U.S. MAGNET DEVELOPMENT PROGRAM

Training reduction milestones and status

MDP Meeting

September 14, 2022

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US Magnet Development Program

Updated milestones

Milestone #	Description	Target	Status *	Updated Target	Requestor	Comments
AIIIe-M1	Commissioning of QCD	May-21	Done		S. Stoynev	
AIIIe-M2	First Ultrasound based test	May-21	Not started	Dec-23	S. Stoynev	We cannot secure the desired ultrasound-machine and will hav another solution, this may/will have to be integrated with "vibr methods" (see later milestones)
AIIIe-M3	First high-Cp cable fabrication	Sep-21	Not started	n/a	E. Barzi	Target dates cannot be provided without allocated resources
AIIIe-M4	First magnet test with QCD	Sep-21	Done		S. Stoynev	
AIIIe-M5	Results from High-Cp cable studies	Dec-21	In progress	n/a	E. Barzi	Target dates cannot be provided without allocated resources
AIIIe-M6	Optimized strand and cable FEM simulations	Dec-21	Not started	n/a	E. Barzi	Target dates cannot be provided without allocated resources
AIIIe-M7	First CCT test with QCD	Feb-22	Not started	Apr-23	S. Stoynev	Delay caused by earlier QCD delays and test stand availability
AIIIe-M8	High-Cp wire and tape optimized versions	May-22	Obsolete		S. Stoynev	We are splitting this milestone
AIIIe-M8a	High-Cp wire optimized versions	May-22	In progress	Jun-23	X. Xu	Delay due to COVID-related factors
AIIIe-M8b	High-Cp tape optimized versions	May-22	In progress	n/a	E. Barzi	Target dates cannot be provided without allocated resources
AIIIe-M9	Fabrication of first coil with High-Cp conductor	Sep-22	Not started	n/a	X. Xu	Schedule is hard to predict as it involves many efforts from coil cabling, coil fabrication, etc.
AIIIe-M10	Design of a dedicated device/technique using vibrational methods	Sep-22	Not started	Sep-23	S. Stoynev	Lack of support shifts the focus
AIIIe-M11	Design of a “cable/stack” testing device and samples	Jan-23	Not started	Jun-23	S. Stoynev	General delay (other tasks)
AIIIe-M12	QCD preparations and test on a large magnet	Feb-23	Not started	n/a	S. Stoynev	This depends on AUP willingness to use QCD, it is not given
AIIIe-M13	Fabrication of a “cable/stack” testing device	Sep-23	Not started	Apr-24	S. Stoynev	General delay (other tasks)

QCD

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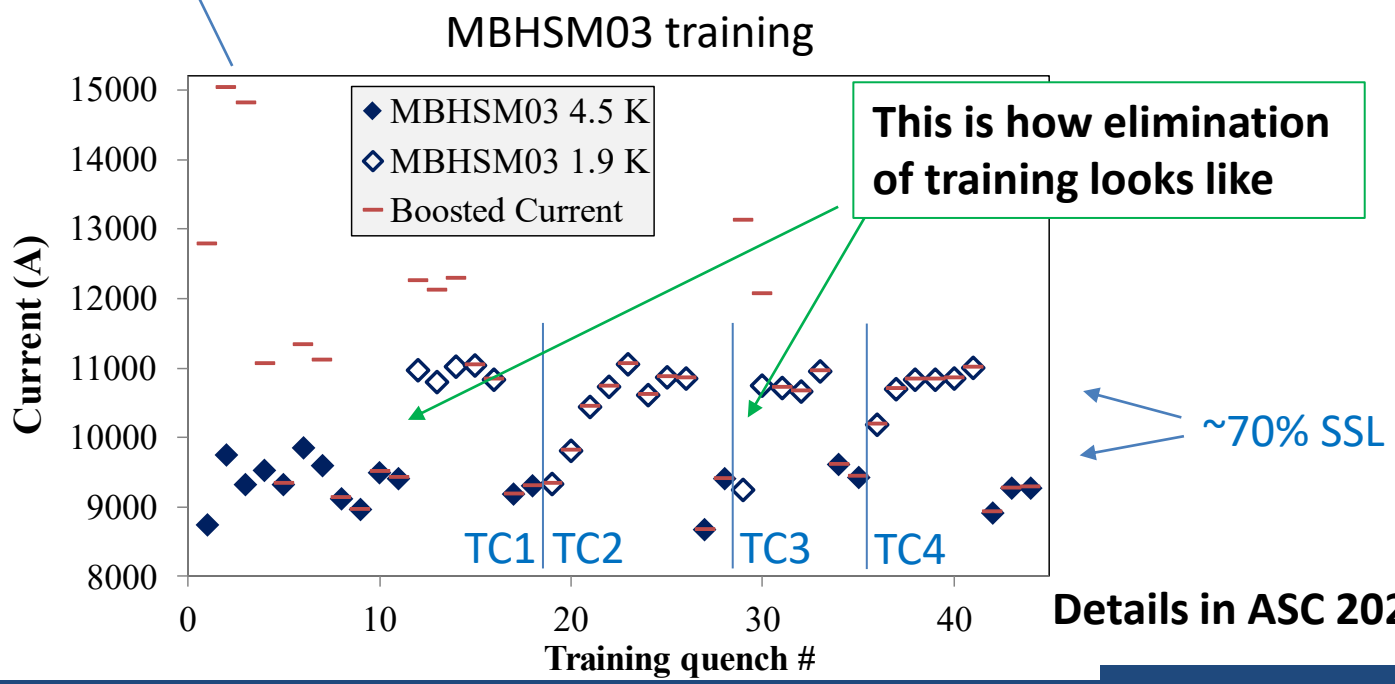
QCD was commissioned and tested, results presented.

The red lines indicate QCD "boosted" current
(QCD was used if the line is above the data point)



Details in ASC 2022

While we will test at opportunity with other magnets assembled at FNAL, the goal was to test a CCT with QCD (in fact, ANY of LBNL CCTs is fine; we'll test at 1.9 K at FNAL). We can't plan this without LBNL, so if at any point LBNL is able to send a magnet to FNAL we'll try to schedule it for testing ASAP.
My preliminary informal conversations did not produce a timeline.

Test on a large magnet is hypothetical at this point.

Vibrational methods for quench studies

AIIIe-M2	First Ultrasound based test	May-21	Not started	Dec-23	S. Stoynev	We cannot secure the desired ultrasound-machine and will hav another solution, this may/will have to be integrated with "vibr methods" (see later milestones)
AIIIe-M10	Design of a dedicated device/technique using vibrational methods	Sep-22	Not started	Sep-23	S. Stoynev	Lack of support shifts the focus

Except for “my time” no resources were spent on any of the above in the last couple of years.
The topic was presented in detail at MDP. There is no stated or offered support, no priority.
https://conferences.lbl.gov/event/515/

It is not clear how or when efforts along the above targets can be spent along other project and R&D efforts but a year is in principle enough to get to “design”.
I expect we at least have some additional documentation prepared (by me) soon, we may start working on small scale experiments regarding friction dependencies on vibration in n-stacks/cable/interfaces.

Note: there will be no LDRDs awarded at FNAL in FY23 or at least there will be a significant delay;
I was hoping we could secure this source of funding

Cable/stack sample testing for quench R&D

AIIIe-M11	Design of a "cable/stack" testing device and samples	Jan-23	Not started	Jun-23	S. Stoynev	General delay (other tasks)
AIIIe-M13	Fabrication of a "cable/stack" testing device	Sep-23	Not started	Apr-24	S. Stoynev	General delay (other tasks)

This is slipping as we speak. Snowmass did not produce any additional emphasis or traction on the need for quench R&D based on fast, simpler, inexpensive, large(r) statistics testing.
European efforts in that direction ("BOX") did not change minds here either.
If there is no support, we will of course not do much along this target.

A four-page R&D proposal + refs was sent to MDP management in January 2020

Proposed FY Budgets (add lines to the table as needed; target 1 page max):

		Personnel (h)	M&S (k$)/y
FY21		**400 (e), 560 (t), 70 (s)**	**50**
FY22		**120 (e), 500 (t), 300 (s)**	**55**
FY23		**80 (e), 320 (t), 330 (s)**	**45**
Total		**600 (e), 1380 (t), 700 (s)**	**150**

M&S: Material and Supplies (do not include overhead)

The first target is "design" studies along the line of "n-stack sample in separately controllable magnetic and force fields". There are different options, and it is mostly engineering work to refine choices. It is not clear who or when may be available but if we are to keep the milestone unchanged it is time to start working on this issue.

It is likely that the "design" will link "fabrication" to existing or forthcoming facilities. In that case, the end date also may be linked to development of this facility (like HFVMTF at FNAL). Before "design" is in advanced stage it doesn't make much sense to elaborate on "fabrication" or fixed deadline – it may involve different types of work. Simplest approaches using previous know-how may just need 6 to 12 months to complete.