

Memorandum

Michael Lindgren
Chief Accelerator Officer

Accelerator Division
P.O. Box 500, MS 306
Kirk Road and Pine Street
Batavia, Illinois 60510-5011
USA
Office: 630.840.8409
mlindgre@fnal.gov

Date: December 16, 2020
To: Todd Sullivan
From: Michael Lindgren, Michael Lindgren, UID:mlindgre
Re: Approval for Running IOTA/FAST Electron Injector

Digitally signed by Michael
Lindgren, UID:mlindgre
Date: 2020.12.16 15:48:01
-08'00'

Safety documentation and procedures for running IOTA/FAST Electron Injector are now complete and in place. Therefore, you are hereby authorized to accelerate and transport beam up to 300 MeV.

cc: M. Convery
D. Broemmelsiek
E. McHugh
M. Schoell
S. McGimpsey

SYSTEM START-UP SIGN-OFF

The signatures below, unless noted in the comments section, indicate that the relevant systems are ready for the restart of beam operation. Indicate in the comments section any remaining work that would affect the restart of beam operations. Indicate N/A for departments that did not do any work on the system.

SYSTEM BEING SIGNED OFF: Linac NIF MTA Booster [8-GeV Line-MI-10 Region]
(Circle as Applicable) [MI-20-MI-62/Recycler] BNB NUM P1-P2 Muon P3-Switchyard
Meson Primary MT MC NM FAST

<u>DEPARTMENT</u>	<u>DATE</u>	<u>SIGNATURE (Department Head/Designee)</u>
1. Controls	10-2-2020	[Signature] for J. Patrick
2. Cryogenics	10/2/2020	[Signature] for B. Hausman
3. E/E Support	10/1/20	[Signature]
4. RPO Manager	10/8/20	Madelyn Schoell, UID:maddiew <small>Digitally signed by Madelyn Schoell, UID:maddiew Date: 2020.10.08 13:14:42 -05'00'</small>
5. LSO	10/8/20	Matthew Quinn, UID:mquinn <small>Digitally signed by Matthew Quinn, UID:mquinn Date: 2020.10.08 13:13:16 -05'00'</small>
6. External Beamlines	N/A	
7. Instrumentation	10/2/2020	[Signature]
8. Interlocks	10/7/2020	[Signature]
9. Main Injector	N/A	
10. Mechanical Support	20/08/2020	[Signature]
11. Muon	N/A	
12. Operations	10/05/2020	[Signature]
13. Proton Source	N/A	
14. RF	10/6/2020	[Signature]
15. ENG Support	10/5/2020	[Signature]
16. Target Systems	N/A	
* 17. Shutdown Coordinator	10/7/20	[Signature] 10723N J. Santucci

Comments and special conditions (please mark comment with department # to connect comment with appropriate department):

* IOTA is not ready for beam, but the linac is. FAST will be running beam to the HEA during off-shifts and working on IOTA on Day Shift. To prevent beam into IOTA, D604 Reversing Switch Config Control key is controlled by RSO.

The FAST radiation shielding meets the requirements documented in the Advanced Superconducting Test Accelerator (ASTA) (12/14) & The Shielding Assessment for the IOTA/FAST shielding assessment.
Electron Injector at 300 MeV (8/14)

FINAL APPROVALS

System Department Head Daniel Broemmelsiek, UID:broemmel
Digitally signed by Daniel Broemmelsiek, UID:broemmel
Date: 2020.10.08 14:52:58 -05'00' Date _____

Assigned RSO Susan McGimpsey
Digitally signed by Susan McGimpsey
Date: 2020.10.08 14:41:48 -05'00' Date _____

AD Division Head Michael Lindgren, UID:mlindgre
Digitally signed by Michael Lindgren, UID:mlindgre
Date: 2020.10.08 14:47:34 -05'00' Date _____

SYSTEM START-UP SIGN-OFF

The signatures below, unless noted in the comments section, indicate that the relevant systems are ready for the restart of beam operation. Indicate in the comments section any remaining work that would affect the restart of beam operations. Indicate N/A for departments that did not do any work on the system.

SYSTEM BEING SIGNED OFF: **Linac NIF MTA Booster [8-GeV Line-MI-10 Region]**
 (Circle as Applicable) **[MI-20-MI-62/Recycler] BNB NuMI P1-P2 Muon R3**

Switchyard Meson Primary MT MC NM FAST

IOTA

<u>DEPARTMENT</u>	<u>DATE</u>	<u>SIGNATURE (Department Head/Designee)</u>
1. Controls	12/15/20	James Patrick <small>Digitally signed by James Patrick Date: 2020.12.15 10:17:00 -06'00'</small>
2. Cryogenics	N/A	
3. E/E Support	12/15/20	Chris Jensen <small>Digitally signed by Chris Jensen DN: cn=Chris Jensen, o=Fermilab, email=cjensen@fnal.gov, c=US Date: 2020.12.16 19:07:55 -06'00'</small>
4. RPO Manager	12/16/20	Madelyn Schoell, UID:maddiew <small>Digitally signed by Madelyn Schoell, UID:maddiew Date: 2020.12.16 07:44:41 -06'00'</small>
5. LSO	N/A	
6. External Beamlines	N/A	
7. Instrumentation	12/15/20	Craig Drennan <small>Digitally signed by Craig Drennan Date: 2020.12.15 13:52:00 -06'00'</small>
8. Interlocks	12/14/20	Adam Olson, UID:aolson <small>Digitally signed by Adam Olson, UID:aolson Date: 2020.12.14 14:45:05 -06'00'</small>
9. Main Injector	N/A	
10. Mechanical Support	12/14/20	
11. Muon	N/A	
12. Operations	12/14/20	Todd Sullivan, UID:sullivan <small>Digitally signed by Todd Sullivan, UID:sullivan Date: 2020.12.11 18:10:53 -06'00'</small>
13. Proton Source	N/A	
14. RF	N/A	
15. ENG Support	N/A	
16. Target Systems	N/A	
17. Shutdown Coordinator	12/15/20	James Santucci, UID:santucci <small>Digitally signed by James Santucci, UID:santucci DN: cn=james_santucci, o=Fermilab, email=jsantucci@fnal.gov, c=US ou=People, cn=James Santucci, ou=US, email=jsantucci@fnal.gov Date: 2020.12.15 16:31:48 -06'00'</small>

Comments and special conditions (please mark comment with department # to connect comment with appropriate department):

This sign-off is for IOTA only, as FAST beam to HEA has already been signed off. IOTA work/changes since the last beam run involved Mechanical Support and Instrumentation systems. All systems should confirm readiness for the restart of beam operations into the IOTA Ring. FAST personnel are responsible for the "Shutdown Coordinator" role.

EE Support performed no work on Iota this shutdown.

The FAST/IOTA radiation shielding meets the requirements documented in the Advanced Superconducting Test Accelerator (ASTA) (12/14) and The Shielding Assessment for the IOTA/FAST Electron Injector at 300 MeV (8/14) shielding assessment.

FINAL APPROVALS

System Department Head	Daniel Broemmelsiek, UID:broemmelsiek <small>Digitally signed by Daniel Broemmelsiek, UID:broemmelsiek Date: 2020.12.16 15:33:11 -06'00'</small>	Date _____
Assigned RSO	Madelyn Schoell, UID:maddiew <small>Digitally signed by Madelyn Schoell, UID:maddiew Date: 2020.12.16 11:50:04 -06'00'</small>	Date <u>12/16/20</u>
AD Division Head	Michael Lindgren, UID:mlindgre <small>Digitally signed by Michael Lindgren, UID:mlindgre Date: 2020.12.16 15:44:38 -06'00'</small>	Date <u>12/16/20</u>

Operator Signatures

Crew Chiefs

Crew B

Crew D

Crew A

Crew C

Crew E

Other

Running Condition FAST

December 16, 2020

Area RSO

Sue McGimpsey

Mode of Operation 55 MeV electrons to low LEA; Up to 300 MeV electrons to HEA.

Beam Limits	Beam Energy	ASE Limit	Operating Limit
	55 MeV	1.96E19 electrons/hr	1.96E17 electrons/hr
	300 MeV	1.96E19 electrons/hr	3.37E18 electrons/hr

Critical Devices N:LGXBS1 and N:LGXBS2

Enclosures Protected FAST/IOTA

Preferred Monitoring Devices* 55 MeV electrons to the LEA is monitored via N:T124, 300 MeV electrons to the HEA is monitored via N:T612

*Other methods of monitoring intensity may be used.

Requirements

Access Devices None

Cool Off Period None

Special Interlocks The CDC Inputs including failure mode devices may all be found on the Safety System Status pages.

Special Concerns Any work performed on critical devices or obtaining a critical device key requires prior RSO approval.

Gates, Fencing and Passive Shielding Requirements There is no access to radiologically fenced areas without prior RSO approval.
Shielding, fencing and posting are in accordance with the shielding assessment for the Advanced Superconducting Test Accelerator (ASTA) (December 2014) and the shielding assessment for the IOTA/FAST Electron Injector at 300 MeV (August 2017).

Assigned RSO approval also signifies that all necessary Interlock Tests have been completed and Removable Shielding is installed.

Ops. Dept. Head Approval Todd Sullivan
Digitally signed by Todd Sullivan
Date: 2020.12.16 12:01:50 -06'00'

Assigned RSO Approval Madelyn Schoell
Digitally signed by Madelyn Schoell, UID:maddiew
Date: 2020.12.16 11:51:44 -06'00'

Sys. Dept. Head Approval Daniel Broemmelsiek
Digitally signed by Daniel Broemmelsiek, UID:broemmel
Date: 2020.12.16 15:34:38 -06'00'

AD Head Approval Michael Lindgren
Digitally signed by Michael Lindgren, UID:mlindgre
Date: 2020.12.16 15:47:21 -06'00'

December 16, 2020

Area RSO

Sue McGimpsey

Operational Comments

MCR must be appropriately staffed according to the Accelerator Safety Envelope.

If beam power remains below 8 watts, FAST is permitted to go into Supervised Access without a radiation survey. Contact RSO/RCT if beam power goes above 8 watts to perform a new radiation survey prior to going into Supervised Access.

Running Condition FAST

December 16, 2020
Sue McGimpsey

Area RSO

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other

Running Condition IOTA

December 16, 2020

Area RSO

Sue McGimpsey

Mode of Operation 150 MeV electrons to IOTA

Beam Limits	Beam Energy	ASE Limit	Operating Limit
	150 MeV injection	1.96E19 electrons/hr	3.60E13 electrons/hr
	150 MeV circulating	n/a*	2.00E10 electrons

*ASE limit is based on injection

Critical Devices N:LGXBS1 and N:LGXBS2

Enclosures Protected FAST/IOTA

Preferred Monitoring Devices* Injected beam is monitored via the Wall Current Monitor (WCM) (N:IBEAMW), and circulating beam is monitored via the DCCT (N:IBEAM)

*Other methods of monitoring intensity may be used.

Requirements

Access Devices None

Cool Off Period None

Special Interlocks The CDC Inputs including failure mode devices may all be found on the Safety System Status pages.

Special Concerns Any work performed on critical devices or obtaining a critical device key requires prior RSO approval.

Gates, Fencing and Passive Shielding Requirements There is no access to radiologically fenced areas without prior RSO approval.
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Sys. Dept. Head Approval Todd Sullivan
Digitally signed by Todd Sullivan
Date: 2020.12.16 12:03:04 -08'00'

Sys. Dept. Head Approval Daniel Broemmelsiek
Digitally signed by Daniel Broemmelsiek,
UID:broemmel
Date: 2020.12.16 15:34:08 -06'00'

Assigned RSO Approval Madelyn Schoell
Digitally signed by Madelyn Schoell,
UID:maddiew
Date: 2020.12.16 11:51:10 -06'00'

AD Head Approval Michael Lindgren
Digitally signed by Michael Lindgren,
UID:mlindgre
Date: 2020.12.16 15:45:35 -06'00'

Operational Comments

MCR must be appropriately staffed according to the Accelerator Safety Envelope.

If beam power remains below 8 watts, FAST is permitted to go into Supervised Access without a radiation survey. Contact RSO/RCT if beam power goes above 8 watts to perform a new radiation survey prior to going into Supervised Access.

Running Condition IOTA

December 16, 2020

Area RSO

Sue McGimpsey

Operator Signatures

Crew Chiefs

Crew A

Crew B

Crew C

Crew D

Crew E

Other