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Memo

Date: March 28, 2022

To: Russell Feder

From: Jim Mills (Review Chair)

Subject: sPHENIX beam pipe support and installation FDR

A Final Design Review addressing tools and procedures for installation and support of the sPHENIX aluminum-beryllium beam pipe will be held on Wed, March 30th starting at 9 AM via a ZOOM. The Zoom link is provided on the INDICO page.

The sPHENIX beam pipe is fragile and valuable and a lot of care has been taken to ensure the pipe can be handled, installed and supported safely. The pipe is initially installed using the INTT support structure. Vacuum conditioning baking then takes place before INTT and MVTX detectors can be installed. There are multiple steps requiring changing configurations of pipe supports. Stiffening “strong back” supports have been designed to protect the beam pipe during handling in the BNL NEG coating facility and when the beam pipe is initially carried into the sPHENIX IR and inserted through the INTT support tube. This review will also cover the design and purchase of the beam pipe bake jackets and the configuration of the rest of the conventional vacuum pipe line.

[Beam pipe install and supports FDR \(30 March 2022\) · Indico \(bnl.gov\)](#)

Design Review Panel

Russ Feder (Chair) – BNL sPHENIX construction manager
Jim Mills – sPHENIX Project Engineer and mechanical engineering
John Haggerty – sPHENIX physics and integration
Rahul Sharma – STAR detector, Mechanical engineering and integration
Jason Bessuille – MVTX detector, mechanical engineering and integration
Walter Sondheim – MVTX detector, mechanical engineering and integration
Cameron Dean – MVTX detector, physics
Dan Cacace – INTT detector, mechanical engineering and integration
Rich Ruggiero – sPHENIX design and integration
Lori Stiegler – sPHENIX safety

There have been several other sPHENIX beam pipe reviews. Below is a list with associated INDICO links of the three most recent:

1. ESRC review of the sPHENIX beam pipe and MBD detector: [ESRC Review of sPHENIX Minimum Bias Detector and Beam Pipe \(18 October 2021\) · Indico \(bnl.gov\)](#)

2. sPHENIX Beam Pipe integration and support PDR: [Beam Pipe Integration and Support PDR \(7 September 2021\) · Indico \(bnl.gov\)](#)
3. sPHENIX Beam Pipe PRR: [sPHENIX Beam Pipe Production Readiness Review \(PRR\) \(15 May 2020\) · Indico \(bnl.gov\)](#)

The general questions to be addressed at this review are:

1. Scope and Requirements – Are the requirements for the presented scope appropriate and well understood by the design team? Has all the required scope been addressed?
2. Engineering and Design – Are the mechanical and structural designs appropriate to meet the requirements and are they mature enough to proceed to fabrication and construction? Are there any ongoing design related questions that have yet to be addressed?
3. Interfaces – Are the main interfaces identified and defined in a released and controlled sPHENIX Interface Control Document?
4. Quality and Acceptance – Are Q/A requirements for major components of this subsystem documented properly? Are they reasonable? Is testing and acceptance criteria been documented in the specification or statement of work and is it reasonable for the complexity, cost, and schedule impact the subsystem has to the overall sPHENIX project plan?
5. Have all recommendations from prior reviews been addressed and acceptably closed out?
6. Are there any open safety related issues that have been generated as part of the design? How will these be mitigated?

Specific topics to be covered at this final design review are:

1. Beam pipe installation and handling
 - a. Are there final designs of components in place to protect the aluminum-beryllium pipe whenever it is being moved or handled?
 - b. Is the installation choreography well thought out and does it capture all obstacles and other handling risks?
2. Beam pipe supports
 - a. Have beam pipe supports been designed to address all of the installation steps?
 - b. Are all of the beam pipe supports correctly integrated with surrounding detectors and other structures?
 - c. Do the supports interface with the beam pipe correctly?
 - d. Do the beam pipe supports minimize deflection adequately?
3. Beam pipe bake
 - a. Has the vacuum conditioning bake of the sPHENIX aluminum-beryllium beam pipe and conventional pipe beam line been properly planned? Have the needed custom bake jackets been designed?
 - b. Have interfaces with the bake blankets been included in the design of the beam pipe supports and other components?
 - c. Has there been adequate thermal modeling to predict beam pipe temperature and the temperature of surrounding structures and components?

General conduct of sPHENIX FDR's is described in

<https://docdb.sphenix.bnl.gov/cgi-bin/private/ShowDocument?docid=207>