

# GMn experiment, status

B. Wojtsekhowski

- Physics to do with GMn
- Preparation status
- GMn run plan

# SBS list

- GMn
- GEn (He-3)
- GEp (p  $\rightarrow$  p polarimeter)
- GEn (n  $\rightarrow$  p & n  $\rightarrow$  n polarimeters)
- SIDIS
- TDIS
- **Wide Angle Pion Production:**  $\vec{\gamma}n, \pi^- \vec{p}$
- **L/T cross section for neutron** – new in Two-Photon-Exchange
- **WAPP with He-3:**  $\vec{\gamma}\vec{n}, \pi^- p$  ; ALL vs. KLL, pion is essential for GPD
- **Strange FF (Gs) at 3 GeV<sup>2</sup>** – discovery level (HCAL+ECAL)
- **DIS g2 for NH<sub>3</sub> transversely pol. target** – (BB/SBS in Hall C)

# GMn group of experiments

- GMn

PI team: B.Quinn, B.Wojtsekhowski\*, D.Hamilton, A.Camsonne

- GEn-RP

PI team: E.Bellini, M.Kohl, B.Sawadsky\*, N.Piskunov, B.Wojtsekhowski, D.Hamilton, K.Gnanvo

- nTPE

PI team: S.Alsalmi, E.Fuchey\*, B.Wojtsekhowski

- WAPP

PI team: J.Arrington, A.Puckett\*, A.Tadepalli, B.Wojtsekhowski

# GMn run group postdocs and Ph.D. students

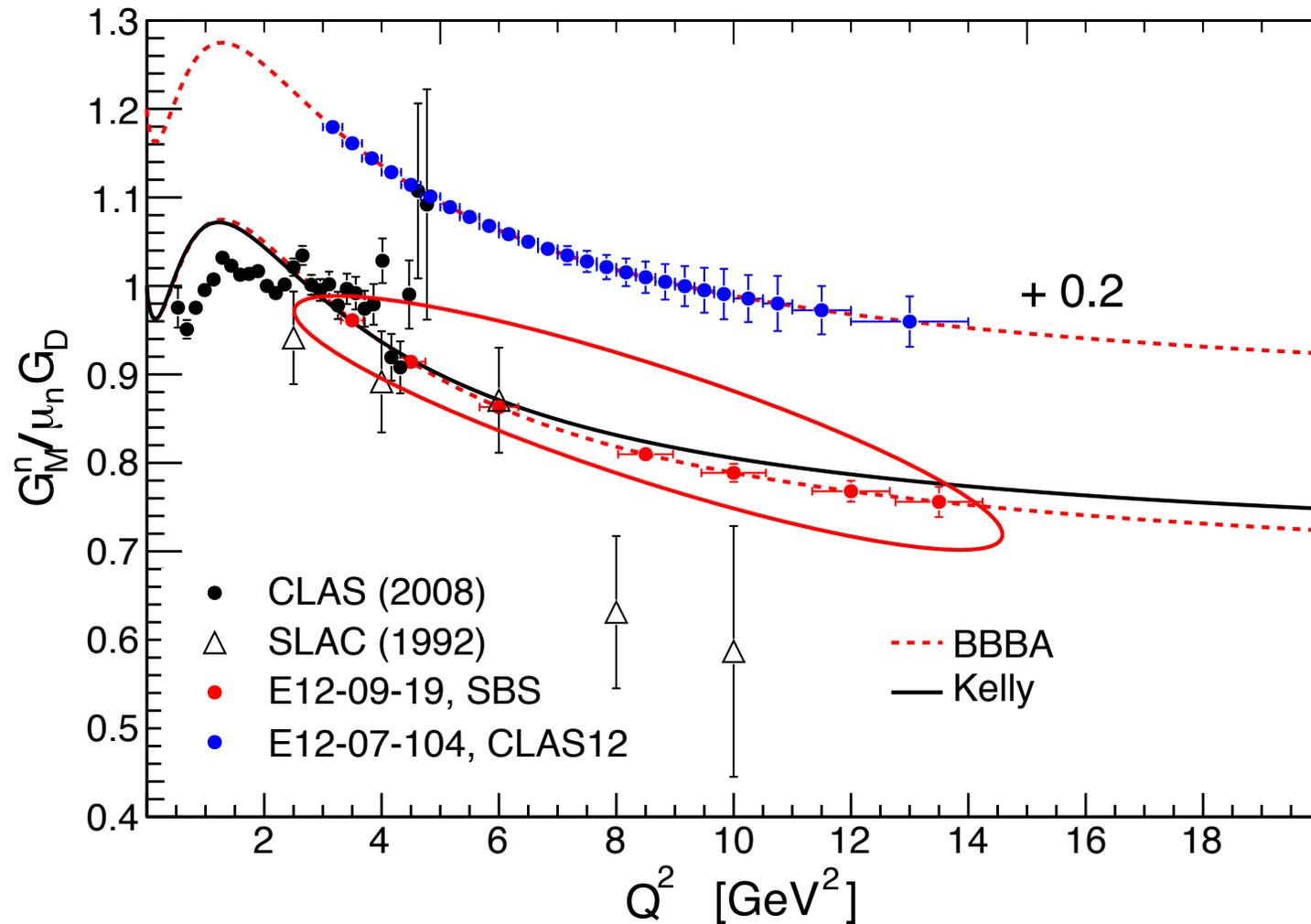
- Catania: V.Brio
- UVa: S.Ali, X.Bai, J.Boyd, S.Jeffas, A.Rathnayake
- W&M: B.Yale, M.Satnik, Z.Wertz
- UConn: E.Fuchey, S.Seeds, P.Datta
- Glasgow: R.Marinaro, G.Penman
- Hampton: T.Gautam, M. Rathnayake, M.Suresh
- CMU: J-C.Cornejo
- JLab: S.Barkus, A.Tadepalli

# Physics program of the group

- GMn via n/p cross section ratio up to  $13.3 \text{ GeV}^2$
- GEn (n  $\rightarrow$  p & n  $\rightarrow$  n polarimeters) at  $4.4 \text{ GeV}^2$
- Wide Angle Pion Production (KLL) at high s/-t/-u
- L/T cross section for a neutron at  $3.8 \text{ GeV}^2$

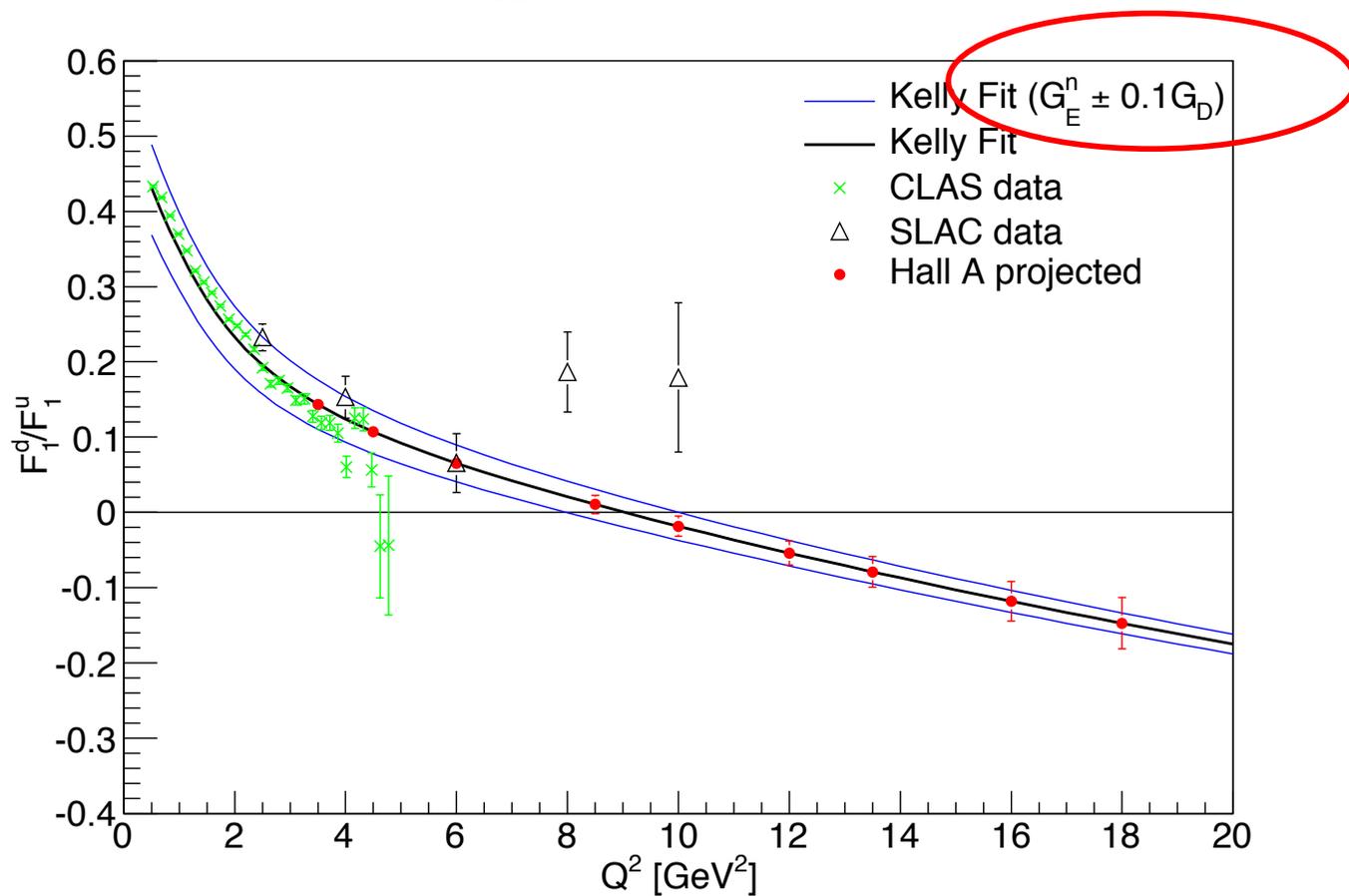
# 12 GeV GMn experiment

Ratio of the cross sections  $D(e, e'n)$  and  $D(e, e'p)$



# $F_1$ decomposition at very large $Q^2$

$$F_1 = \frac{G_E + \tau G_M}{1 + \tau} \quad F_2 = -\frac{G_E - G_M}{1 + \tau}$$



# Hardware item list

- Hall A infrastructure (also counting room)
- Hall A beam line, BPMs, Moller
- LH2 + LD2 + optics targets +
- HRS-L spectrometer
- SBS magnet and correctors with power/cooling
- BB magnet with power/cooling
- HCAL + the mezzanine and cable lines
- BB detector package with GEM, e-bunker/cables
- SBS many GEMs, e-bunker/cables
- SBS proton detectors for GEn-RP
- DAQ advanced system and its bunker

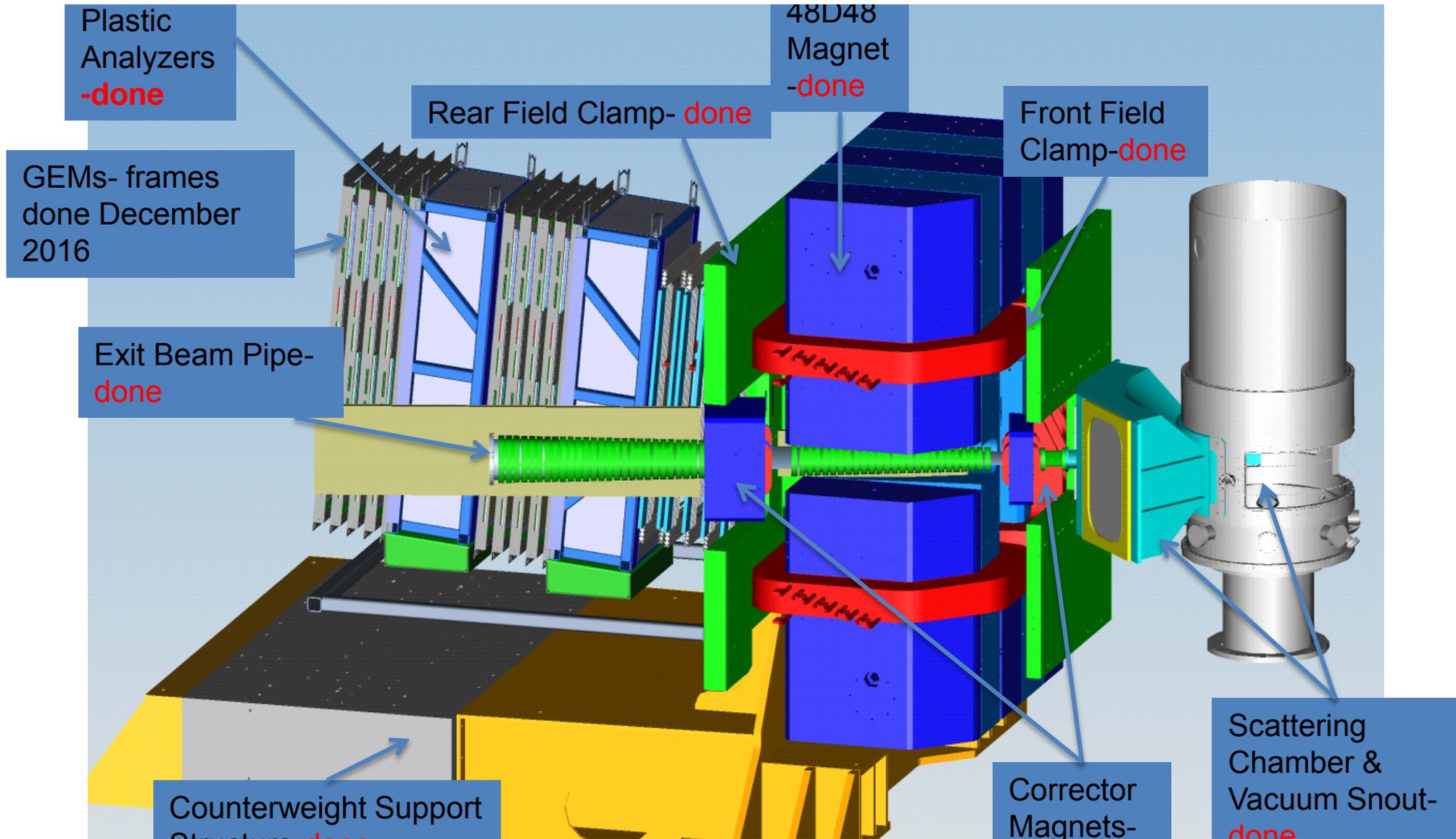
# List of teams

- Hall A tech – Jessie+
- Hall A beam line – acc + D.Flavy, S.Malace
- LH2 + LD2 + optics targets – D.Meekins
- HRS-L spectrometer – R.Michaels, M.Satnik
- SBS magnet – Jessie+
- BB magnet – Jessie+
- HCAL – Scott, CMU, UConn, Temple, CU
- BB detector – Holly+, Kondo+, Todd+, Ralph+, Arun+
- SBS GEMs – Kondo+, HU, UConn
- SBS proton – Brad+
- DAQ – Alex+, Mark+, B.Moffit, B.Raydo
- DAQ bunkers+magnet power+ – Jack+
- Software – A.Puckett+
- Run coordinators - D.Jones

# DAQ bunker, today

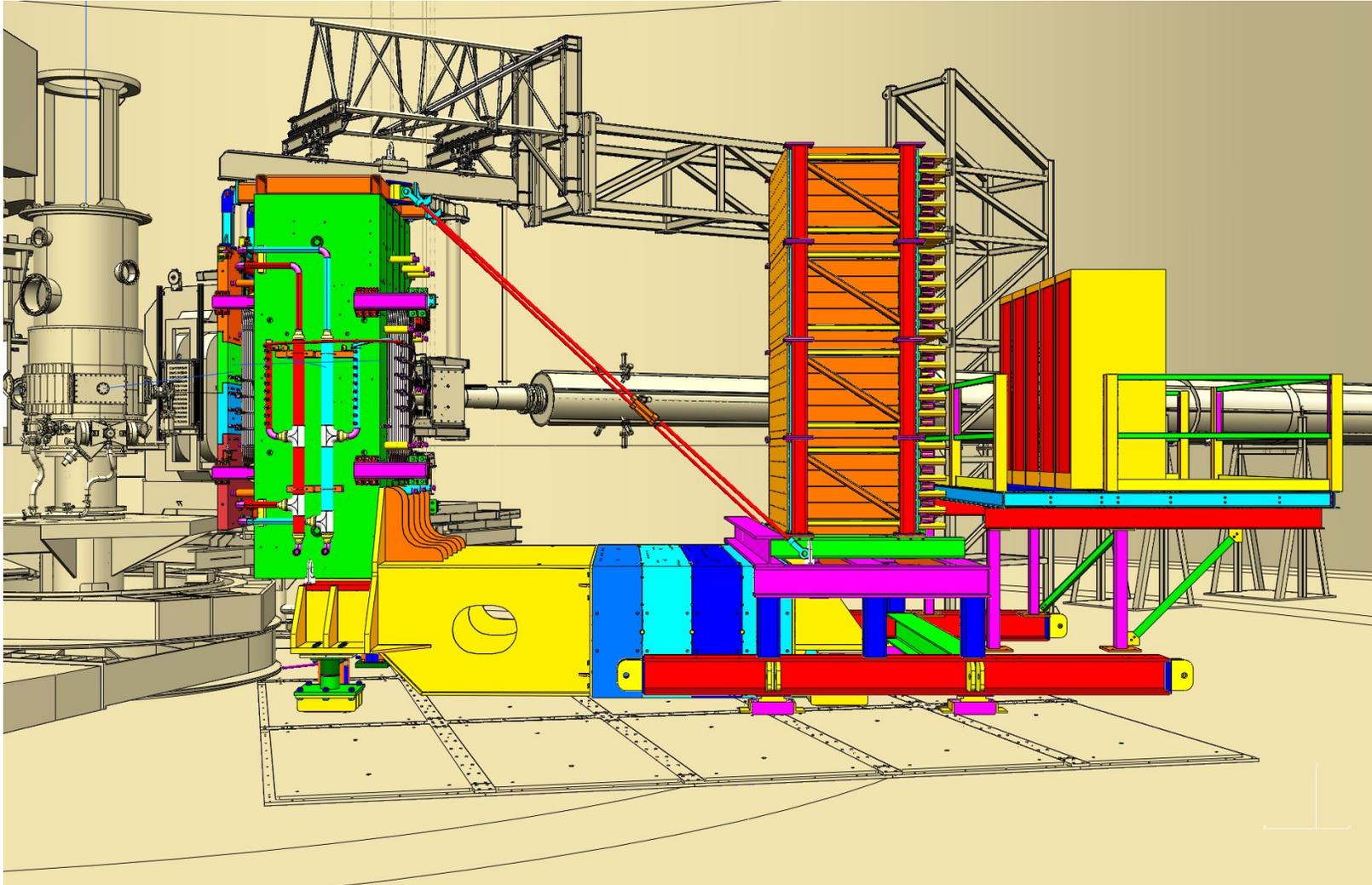


# Super Bigbite Spectrometer



Solid angle 70 msr for the central angle  $> 15^\circ$

# Proton arm calorimeter



energy resolution  $60\%/\sqrt{E[GeV]}$   
time resolution  $\sim 0.5$  ns

# Status/remaining work/time line

Next beam in Hall A is for GMn+

We need to be ready for the beam in a few months!

- ✓ Design/layout of the experiment, 100%
- ✓ Hall A infrastructure, preparation is in full speed
- ✓ SBS magnet components/installation
- ✓ BB magnet+
- ✓ BB detector package, GEM chambers, a lot to do
- ✓ HCAL, mezzanine, cables for the Hall, a lot to do
- ✓ SBS trackers, a lot to do
- ✓ RP detectors, a lot to do
- ✓ Move/re-test the detectors in the hall ~3 months

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- ✓ RP detectors, a lot to do
- ✓ Move/re-test the detectors will take ~3 months

**Problems?** Big: current rate of progress. How to estimate?

- 1) Project the speed using the rate in previous 2-3 months
- 2) Project the scope of similar scale experiments in the past

# Status/remaining work/time line

- ✓ BB magnet+
- ✓ BB detector package, GEM chambers, a lot to do
- ✓ HCAL, mezzanine, cables for the Hall, a lot to do
- ✓ SBS trackers, a lot to do
- ✓ RP detectors, a lot to do
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**Problems?** Big: current rate of progress. What are the reasons?

- 1) Limited access, detector requires a lot of work at the lab
- 2) Multiple projects
- 3) Scope of readiness for beam commissioning.  
Beam is for equipment which is ready.

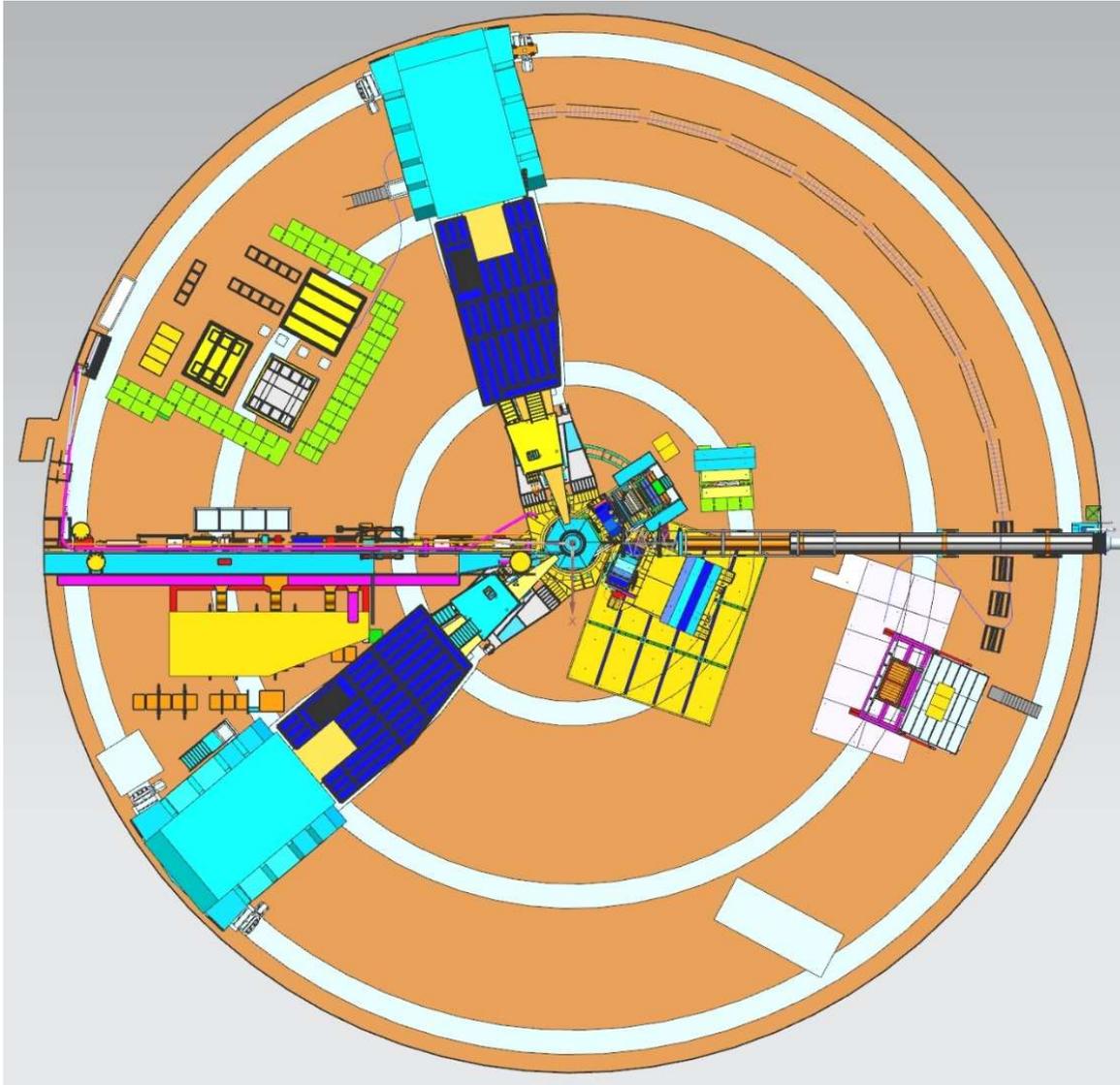
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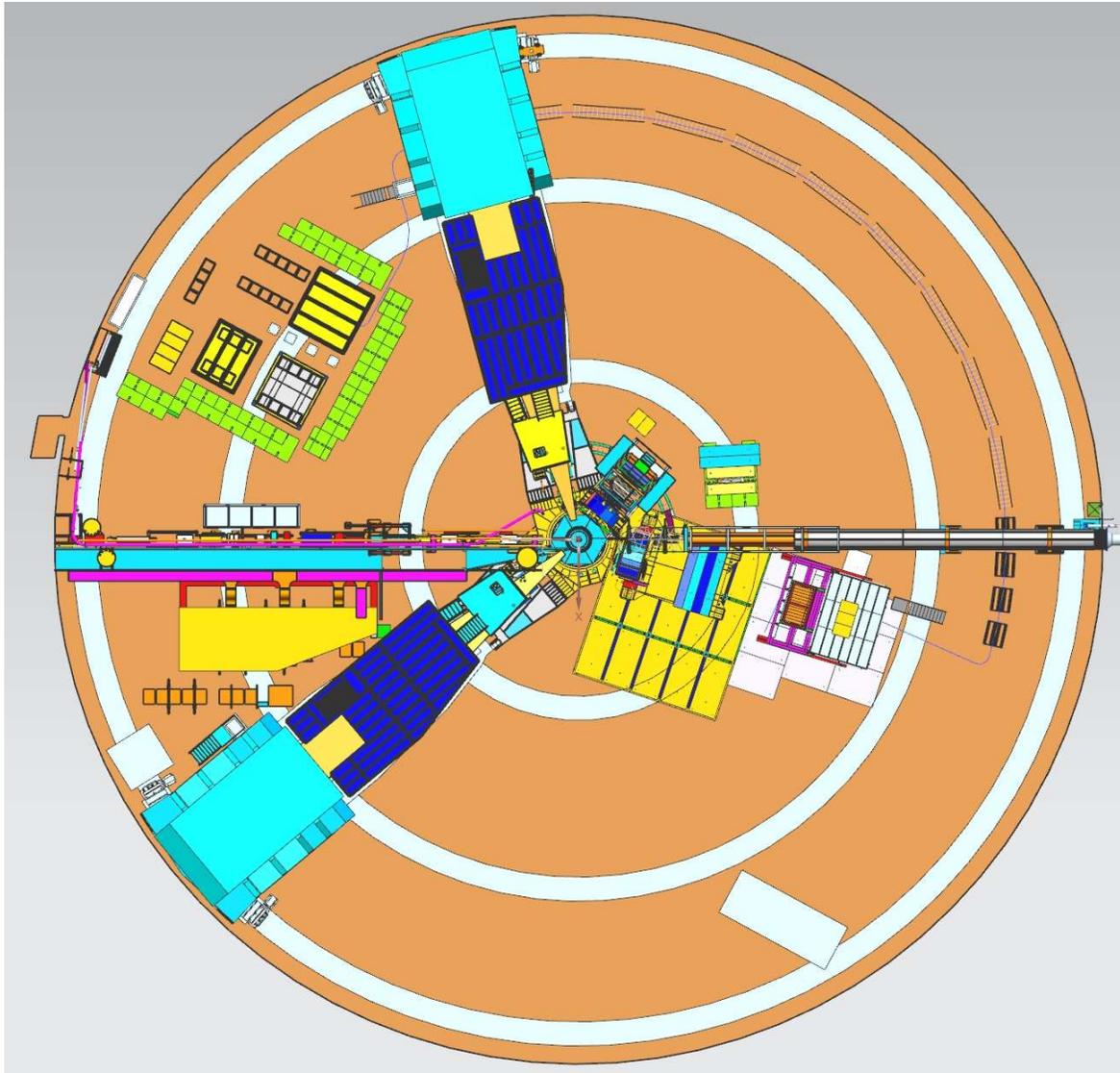
**Problems?** Can detectors be ready for August? **No sure**, if the current speed of progress will continue. We need:

Focus/Scope → a Review will be in two weeks

# Top view, from Ch.Soova, today

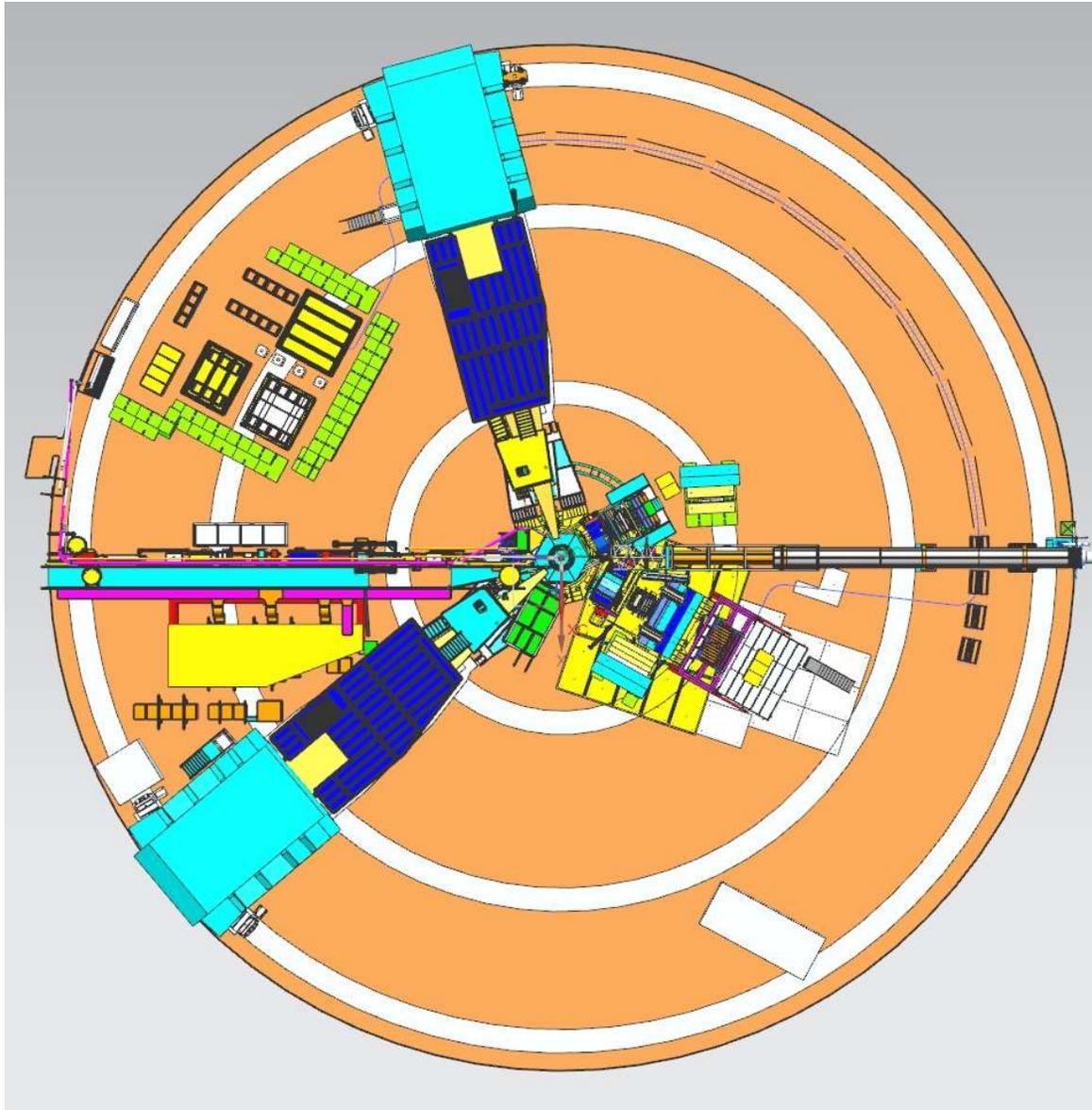


Prep.	
BB°	33.1°
BB m	1.80 m
SBS°	23.3°
SBS m	2.25 m
HCAL°	see SBS
HCAL m	17.0 m
HRS-BL°	105.0°
B Line	3
FLOOR	Config.3



5a	
BB°	49.0°
BB m	1.55 m
SBS°	16.6°
SBS m	2.25 m
HCAL°	see SBS
HCAL m	11.0 m
HRS-BL°	105.0°
B Line	3
FLOOR	Config.1

**Note:**  
 HCAL Hilman roller is 2.5"  
 from the edge of the floor  
 plate.



GEn-Rp	
BB°	29.0°
BB m	1.85 m
SBS°	29.2°
SBS m	2.25 m
HCAL°	see SBS
HCAL m	8.5 m
HRS-BL°	105.0°
B Line	3
FLOOR	Config.8

# Beam schedule

	A	B	C	D	E	F	G	H	I	J
92	06/19/21	Saturday	1.82	Restore						
93	06/20/21	Sunday	1.82	Restore						
94	06/21/21	Monday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
95	06/22/21	Tuesday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
96	06/23/21	Wednesday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
97	06/24/21	Thursday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
98	06/25/21	Friday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
99	06/26/21	Saturday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
100	06/27/21	Sunday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
101	06/28/21	Monday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
102	06/29/21	Tuesday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
103	06/30/21	Wednesday	1.82	Physics	SBS commissioning		Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
104	07/01/21	Thursday	1.82	Physics	(3 weeks?)		Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
105	07/02/21	Friday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
106	07/03/21	Saturday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
107	07/04/21	Sunday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
108	07/05/21	Monday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
109	07/06/21	Tuesday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
110	07/07/21	Wednesday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
111	07/08/21	Thursday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
112	07/09/21	Friday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
113	07/10/21	Saturday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
114	07/11/21	Sunday	1.82	Physics			Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
115	07/12/21	Monday	1.82	Physics	R12-09-019	7.3/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
116	07/13/21	Tuesday	1.82	Physics	R12-09-019	7.3/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
117	07/14/21	Wednesday	1.82	Physics	R12-09-019	7.3/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
118	07/15/21	Thursday	1.82	Physics	R12-09-019	7.3/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
119	07/16/21	Friday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
120	07/17/21	Saturday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
121	07/18/21	Sunday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
122	07/19/21	Monday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
123	07/20/21	Tuesday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
124	07/21/21	Wednesday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
125	07/22/21	Thursday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
126	07/23/21	Friday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
127	07/24/21	Saturday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
128	07/25/21	Sunday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
129	07/26/21	Monday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
130	07/27/21	Tuesday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
131	07/28/21	Wednesday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
132	07/29/21	Thursday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
133	07/30/21	Friday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
134	07/31/21	Saturday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
135	08/01/21	Sunday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
136	08/02/21	Monday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
137	08/03/21	Tuesday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
138	08/04/21	Wednesday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
139	08/05/21	Thursday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
140	08/06/21	Friday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
141	08/07/21	Saturday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
142	08/08/21	Sunday	1.82	Physics	R12-09-019	9.2/40/-/500	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
143	08/09/21	Monday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
144	08/10/21	Tuesday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
145	08/11/21	Wednesday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
146	08/12/21	Thursday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
147	08/13/21	Friday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
148	08/14/21	Saturday	1.82	Physics	R12-09-019	Reconfigure	Run Group 1	3.7/200/-/500	R12-19-006	9.2/70/-/250
149	08/15/21	Sunday		Reconfigure			Install Run Group M			
150	08/16/21	Monday		Reconfigure			Install Run Group M			
151	08/17/21	Tuesday		Reconfigure			Install Run Group M			
152	08/18/21	Wednesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
153	08/19/21	Thursday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
154	08/20/21	Friday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
155	08/21/21	Saturday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
156	08/22/21	Sunday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
157	08/23/21	Monday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
158	08/24/21	Tuesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
159	08/25/21	Wednesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
160	08/26/21	Thursday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
161	08/27/21	Friday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
162	08/28/21	Saturday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
163	08/29/21	Sunday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
164	08/30/21	Monday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
165	08/31/21	Tuesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
166	09/01/21	Wednesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500

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166	08/31/21	Tuesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
167	09/01/21	Wednesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
168	09/02/21	Thursday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
169	09/03/21	Friday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
170	09/04/21	Saturday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
171	09/05/21	Sunday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
172	09/06/21	Monday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
173	09/07/21	Tuesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
174	09/08/21	Wednesday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
175	09/09/21	Thursday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
176	09/10/21	Friday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
177	09/11/21	Saturday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
178	09/12/21	Sunday	1.96	Physics	R12-09-019	4.0/40/-/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
179	09/13/21	Monday	1.96	Physics	Reconfigure		Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
180	09/14/21	Tuesday	1.96	Physics	Reconfigure		Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
181	09/15/21	Wednesday	1.96	Physics	Reconfigure		Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
182	09/16/21	Thursday	1.96	Physics	Reconfigure		Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
183	09/17/21	Friday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
184	09/18/21	Saturday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500

July 2020 - December 2021 (v20200619.1)

	a	b	c	d	e	f	g	h	i	j
184	09/19/21	Sunday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
185	09/20/21	Monday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
186	09/21/21	Tuesday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
187	09/22/21	Wednesday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
188	09/23/21	Thursday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
189	09/24/21	Friday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
190	09/25/21	Saturday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	R12-19-006	8.0/70/-/500
191	09/26/21	Sunday	1.96	Physics	R12-17-004	4.0/40/p/500	Run Group M	6.0/200/-/500	PASS CHANGE	
192	09/27/21	Monday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
193	09/28/21	Tuesday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
194	09/29/21	Wednesday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
195	09/30/21	Thursday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
196	10/01/21	Friday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
197	10/02/21	Saturday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
198	10/03/21	Sunday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
199	10/04/21	Monday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
200	10/05/21	Tuesday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
201	10/06/21	Wednesday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	R12-19-006	9.9/70/-/250
202	10/07/21	Thursday	1.96	Physics	Sched. Contingency		PASS CHANGE		R12-19-006	9.9/70/-/250
203	10/08/21	Friday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	R12-19-006	9.9/70/-/250
204	10/09/21	Saturday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	PASS CHANGE	
205	10/10/21	Sunday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	R12-19-006	6.0/70/-/500
206	10/11/21	Monday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	R12-19-006	6.0/70/-/500
207	10/12/21	Tuesday	1.96	Physics	Sched. Contingency		PASS CHANGE		Sched. Contingency	
208	10/13/21	Wednesday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency	
209	10/14/21	Thursday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency	
210	10/15/21	Friday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency	
211	10/16/21	Saturday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency	
212	10/17/21	Sunday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency	
213	10/18/21	Monday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency	
214	10/19/21	Tuesday	127 days (18.1 weeks)							
215	10/20/21	Wednesday	1.96	Sched. Contingency	Sched. Contingency		Sched. Contingency		Sched. Contingency	
216	10/21/21	Thursday	1.96	Sched. Contingency	Sched. Contingency		Sched. Contingency		Sched. Contingency	
217	10/22/21	Friday	1.96	Sched. Contingency	Sched. Contingency		Sched. Contingency		Sched. Contingency	
218	10/23/21	Saturday	1.96	Sched. Contingency	Sched. Contingency		Sched. Contingency		Sched. Contingency	
219	10/24/21	Sunday	1.96	Sched. Contingency	Sched. Contingency		Sched. Contingency		Sched. Contingency	
220	10/25/21	Monday	1.96	Sched. Contingency	Sched. Contingency		Sched. Contingency		Sched. Contingency	
221	10/26/21	Tuesday	134 days (19.1 weeks)							

# Run plan

4 weeks of commissioning

step #	task	$Q^2$ GeV <sup>2</sup>	$\theta_{BB}/\theta_{SBS}$ $\theta_{HRS-L}$	$E_b,$ GeV, $\mu$ A	calendar, hours	tech. hours
Preparation, HCAL 17 m Com1a see table 3 Temp. removal Moller pol. test	BigBite/SBS comm. BigBite BigBite+detector Moller		33.1 / 23.3 33.1 / 23.3	5.56 no 5.56	24 56 8	24
Move per table 15 Com2a see table 2 Com2b (pass change-1) Com2c, see table 15	HRS beam line comm.  HCAL calibration	  $\sim 4.12$	50. / 23.3 50. / 23.3 50. / 23.3 50. / 23.3	no 5.56, @2h 3.74 3.74	4 24 8 24	4
Com3a per table 16 Com3b (pass change-2) Com3c, see table 16	move SBS/HCAL  HCAL calibration	  $\sim 5.08$	42. / 20.5 42. / 20.5 42. / 20.5	no 5.56 5.56	32 8 24	16
Com4a move Com4b see table 2 Com4c see table 2 Com4d see table 2	HRS to 90+ <sup>o</sup> SBS/HCAL reinstall BB prepare BB det.		29.0 / 29.2 29.0 / 29.2 29.0 / 29.2	no no no no	4 32 104 168	4 16 40
Com5a see table 3 Com5b move 17 - to 8.5 m Com5c see table 4	comm. BigBite HCAL HCAL & BB		29.0 / 29.2 29.0 / 29.2 29.0 / 29.2	5.56 no 5.56	48 4 48	4 =612h
1a beam pol. measurement 1b (install analyzers) 1c see table 5	Moller GEN-RP , <i>day 1</i> GEN-RP prod	4.4	29.0 / 29.2 29.0 / 29.2	5.56 no 5.56	8 4 168	4
1d (pass change-3) 1e see table 6 1f prep. to GMn prod	beam WAPP prod pol. remove	s=10.3	29.0 / 29.2 29.0 / 29.2 29.0 / 29.2	7.38 7.38 no	8 96 56	24
2a move tab. 9 to 7	BB/SBS/HCAL	$\epsilon = 0.82$	25.5 / 32.5	no	32	16

# Run plan

7 weeks of production

Com5c see table 4	HCAL & BB		29.0 / 29.2	5.56	48	=612h
1a beam pol. measurement	Moller			5.56	8	
1b (install analyzers)	GEn-RP , <i>day 1</i>		29.0 / 29.2	no	4	4
1c see table 5	GEn-RP prod	4.4	29.0 / 29.2	5.56	168	
1d ( <a href="#">pass change-3</a> )	beam		29.0 / 29.2	7.38	8	
1e see table 6	WAPP prod	s=10.3	29.0 / 29.2	7.38	96	
1f prep. to GMn prod	pol. remove		29.0 / 29.2	no	56	24
2a move tab. 9 to 7	BB/SBS/HCAL	$\epsilon = 0.82$	25.5 / 32.5	no	32	16
2b ( <a href="#">pass change-4</a> )	beam		25.5 / 32.5	5.56	8	
2c see table 7	nTPE prod	$Q^2=3.8$	25.5 / 32.5	5.56	88	
3a move tab. 9 to 7	BB/SBS/HCAL	$\epsilon = 0.58$	45.0 / 25.8	no	32	16
3b ( <a href="#">pass change-5</a> )	beam		45.0 / 25.8	3.74	8	
3c see table 9	GMn prod-2	$Q^2=3.8$	45.0 / 25.8	3.74, @11h	64	
4a move tab. 9 to 10	BB/SBS/HCAL		33.0 / 24.6	no	32	16
4b ( <a href="#">pass change-6</a> )	beam		33.0 / 24.6	5.99	8	
4c see table 10	GMn prod-3	5.7	33.0 / 24.6	5.99, @12h	56	
5a move tab. 8 to 11	BB/SBS/HCAL		49.0 / 16.6	no	32	16
5c see table 11	GMn prod-4	7.7	49.0 / 16.6	5.99, @6h	56	
6a move tab. 11 to 12	BB		39.0 / 16.6	no	8	8
6b ( <a href="#">pass change-7</a> )	beam		39.0 / 16.6	7.95	8	
6c see table 12	GMn prod-5	9.8	39.0 / 16.6	7.95, @6h	24	
7a move tab. 12 to 13	BB/SBS/HCAL		48.0 / 13.3	no	32	16
7b see table 13	GMn prod-6	11.0	48.0 / 13.3	7.95, @7h	56	
8a move tab. 13 to 14	BB only		41.0 / 13.3	no	8	8
8b ( <a href="#">pass change-8</a> )	beam		41.0 / 13.3	9.91	8	
8c see table 14	GMn prod-7	13.3	41.0 / 13.3	9.91, @11h	212	
9a move tab. 7 to 8	SBS/HCAL/BB		32.0 / 33.5	no	32	16
9b ( <a href="#">pass change-9</a> )	beam		32.0 / 33.5	4.01	8	
9c see table 8	GMn prod-1,	$Q^2=3.0$	32.0 / 33.5	4.01, @11h	56	=1184h

SBS commissioning 612 h = 26 cal days	SBS production 1184 h = 49 cal days	Beam 3.7 GeV 32+72 hours	Tech work
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Table 1: The time table of the GMn run group. Note: @ time with 60  $\mu$ A.