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Associate Laboratory Director's Cost & Schedule Review of sPHENIX

April 9-11, 2019

Charge to the Review Committee

The sPHENIX detector will enable the study of the microscopic nature of the quark gluon plasma addressing the scientific questions prioritized in the 2015 NSAC Long Range Plan. sPHENIX will have an unprecedented combination of full coverage, high efficiency and high-resolution Upsilon spectroscopy that will enhance the physics reach afforded by the Relativistic Heavy Ion Collider (RHIC) complex prior to the possible construction of an Electron Ion Collider.

The sPHENIX detector is proposed as a major upgrade to the PHENIX detector and consists of 1) the sPHENIX MIE, 2) Infrastructure and Facility Upgrade Project, and 3) Tracking System Upgrades.

The sPHENIX MIE was granted CD-1/CD-3a approval from DOE in August 2018, with a project cost range of \$24.2-34.5M. The project is now exempt from DOE Order 413.3b¹ and is ready to request approval by the BNL Director of PD-2, Project Decision for Approval of the Project Baseline, and PD-3, Project Decision for Approval of Start of Production. The MIE includes project management, an outer tracking system with associated electronics, an electromagnetic and hadronic calorimeter with electronics, a data acquisition and trigger system plus a minimum bias detector. The MIE is additionally supported by BNL contributed labor that is redirected from RHIC Ops labor.

The Infrastructure and Facility Upgrade Project has a cost range of \$29.8-31.8M and includes BNL labor and M&S. The deliverables of the Infrastructure and Facility Upgrade Project include the magnet, the flux return steel, detector carriage/cradle and the cryogenics system.

The Tracking System Upgrades consist of a silicon strip detector provided as an in-kind contribution by RIKEN, and a vertex detector using state-of-the-art Monolithic Active Pixel Sensors. The tracking systems are ready for a "CD-1 equivalent" review.

The review panel is requested to answer the following questions for the sPHENIX MIE and the Infrastructure and Facility Upgrade Project:

1. Final Design: Is the final design technically mature, sound and likely to meet the performance expectations to support PD-2 and PD-3 approval?
2. Project scope: Is the scope of each project sufficiently defined to support approval of PD-2 and PD-3? Are the specifications, designs and execution plans likely to meet the technical

¹ Office of Science Memo dated August 2, 2018 exempting projects estimated to cost \$50M or less from the DOE Order 413.b project management requirements.

performance requirements? Are the interfaces with other projects properly understood and documented?

3. Risks: Are the project risks properly identified and appropriate mitigation strategies in place?
4. Management: Is there a capable team in place to effectively manage the two projects as defined in the approved baselines for each? Does the management team have the resources and management tools necessary for the size and complexity of this overall effort?
5. Cost and Schedule: Are the cost and schedule estimates for each project credible and adequately detailed to establish their respective baselines? Do they include adequate scope, cost and schedule contingency?
6. Environment, Safety & Health and Quality Assurance (ES&H/QA): Are the ES&H/QA aspects being properly addressed given the current state of the project?
7. Prerequisites: Have all the prerequisite activities and documents necessary to support PD-2 and PD-3 approval been completed? Is the project ready for a PD-2/PD-3 review?
8. Recommendations: Have the recommendations from past reviews been appropriately addressed?

The review panel is requested to answer the following questions for the sPHENIX Tracking System Upgrades:

1. Conceptual Design: Is the conceptual design sound and likely to meet the project's technical performance requirements most efficiently and effectively?
2. Project Scope: Are the project's scope and specifications sufficiently defined to support the preliminary cost and schedule estimates? Are the interfaces with the sPHENIX MIE project and the Infrastructure and Facility Upgrade Project properly understood and documented?
3. Risks: Are the project risks properly identified and appropriate mitigation strategies in place?
4. Cost and Schedule: Are the cost and schedule estimates credible and realistic for this stage of the project? Do they include adequate scope, cost, and schedule contingency?
5. Management: Is the project being properly managed at this stage? Is the documentation appropriate at this stage of the project?
6. ES&H: Is ES&H being properly addressed given the project's current stage of development?

The review will take place from Tuesday to Thursday, April 9-11, 2019 at BNL. A closeout will be presented to the sPHENIX team and the Laboratory prior to adjourning. A report should be submitted to my office by closeout of business on April 22, 2019.

I very much appreciate your willingness to lend your time and expertise to this important step in the sPHENIX review process and look forward to receiving your assessment.

Sincerely,



Berndt Mueller
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