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### **MAGIS-100 Camera Schedule**

Linda Valerio 27 October 2021

## **Schedule overview**

#### Quarterly overview of baseline schedule for Fermilab activities (anticipated after Aug 2021 BCR):

				Accelerator Shutdown	n			Accelerator Shutdown	1				
FY20	FY21			(technicians scarce)	FY22			(technicians scarce)	FY23				
July-Sept 20	Oct-Dec 20	Jan-March 21	April-June 21	July-Sept 21	Oct-Dec 21	Jan-March 22	April-June 22	July-Sept 22	Oct-Dec 22	Jan-March 23			
										Shaft Phase 1			
Design				Design/Procure			Modular Assembl	Installation					
						Civil Construction	-			Shaft Phase 2			
				Civil Construction	contracts prepared	Laser Room	Civil Construction	- Shaft		Installation			
							Laser Installation						

#### Baseline schedule anticipated after August 2021 baseline change request.



### **Camera schedule**

Act	tivity	D	Activity Name	Start	Finish
6	-	MAGIS100-WS-2	109.08 Camera System	02-Jan-19 A	19-Sep-22
	-	MAGIS100-WS	S-2109.08.01 Science cameras	01-Sep-20 A	16-Aug-22
		A1501010	Science camera design	01-Sep-20 A	01-Nov-21
		A1501020	Science camera procurement	02-Nov-21	08-Feb-22
		A1501030	Science camera qualification	09-Feb-22	16-Aug-22
	-	MAGIS100-WS	S-2109.08.02 Diagnostic Cameras	02-Jan-19 A	16-Sep-22
		A1502010	Diagnostic camera design	02-Jan-19 A	15-Oct-21
		A1502020	Diagnostic camera procurement	18-0ct-21	13-Dec-21
		A1502030	Diagnostic camera qualification	14-Dec-21	16-Sep-22
	-	MAGIS100-WS	S-2109.08.03 Equipment transport	19-Sep-22	19-Sep-22
		A1503020	Diagnostic cameras shipped - milestone	19-Sep-22	

Schedule from September 2021.

Science cameras are sent to Stanford for integration into atom source connection nodes. Diagnostic cameras are sent directly to Fermilab for installation in modular connection nodes.

Original date for science camera procurement is next week – more time may be acceptable as shown in the following slides.

**‡** Fermilab

# **Connection Node schedule**

ctivity	y I	D	Activity Name	Start	Finish 🗸	
-	1	MAGIS100-WS-2	109.05 Connection Node	01-Oct-19 A	04-Oct-22	
E	-	MAGIS100-WS	S-2109.05.01 Prototype	01-Oct-19 A	06-Jun-22	
		A0501010	Connection Node Prototype Design	01-Oct-19 A	30-Jul-21 A	
		A0501020	Connection Node Prototype Procurement	02-Aug-21	01-Dec-21	
		A0501030	Assembly 30% complete - milestone		04-Feb-22	
		A0501040	Assembly 60% complete - milestone		05-Apr-22	
	ľ	A0501000	Connection Node Prototype Assembly Progress (monthly report	02-Dec-21	06-Jun-22	
		A0501050	Assembly 100% complete - milestone		06-Jun-22	
E	-	MAGIS100-WS	S-2109.05.02 Lattice and in-vacuum optics	06-Feb-20 A	08-Jul-22	
	ſ	A1802320	Lattice and In-vacuum optics design complete		01-Nov-21	
		A0502010	Lattice and in-vacuum optics Design	06-Feb-20 A	01-Nov-21	
		A0502020	Lattice and in-vacuum optics Procurement	09-Nov-21	11-Jan-22	
		A0502030	Lattice and in-vacuum optics Assembly	12-Jan-22	08-Jul-22	
E	-	MAGIS100-WS	S-2109.05.03 Cameras system Integration	17-Aug-22	16-Sep-22	
		A0503030	Align cameras in connection node enclosure	17-Aug-22	16-Sep-22	
E		MAGIS100-WS	S-2109.05.04 Correction coils for gaps at atom sources	02-Oct-19 A	09-Aug-22	
		A0504010	Correction coils for gaps at atom sources - Design	02-Oct-19 A	01-Nov-21	
		A0504020	Correction coils for gaps at atom sources - Procurement	02-Nov-21	01-Dec-21	
		A0504030	Correction coils for gaps at atom sources - Assembly	11-Jul-22	09-Aug-22	
E	-	MAGIS100-WS	S-2109.05.05 Enclosure	01-Oct-19 A	07-Dec-21	
		A1802140	Connection Node Enclosure design complete		29-Oct-21	
		A0505010	Enclosure Design	01-Oct-19 A	29-Oct-21	
		A0505020	Enclosure Procurement	03-Nov-21	07-Dec-21	
E	-	MAGIS100-WS	S-2109.05.06 Connection node integration	17-Aug-22	15-Sep-22	
		A0506030	Connection node 3 integration	17-Aug-22	15-Sep-22	
		A0506020	Connection node 2 integration	17-Aug-22	15-Sep-22	
		A0506010	Connection node 1 integration	17-Aug-22	15-Sep-22	N
E		MAGIS100-WS	S-2109.05.07 Qualification	19-Sep-22	03-Oct-22	$\langle \ \rangle$
		A0507030	Connection node 3 qualification	19-Sep-22	03-Oct-22	
		A0507020	Connection node 2 qualification	19-Sep-22	03-Oct-22	
		A0507010	Connection node 1 qualification	19-Sep-22	03-Oct-22	
E		MAGIS100-WS	S-2109.05.08 Equipment transport	04-Oct-22	04-Oct-22	
		A0508010	Connection node 1 shipped - milestone	04-Oct-22		
		A0508020	Connection node 2 shipped - milestone	04-Oct-22		
		A0508030	Connection node 3 shipped - milestone	04-Oct-22		

Schedule from September 2021.

Science cameras are integrated into atom source connection nodes before being shipped to Fermilab.



## Schedule delays indicate more time

#### Mid-level view of MAGIS-100 schedule (September 2021):

									Accelerato	r Shutdown (te	echnicians scare	ce)							
Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23
																			С
Atom Source Design/Procurement Atom Source Assembly/Qu																Atom Source	es Prep/Install	Install Fibers	<b>o</b>
							Install Science Cameras at										м		
Connection	Node Design/	Procurement	Connection	Node Assem	bly/Qualificati	on				St	anford								м
													Sections and		1				
Vacuum Tube Procurement/Processing								Assembly of Modular Sections								n Nodes Install		s	
															Install	s			
Magnetic Systems Design/Procurement									Couplers										
																			0

Schedule from September 2021.

The schedule is always shifting, so the gap may disappear or be needed for other purposes. Any proposed delay for science camera delivery to Stanford must be approved. NING START

#### Complete Schedule View Mid-level map view of MAGIS-100 schedule (September 2021):

		Accelerator Shutdown (technicians scarce)																		
WBS levels	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23
2, 16, 17	Atom Source	Design/Proce	ure	Atom Sourc	e Assembly/C	ualification											Atom Sour	rces Prep/Install	Install Fibers	C o
F 0 1C 17	Comparties N	ada Dasian //		Composition	N						ice Cameras at								м	
5, 8, 16, 17	Connection Node Design/Procure Connection Node Assembly/Qualification Science										Sta	anford					-			м
8, 16, 17	Cameras Design Procure Science Camera Qualification										To Stanford									s
12 16 17																				S
12, 16, 17	Assembly Fix	Procure									- 1									
9, 12, 16, 17	Vacuum Tube	Procure/Fin	al Chamber De	esign/Processi	ng											0				
0 12 16 17	Vacuum Syste	ame Design	Procure													N				
9, 12, 16, 17		ents Design	Procure							1		Assembly of M	iouular Section	115					Install	N
6, 16, 17	Magnetic Sys					Procure				Couplers										
10, 16, 17	DAQ for Modular Assembly Sensors Procure DAQ Sensors Qualification																		s	
10, 10, 17																			т	
11, 16, 17	Modular Infra	structure De	sign		Procure								1						Lundon II	A
8, 16, 17	Diagnostic Ca	meras Desig	n/Procure	Diagnostic (	Camera Qualif	ication											Modula	r Sections and	Install Cameras	R
		Diagnostic Cameras Design/Procure Diagnostic Camera Qualification															Connectio	on Nodes Install	Install	s
7, 16, 17	Retroreflectiv	e Mirror Pro	curement	Retroreflect	ive Mirror As	sembly/Qualifi	cation	-									-		Mirror	-
11, 16, 17	Secondary Cra	ane Design	Procure				Install Crane													
									Assembly/											
12, 16, 17	Installation F	ixture Design	1			Procure			Qualification								-			-
11, 16, 17	Connections t	o Walls of Sl	naft Designs (F	FESS)	Civil Constru	uction Bid Proc	ess													
			Designs to																	
11, 16, 17	Adjustable Su Platform Stat		BESS ↑ Designs to	Procure													-			-
11, 16, 17	Design		FESS ↑	Procure						Install Structural Systems										
11 16 17	Mobile Work	Platform	Designs to																	
11, 16, 17	Design		FESS ↑	Procure										Install			-			-
12, 16, 17	Electrical Des	igns*	_		Procure								-	Cables						
10, 16, 17	DAQ Computing	Brocuro	DAO and Er	ont End Desigr	Qualification														Install DAQ	
10, 10, 17	Controls and		DAQ and Th	one End Design	rquanneation		Controls and	d Networking	Install											
13, 16, 17	Design		Procure				Qualit	fication	Controls											-
3, 16, 17	Interferomet	v Laser Syste	ems Assembly	/Qualification																
-,,	Laser Room								Laser											
11, 16, 17	Design Civil Construction Bid Process							System											-	
12, 16, 17	Compressed Air Design* Procure Laser Room Construction								Installation											
12, 16, 17	Interlocks Final Design/Procure*								LTS											
11, 16, 17									Assembly	LTS Install										
	Frequency Co	mb System													Install					
4, 16, 17	Design/Procu Water	re	Frequency C	Lomb System A	Assembly/Inte	gration/Qualif	Ication								Comb					
12, 16, 17	Design*	Procure				Install Wate	r													

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\*BCR developing