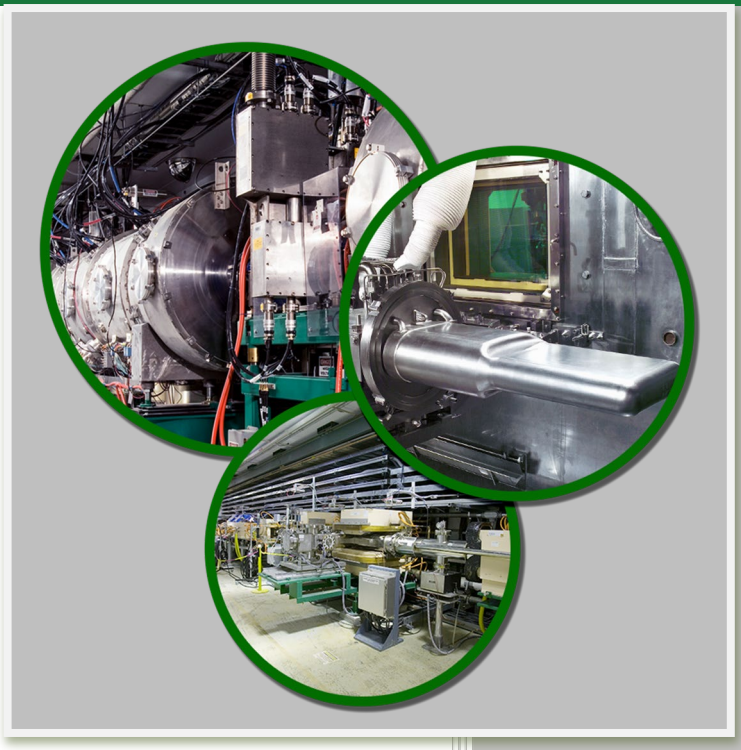
PPUP-200-IC0001, R00

PROTON POWER UPGRADE (PPU) PROJECT

Interface Control Document for 2.3 Cryomodule Integration at Jefferson Lab



January 2019

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MANAGED BY UT-BATTELLE FOR THE US DEPARTMENT OF ENERGY

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under contract DE-AC05-00OR22

DOCUMENT TITLE		DOC. NO.
Proton Power Upgrade Interface Control Document 2.3 Cryomodule Integration at Jefferson Lab		PPUP-200-IC0001, R00
LABORATORY	**DIVISION / GROUP**	**ISSUE DATE**
ORNL/NScD/SNS	RAD	January 3, 2019
Prepared by: **Stephen Stewart**	S. Stewart 2019.01.03 10:43:51 -05'00'	

	SIGNATURE / DATE					
	REV. 0	**Date**	**REV. 1**	**Date**	**REV. 2**	**Date**
PPU Project Manager	*Mark Champion* Mark Champion Digitally signed by Mark Champion Date: 2019.01.14 16:03:42 -05'00'					
PPU 2	*Matt Howell* 2019.01.03 15:19:24 -05'00'					
PPU 2.2	*John Mammosser* John Mammosser Digitally signed by John Mammosser Date: 2019.01.04 10:16:06 -05'00'					
PPU 2.3	*Ed Daly*					
PPU 2.5	*Chris Stone* Digitally signed by Chris Stone Date: 2019.01.14 09:53:42 -05'00'					
PPU 2.6	*Jeff Saunders* Jeff Saunders Digitally signed by Jeff Saunders Date: 2019.01.11 14:29:12 -05'00'					
PPU 2.7	*Karen White* Karen S. White Digitally signed by Karen S. White Date: 2019.01.24 14:08:42 -05'00'					
QA	*Bryan Robertson* Bryan Robertson 2019.01.14 09:56:22 -05'00'					

REV. NO.	REVISION DESCRIPTION
0	Initial release

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1 Acronyms

Acronym	Definition
SNS	Spallation Neutron Source
Jlab	Jefferson Lab
PPU	Proton Power Upgrade
LINAC	SNS linear accelerator

2 Purpose

This document describes the interfaces and responsibilities between SNS and JLab for the purpose of fabrication of PPU cryomodules.

3 Scope

The PPU requires that 7 new High Beta Cryomodules are to be assembled, tested, and installed in the LINAC. This document covers the interface requirements related to the following topical areas where work at JLab and SNS interfaces need to be defined:

- Insulating Vacuum
- Beamline Vacuum
- Coupler Waveguide Transition
- HTA Testing, Cavity
- Coupler and Cavity procurement
- Coupler assembly, testing, and Shipping
- Completed Cryomodule shipping and testing
- Cryomodule Controls

4 Technical, Cost, and Schedule Baselines

The interface diagram shown in Figure 1 details WBS elements that interface with JLab.

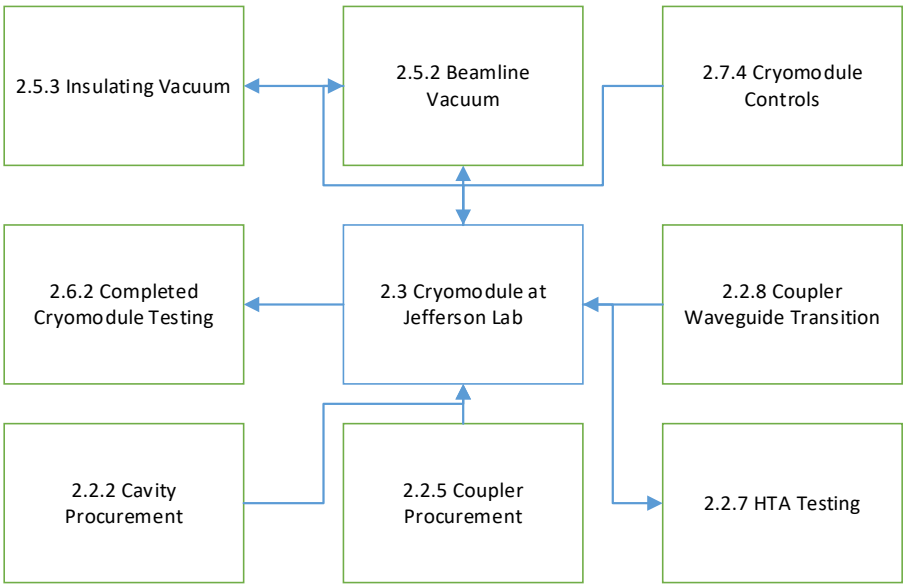

Figure 1. SCL PPU interface diagram

5 Responsibilities

5.1 2.2.2 Cavity Procurement

This WBS element includes procurement labor and cost for 30 new cavities, material scanning contract for raw niobium sheets, travel to vendors facilities, procurement of cavity shipping boxes, cavity vertical test hardware, and travel to the partner lab facilities to witness process qualification This also includes the vertical testing of 3 “Reference HB Cavities” both at 2.3 JLab for the qualification and at the vendor for setup and process qualification. Any reprocessing of cavities will be done at JLab but paid for in 2.2.4 Cavity Reprocessing.

5.2 2.2.5 Coupler Procurement

The coupler acquisition WBS will be performed by SNS and includes the procurement and qualification of 30 new power coupler assemblies, procurement of coupler tooling and instrumentation, and misc. vacuum equipment. These components will be shipped by the vendor to SNS to be assembled, baked, RF qualified, and shipped to 2.3 JLab. SNS will ship waveguide assembled couplers (pairs) under 2 psig nitrogen pressure to 2.3 JLab with CCG’s, viewport, and electron probe installed. The waveguides will be mounted on coupler cleanroom carts. SNS will ship heaters, magnets, and clixon to 2.3 JLab for installation at JLab.

5.3 2.2.7 HTA Testing

Horizontal testing of a cavity provides the most detailed information for a cavity before it is installed in a cryomodule. This testing truly characterizes end group performance because the end groups are not submerged in liquid helium as they are in the VTA. However, the setup of the HTA is considerably longer than the VTA. Therefore, only one of the first article cavities will be tested in the HTA. Selected cavities may be identified for HTA testing based on VTA qualification data. It is assumed for the baseline plan that a total of three HTA tests will be performed. 2.3 JLab is responsible for dressing the cavity with a helium vessel. JLab will be responsible for packaging cavities for shipment after VTA test. SNS is responsible for providing shipping crate and instructions for packaging. At SNS the RF coupler will be assembled to the cavity for the integrated test. 2.2.7 covers integrating the dressed cavity in the HTA, performing

the RF tests, and capturing and analyzing the data for these tests. This work will be performed at SNS. SNS will be responsible for all shipping charges and shipment back to 2.3 JLab. SNS to install couplers for HTA testing.

5.4 2.2.8 Coupler Waveguide Transition

This element includes design, procurement, and installation of the twenty-eight RF coupler waveguide transitions. SNS is responsible for all air side coupler components which includes the waveguide brackets, outer conductor extension, doorknob, terminal waveguide, inner conductor extension, gas barrier, and the flexible waveguide piece.

5.5 2.5.2 Beamline Vacuum

The scope of this element is design, procurement and installation of all necessary hardware for the beamline vacuum system. This includes ion pump controllers, fast valves controls, compressed air line to valves, and ion gauge controllers.

The interface is at the Soft Shut warm valves on each side of the cryomodule as seen in Figure 2. 2.3 JLab owns the Soft Shut valves and everything in the cryomodule including the ion pump. SNS owns warm section between the cryomodules.

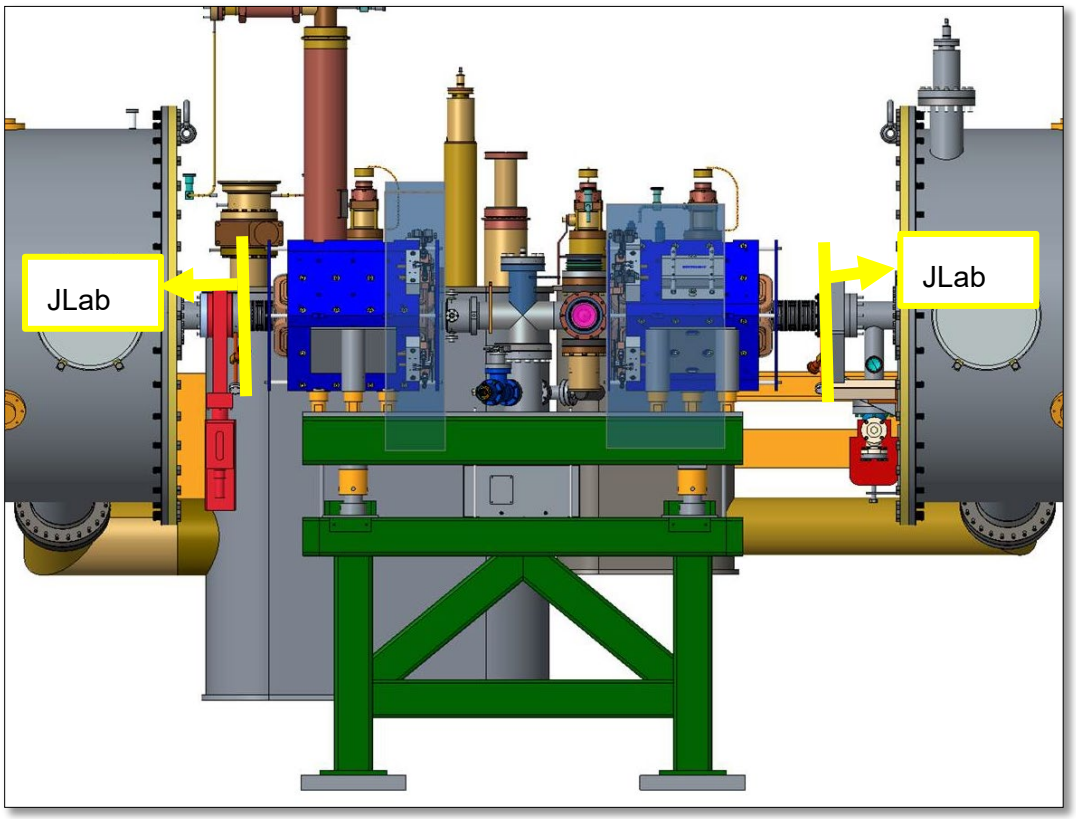

Figure 2. PPU cryomodule beamline configuration.

5.6 2.5.3 Insulating Vacuum

The scope of this WBS element includes the design, procurement, and installation of the insulating vacuum system for cryomodules in the tunnel. This system will keep the insulating

vacuum below 1x10^-4 torr during operation in the event the cryomodule leaks. The interface is at the insulating vacuum gate valve as seen in Figure 3. 2.3 JLab owns the valve and everything on the cryomodule side. SNS owns all other insulating vacuum components in the LINAC and Klystron gallery.

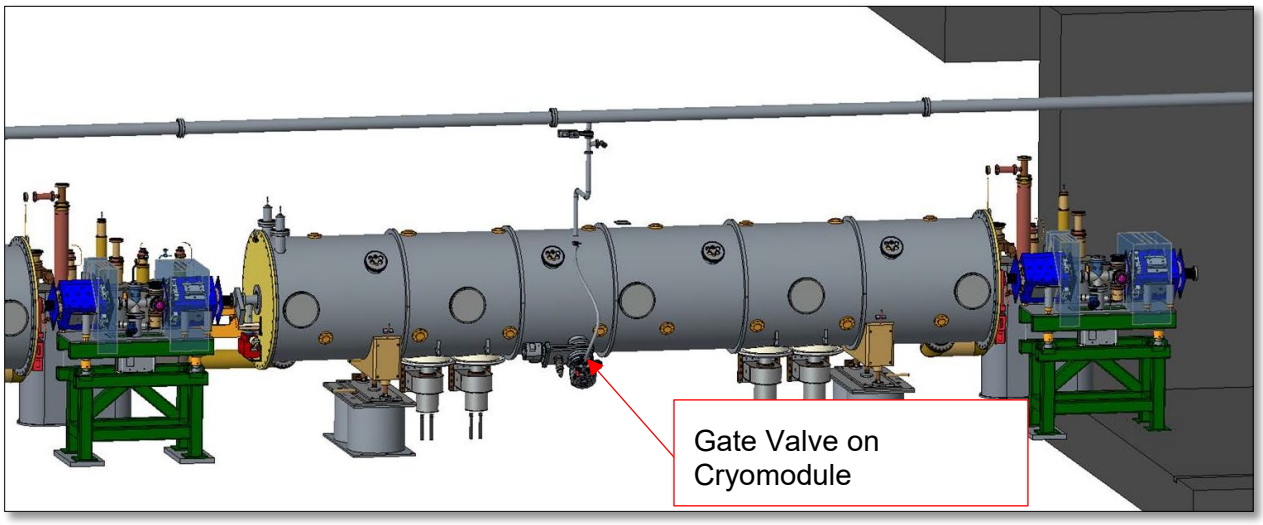

Fig. 3. PPU cryomodule insulating vacuum configuration.

5.7 2.6.2 Completed Cryomodule Testing

The scope of the completed cryomodule testing is to test and qualify the cryomodule in the RFTF test cave for installation in the tunnel. All associated installation of the cryomodule in the test cave along with instrument check out are part of the scope of this WBS element. The cavities in the cryomodule will each be tested individually. 2.3 JLab responsible for shipping cryomodules including modifications to existing shipping fixture or new shipping fixture. Delivery of first cryomodule will be the shipping test. SNS responsible receiving and moving into Test Cave.

5.8 2.7.4 Cryomodule Controls

All instrumentation inside the Cryomodule will be supplied by 2.3 JLab except for the 2.2 coupler instrumentation and the three pressure transmitters provided in 2.7 SCL Controls. 2.3 JLab will ship 30/30 gauge on helium circuits. 2.3 JLab procures primary JT, Secondary JT, and cooldown valve actuators. SNS procures shield supply and RT actuators.

6 Reference Materials

- PPU-P02-SW0001 PPU Cryomodule Design