tokyo,
Tokyo, Japan
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“Contributions of Jazan to the Jlab and EIC Research Programs and Prospects for Future”

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Jazan.

Friday, March 17th, 2023.

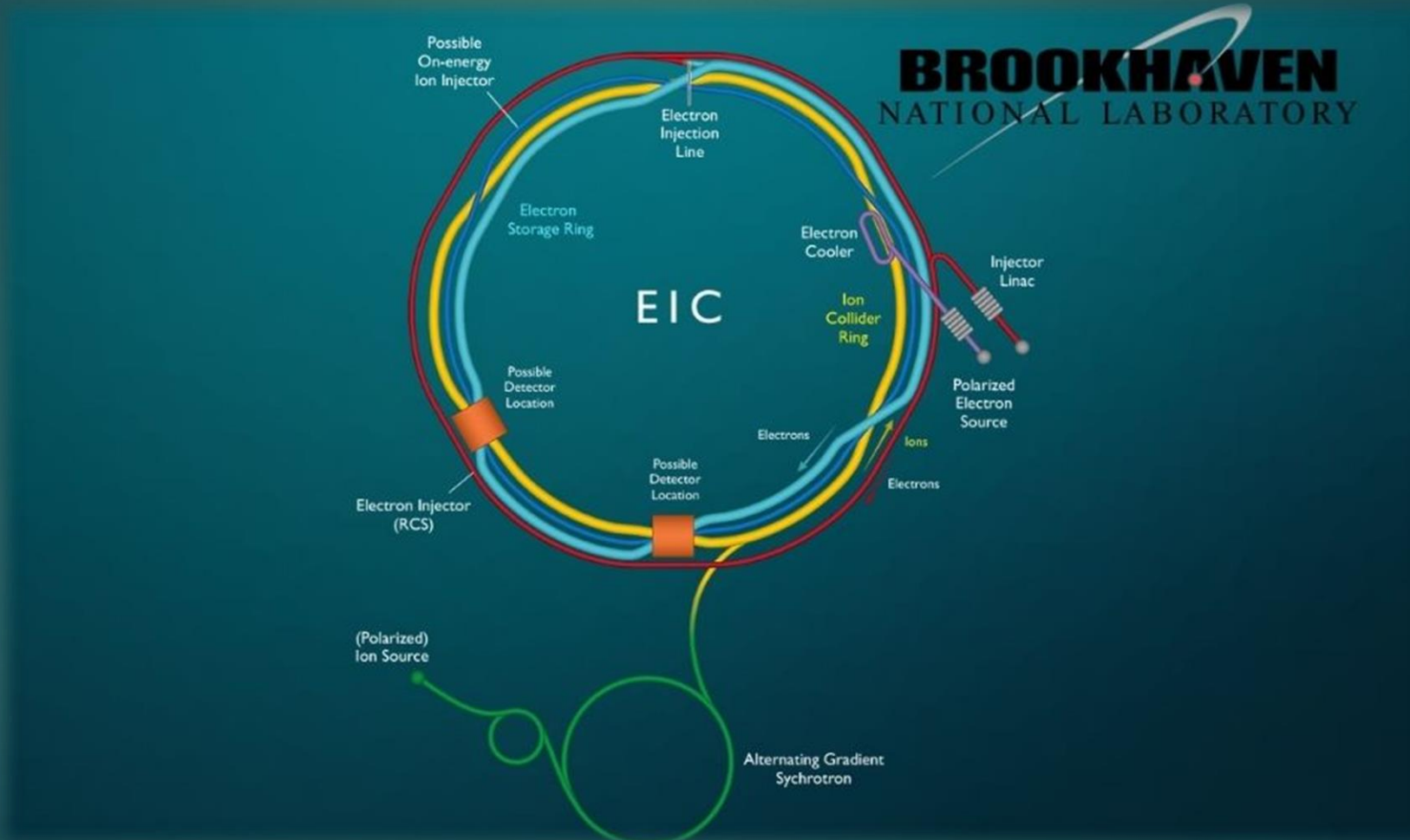
Jazan University

(Established 2006)

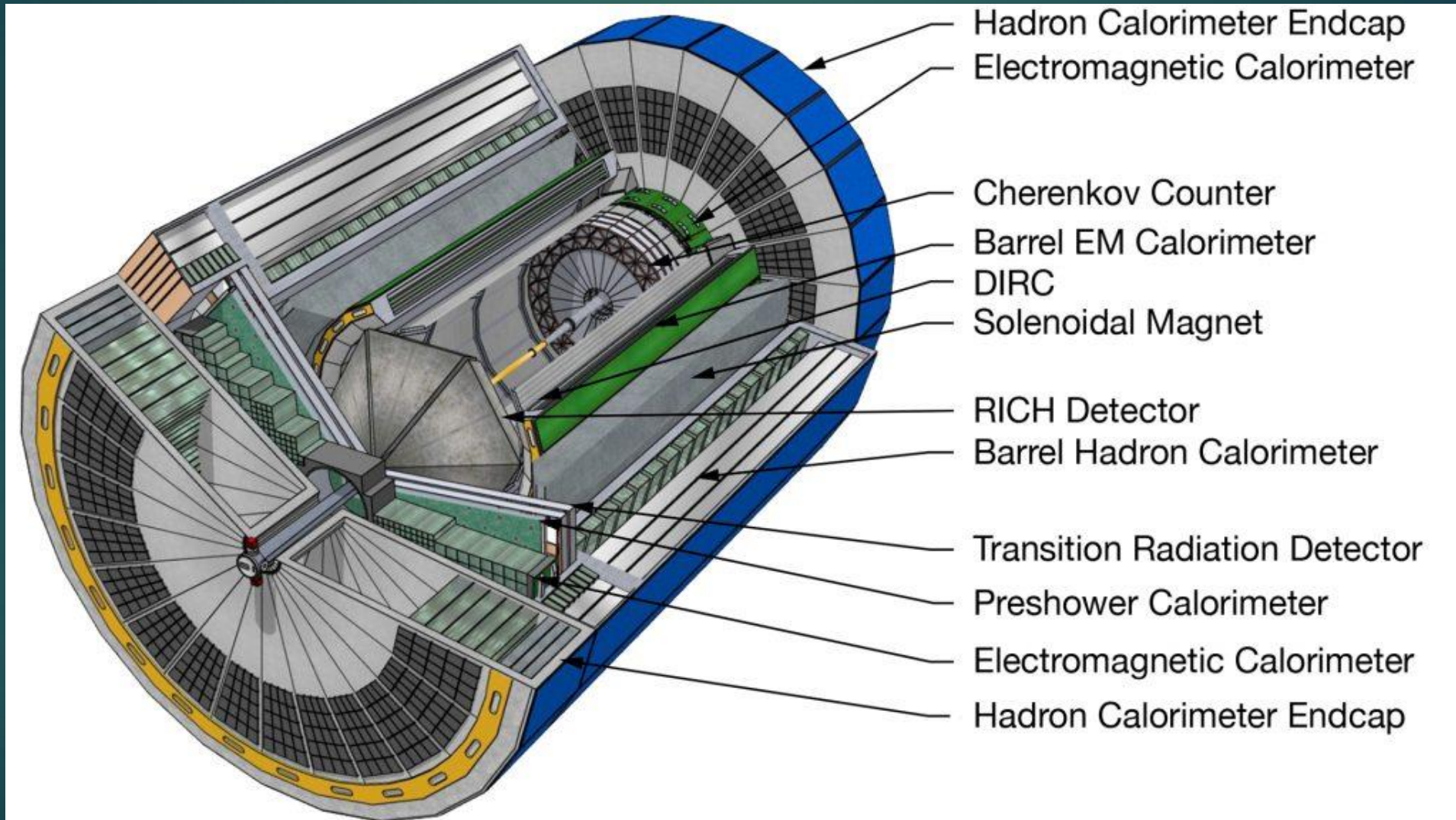


The Electron-Ion Collider (at the Brookhaven Lab.)

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EPIC Detector



JU Membership in Compact Muon Solenoid (CMS) at the LHC (2013-2018)

- ❑ I joined the program in 2018.
- ❑ Studied the Upgrades to CMS.
- ❑ Studied the Electromagnetic Calorimeter (ECAL@CMS).
- ❑ Mainly PbWO₄ crystals coupled to Hamamatsu APDs and read-out by front-end electronics (VFE and FE cards).
- ❑ I designed and assembled an APD testing system in my lab.
- ❑ No further contribution made (as our institution opted not to continue support for the CMS program any more).

My and Jazan University's Contributions to the Jlab Halls A & C

- ❑ The EMC Effect Verification Experiments Suite (XEMPT)
- ❑ Hall C Physics Program
- ❑ Hall A Physics Program (limited role)

JU Membership and Contributions to the Physics Program at Jlab (2014-2020, 2022-)

Hall C

□ At the Hall C (where I first contributed to in 2004 as a graduate student in the XEMPT Suite of experiments), my role has been both in assembly and testing and in experiment running, online analysis, limited coding and shift incharge roles in various experiments since 2016.

The SuperHMS 11 GeV/c Spectrometer (Hall C) Revamping and Testing

(Eric Pooser and M. Bukhari, 2016)

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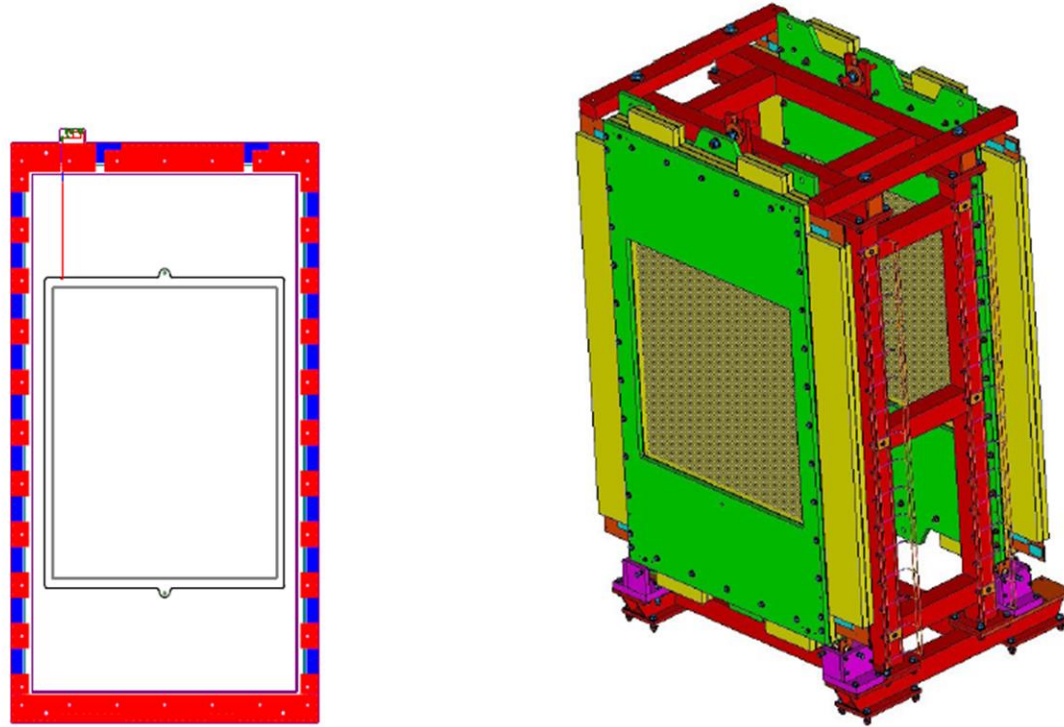


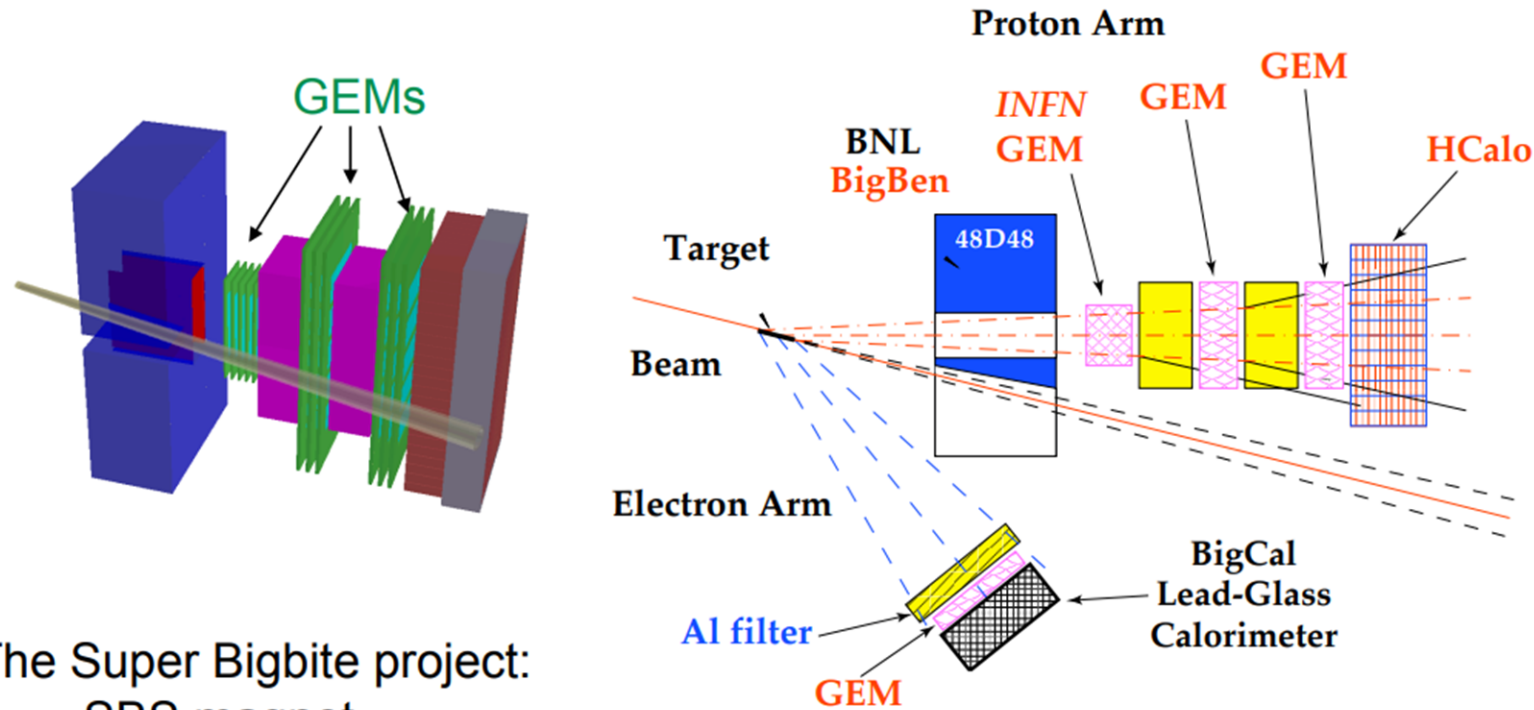
Figure 17: (Left) Technical drawing of cathode (k-plane) PCB. (Right) Technical drawing of the two drift chambers mounted in the Aluminum frame such that the scattered particles would enter the chamber from the left. The chambers are fixed to the frame by a bolt through the top tab on the chamber plate which allows for fine adjustments to the pitch. The downstream chamber (DC2) is mounted in the reverse orientation from the upstream chamber (DC1).

Image from S. Ali et al., a paper in process

- ❑ I joined Hall A work in 2018-2019, quite lately.
- ❑ At the Hall A, I assisted Bogdan Wojtsekhowski in mounting and testing Lead-glass blocks for Super Big-Bite Hadron Calorimeter.
- ❑ Data taking, Online Analysis and Shift Incharge roles for the APEX (Dark Photon Experiment).

The SBS apparatus

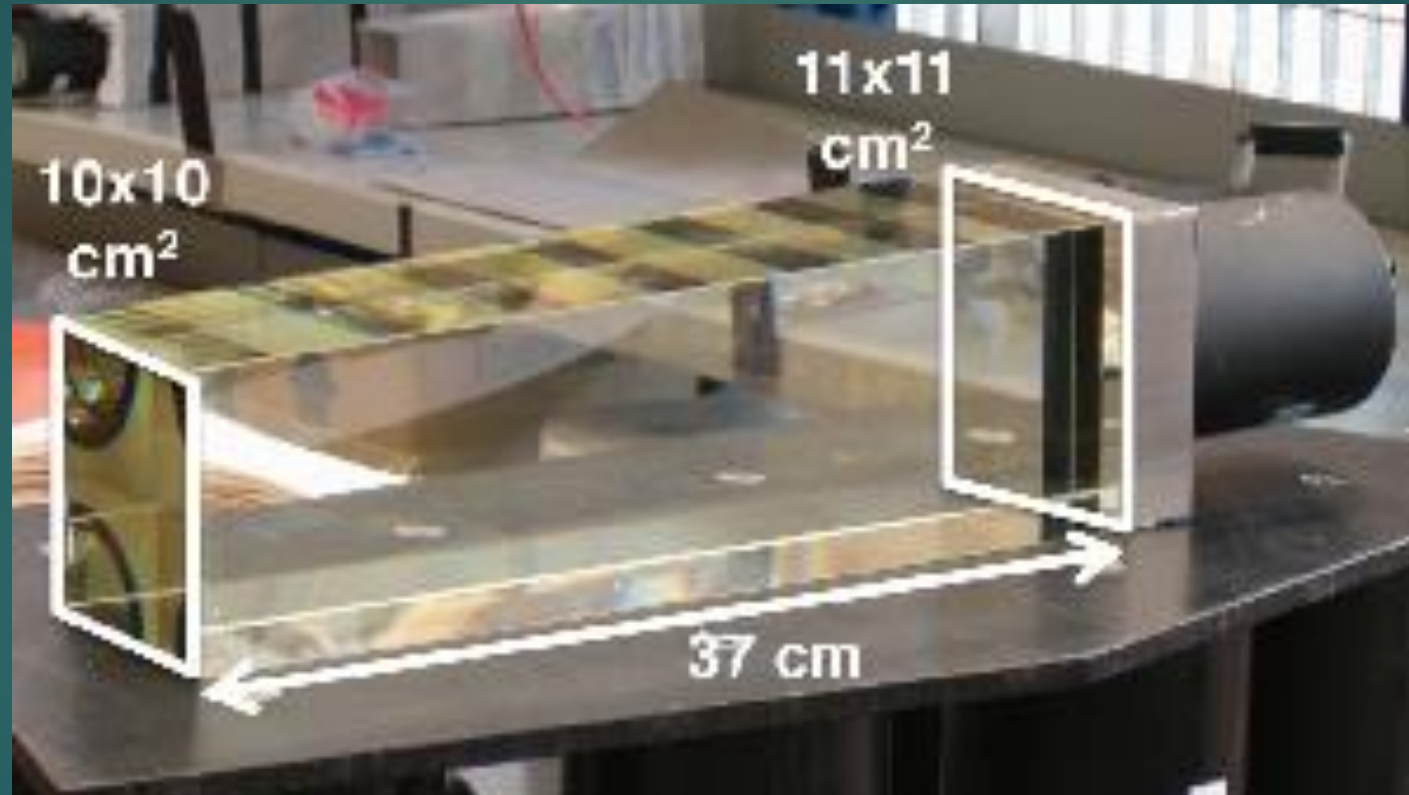
Bogdan Wojtsekhowski, Hall A JLab



The Super Bigbite project:

- SBS magnet
- SBS trackers
- Hadron calorimeter
- Trigger and DAQ

Super-BigBite BBS HCAL Lead-Glass Calorimeter



Homogeneous Cal.; 95% Lead; $X_0=0.9\text{cm}$

My and Jazan University's Contributions to the EIC YELLOW REPORT (at the End of 2020)

- ❑ Main objective: High-throughput, Efficient Streaming Readout (SRO) and Data Acquisition (DAQ) for the ~3000 PbWO₄ EMCAL Channels.
- ❑ Analysis and comparison of various chip architectures.
- ❑ Based upon which I edited and contributed a few pages.
- ❑ Mainly the DAQ and Streaming Read-out Sections in the YR.

Future Prospects and Plan:

- ❑ Viable contributions to detector development and electronics efforts.
- ❑ Mainly for the PbWO₄ Crystal/Sci-Fi EMCAL assembly, testing And integration
- ❑ or MPG Tracker, etc.
- ❑ and wherever any help is required.

EIC EMCAL SciGlass Elements Assembly and Testing

- ❑ We could possibly assist in the assembly and testing of the EMCAL SciGlass scintillators.
- ❑ 8000 homogeneous scintillator blocks
- ❑ Each block of $45.5 \times 4 \times 4 \text{ cm}^3$ dimensions
- ❑ Seventeen radiation-lengths ($17X_0$)
- ❑ Covers roughly 10cm radial read-out space once assembled

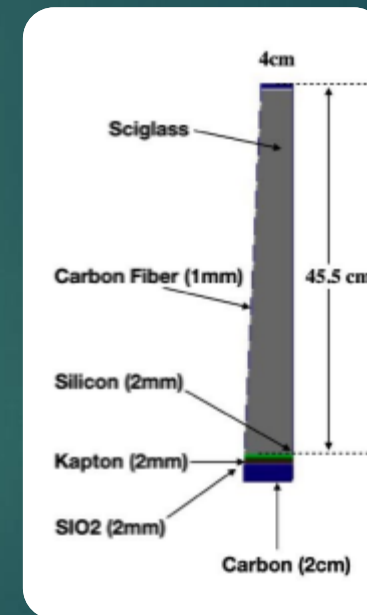
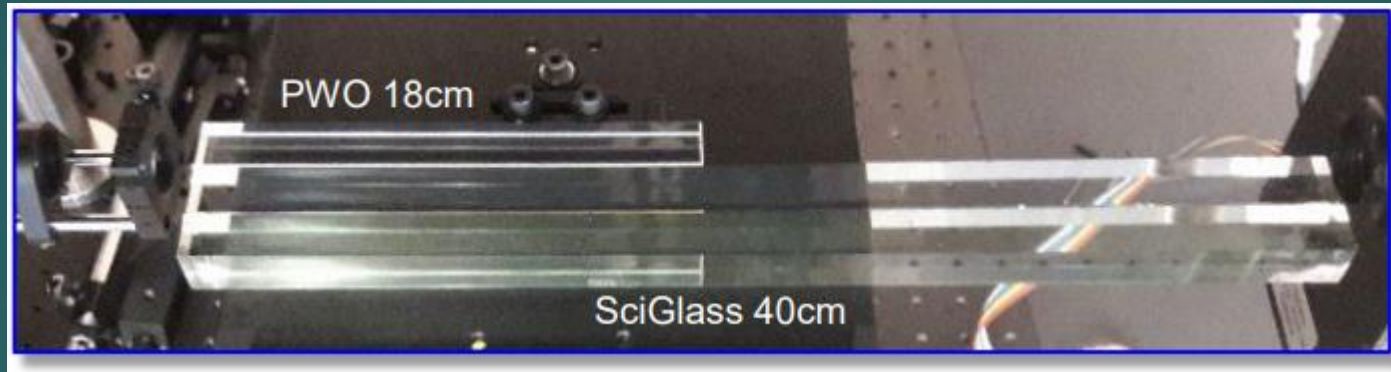


Image courtesy: Osti.gov

The first 30Gy radiation-tested PWO4-SciFi prototypes (courtesy Scintilex)

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Gratitude

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- ▶ Thanks to the Jlab, especially to
- ▶ **Steve Wood (Jlab)**
- ▶ **Bogdan Wojtsekhowski (Jlab)**
- ▶ **Rolf Ent (Jlab)**
- ▶ **John Arrington (ANL)**
- ▶ **Doug Higinbotham (Jlab)**
- ▶ **Mark Jones (Jlab)**
- ▶ **Bishnu Pandey (Hampton Uni.)**
- ▶ **John Lajoie (Iowa State, EIC)**
- ▶ Thank you **RIKEN, University of Tokyo** and especially great thanks to **Taku Gunji** and colleagues for inviting and to all audience for attending this talk.



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