Status report on Run-Group B

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DPWG, JLab, October 5th 2017

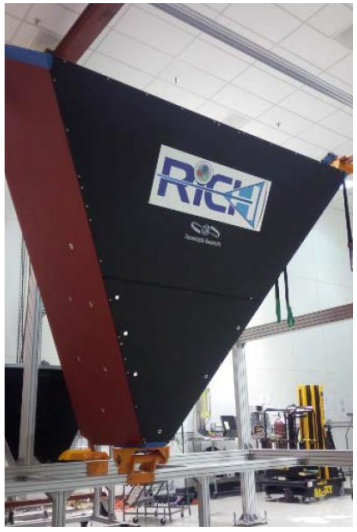
Run-Group B: physics and setup

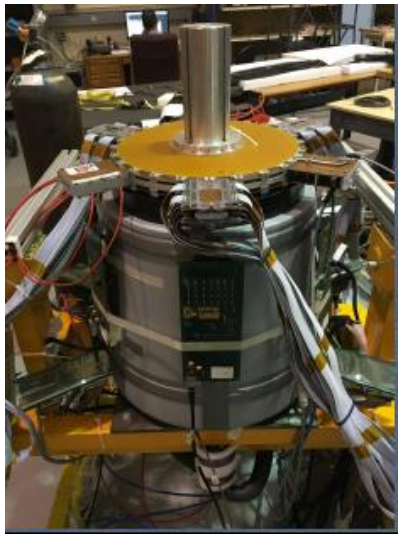
- **RG-B**: measurements of **FFs, PDFs, GPDs, and TMDs** using **deuteron as a neutron target**

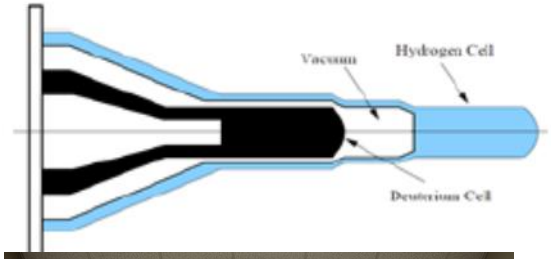
→ **quark-flavor separation,** combining with proton results

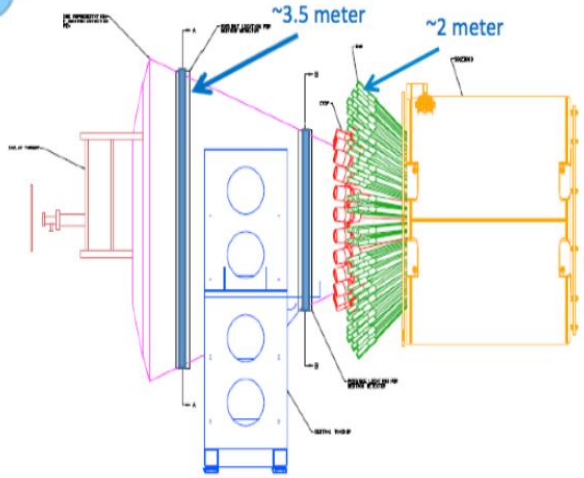
- Common features to all experiments of RG-B: **liquid deuterium** target, **11-GeV** beam
- Approved PAC days: **146**; days in the run-groups table: **90**

Neutron magnetic form factor	Dual target	A- 30
Study of partonic distributions in SIDIS kaon production	*Dual target*, RICH	A- 56
Boer-Mulders asymmetry in K SIDIS	*Dual target*, RICH, two field settings	A- 56
Deeply virtual Compton scattering on the neutron	Single-cell target, CND, FT	A (HI) 90
Collinear nucleon structure at twist-3	*Dual target*, RICH	--
In medium structure functions, SRC, and the EMC effect	Single-cell target, BAND	--









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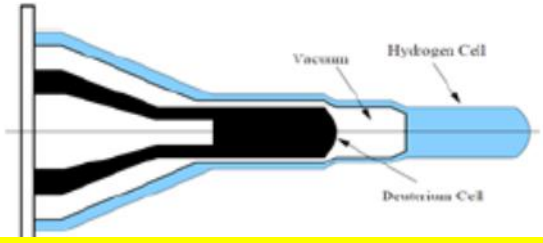
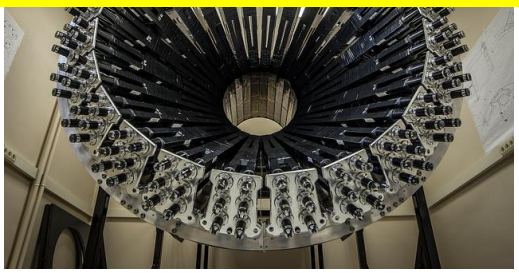
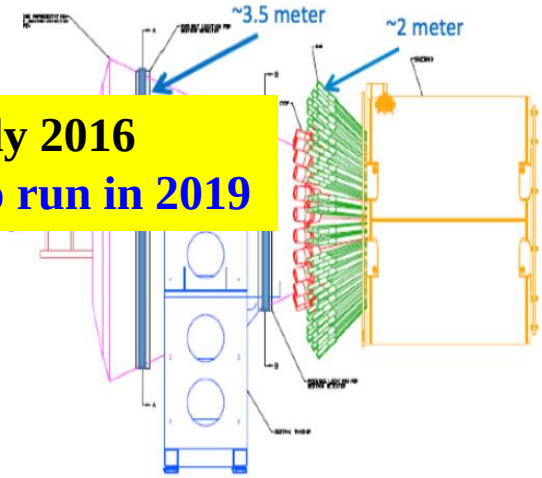


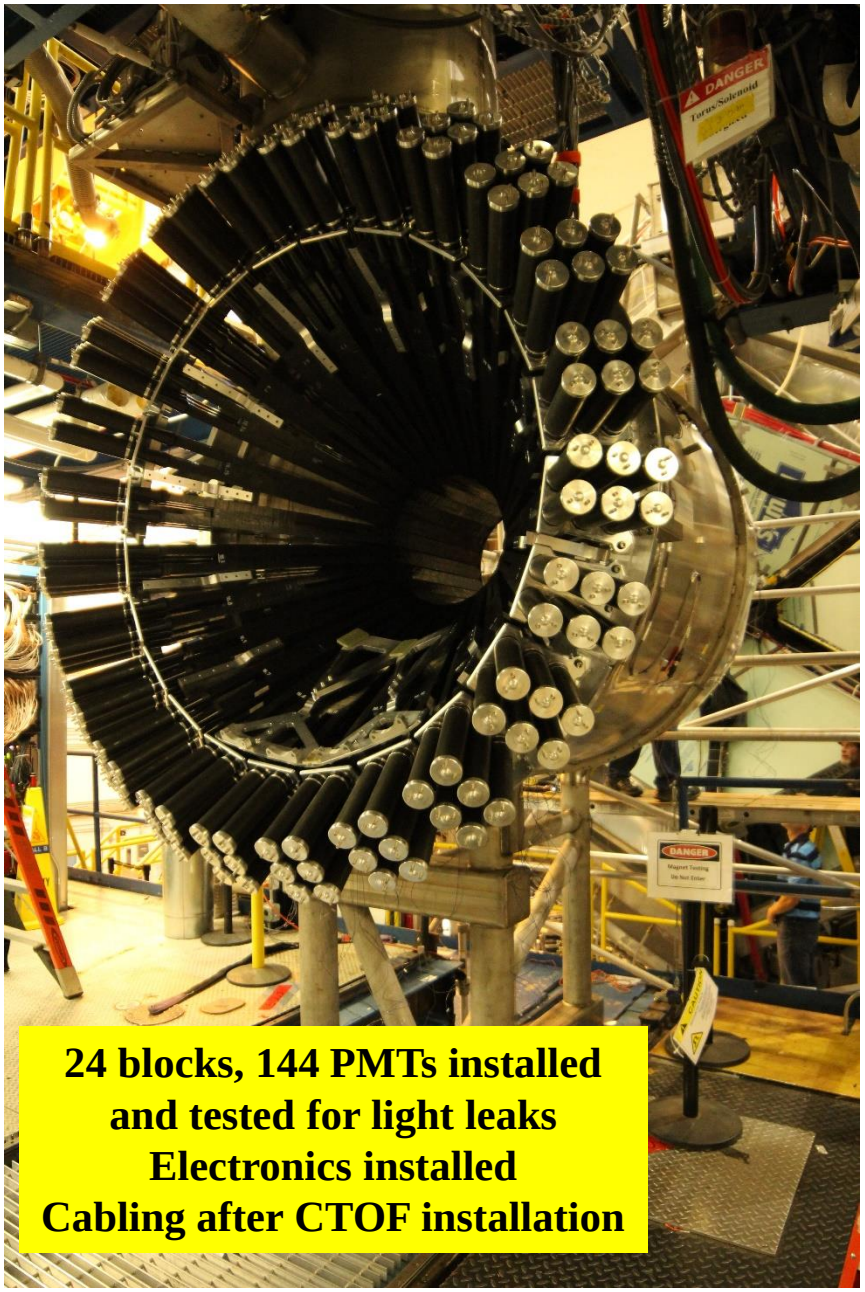




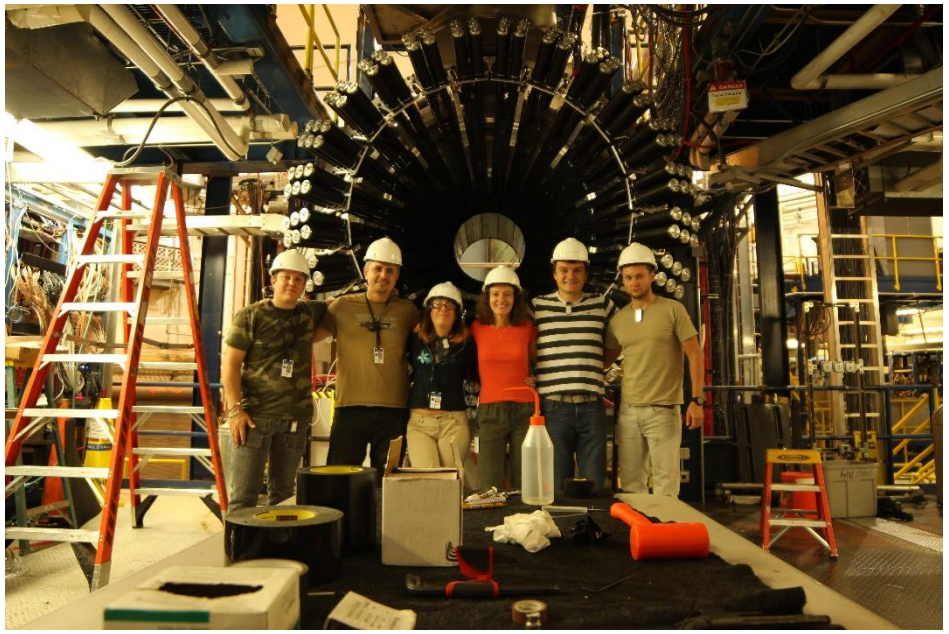
A scheduling request for 2018 was submitted in July 2016

Given the current accelerator schedule, RG-B is likely to run in 2019

CND installation (20-26 September)



24 blocks, 144 PMTs installed and tested for light leaks
Electronics installed
Cabling after CTOF installation



Forward Tagger Installed

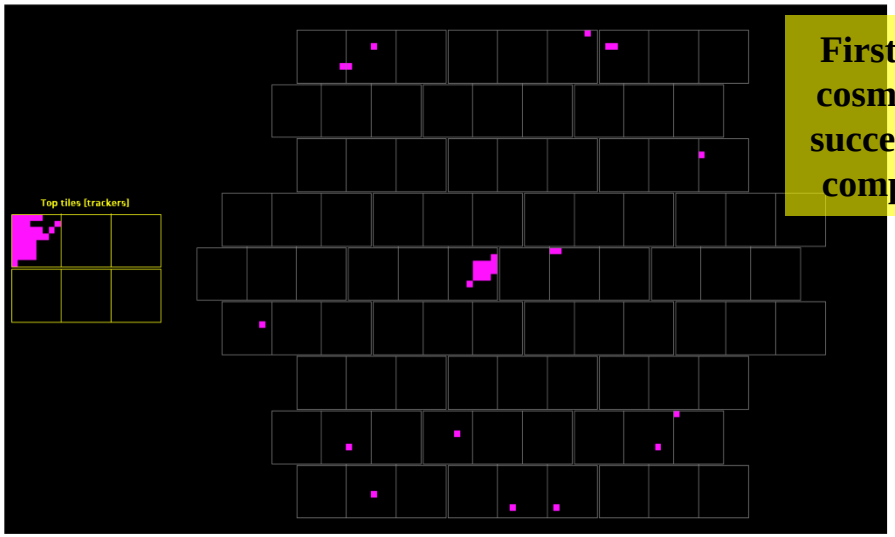
Mechanical structure
- Mechanical structure ready
- Installation tools in preparation

Aerogel
- Baseline production done
- Working on additional spares

Mirrors
- Spherical reveal defects after coating
- Resurface done, coating ongoing
- Lateral mirrors at JLab

PMT + Electronics
- Being assembled

RICH assembly on track for installation mid November



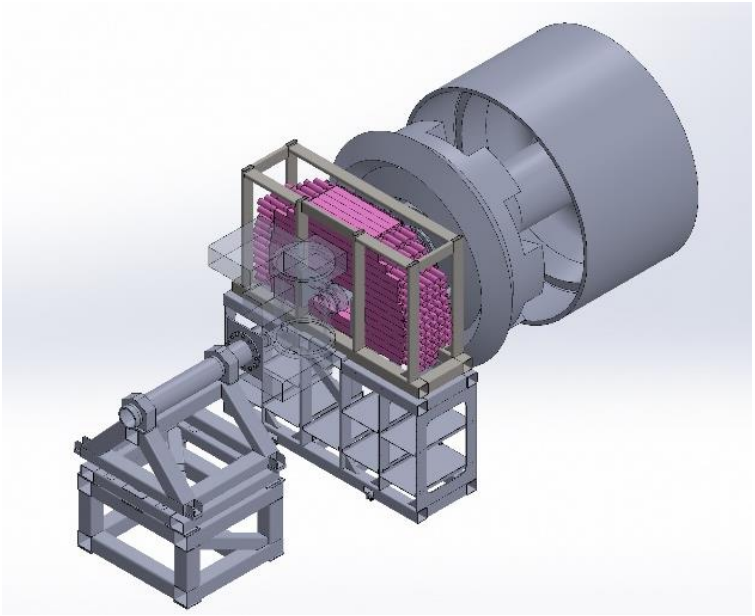
First stage cosmic run successfully completed

Status of BAND

« In medium structure functions, short-range correlations, and the EMC effect », O. Hen et al.

BAND: new scintillator-based **back angle neutron detector**

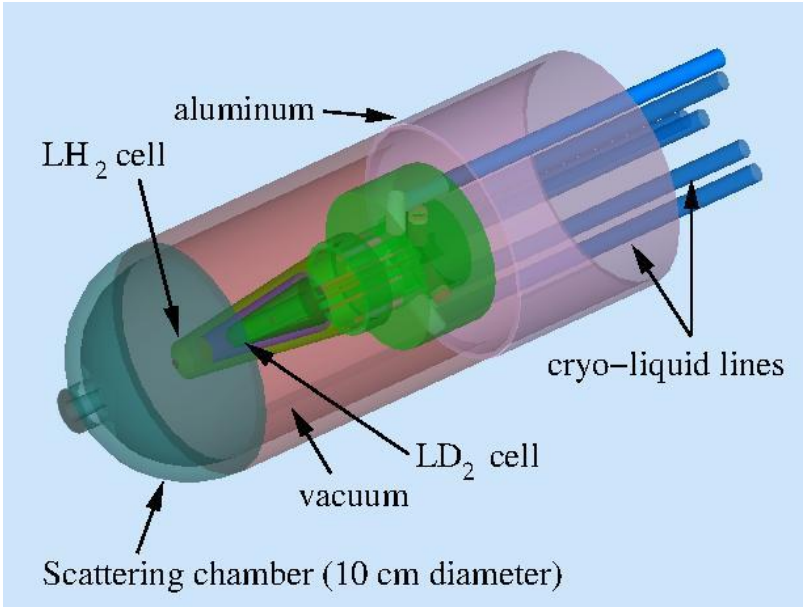
- 160-170^{o}
- ~ 35% neutron detection efficiency
- ~ 7x7 cm^{2} scintillators
- MRI applied for 2017



- ✓ Design and R&D are complete
- ✓ Magnetic shielding tests are still ongoing
- ✓ NIM paper in preparation
- ✓ Most PMTs, all scintillators were recently purchased
- ✓ Construction and tests starting in these days, to be completed by early summer, then shipping to JLab
- ✓ Design of laser calibration system done. A 400 fiber distribution system is due to arrive in a few weeks and the laser itself next month
- ✓ Discussion of ERR with the lab resulted in a general agreement to hold the BAND ERR as part of the general RG-B ERR, in early 2018 (?). BAND will NOT be a condition for RG-B to pass the ERR
- ✓ Full GEANT4 simulation of the detector exists. Results are consistent with the « simpler » estimations used for the proposal

Dual target

- Modeled after E5 target used in CLAS G_M^n measurement
- Dual target with two, 2-cm cells containing LH2 and LD2 separated by 1-cm gap
- Geometry file is part of the standard gemc distribution



August 2017: as an ERR would be needed, soon, and the dual target is not ready for that, it is agreed to run the first part of RG-B with an ordinary deuterium target

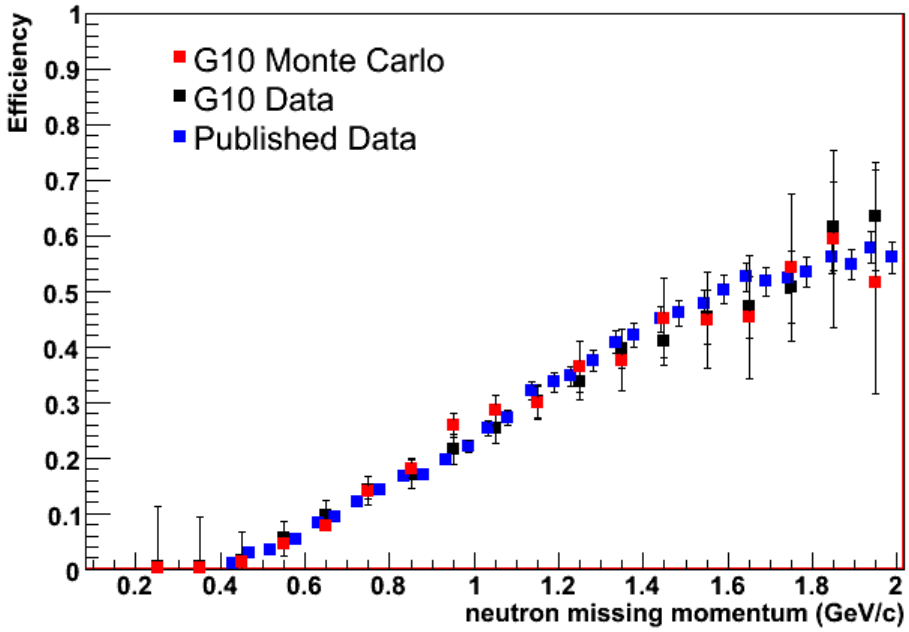
Alternative idea: using deuterium data for NDE

Work by S. A. Pereira on g10 data set

Chosen reaction **$\gamma d \rightarrow p n \pi^+ \pi^-$**

Exclusivity cuts:

- Missing mass of $\gamma d \rightarrow p\pi^+\pi^- X$
- Angle between the direction of expected and measured neutron
- Polar angle Θ_{miss} between 10° and 45°
- Azimuthal angle Φ_{miss} in the sector reference frame
- Background subtraction under missing mass peak



Proton-target runs can also be taken periodically during RG-B

Simulations

Different running conditions are listed in the proposals composing the RG (field settings, FT in or not)
Realistic simulations are necessary to reach an agreement

For the **nDVCS** experiment work is underway (R. Wang, Orsay post-doc):

- **GENEPI** event generator (DVCS and exclusive π^0 electroproduction on deuteron)
- **GEMC** including all CLAS12 components (except BAND)
- **CLARA** (CND reconstruction is now part of coatjava)
- **Analysis** (final state selection, binning in the relevant kinematic variables)
- The full MC chain is being tested, scripts are under development
- Plan: study **acceptances for the nDVCS and enπ^0(p) channels**, for different **field settings** (full/half, inbending/outbending, for both torus and solenoid) and **including or not the FT**
- Then redo the same study including **background**

Things to do, discussion items

- We should resume monthly (or even bi-weekly) meetings
- Each experiment should run full simulations
- Plan for ERR: when should it be? What is the format?
- Joint meetings with RG-A should be considered