

Overview and Presentation of Charge

Steve Holmes
AAC Meeting
November 16-17, 2009

Project X Update Since February Meeting

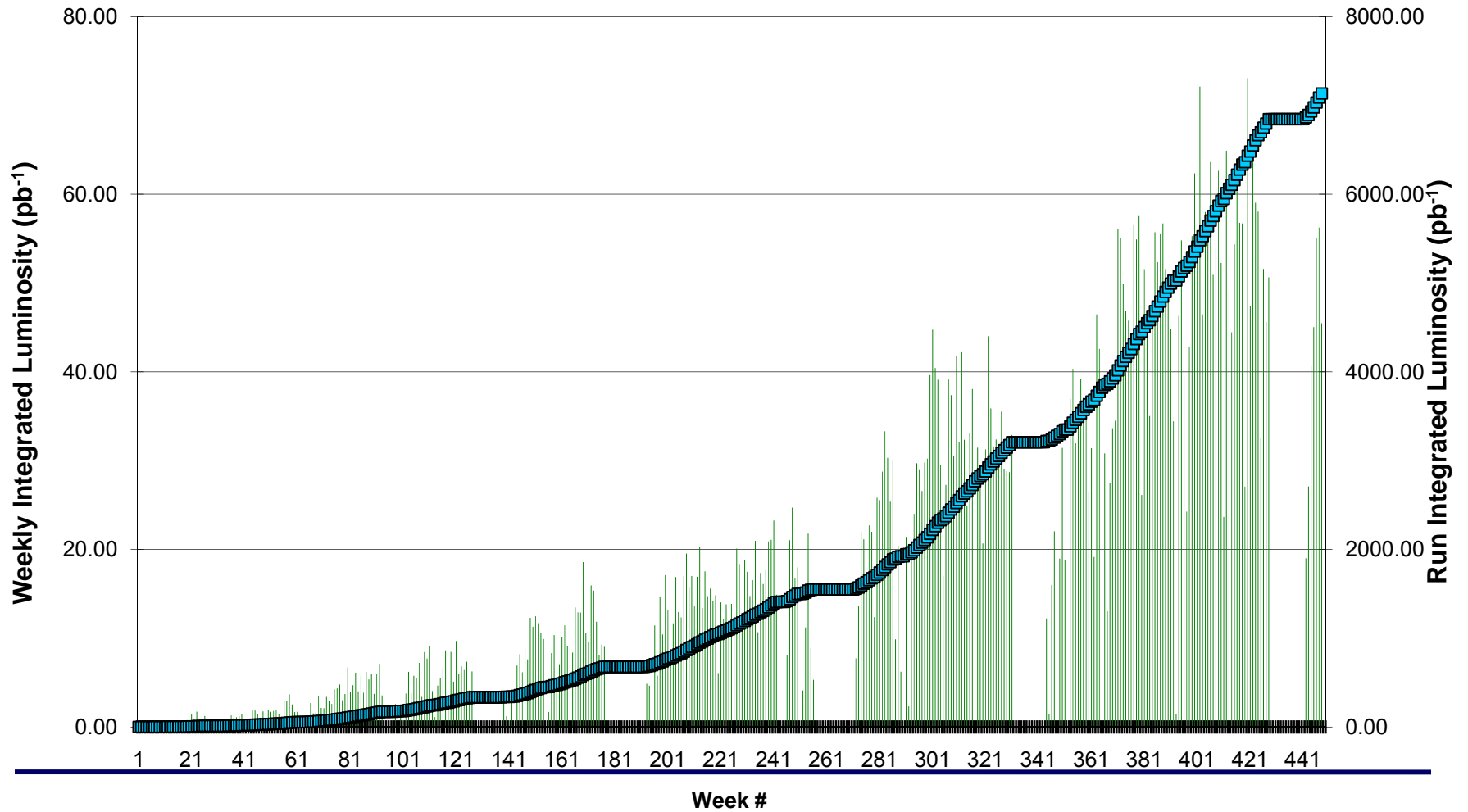
Run II



- FY2009 numbers
 - 1.9 fb⁻¹ delivered to CDF and D0
 - 6.9 fb⁻¹ total for Run II
- 11 week shutdown June-September, followed by October startup
 - Complete installation of new Booster Correctors
 - Construction of service buildings for gap clearing kickers
- **The current plan is to continue operations through 9/30/11**
 - (Year added since May meeting)
 - One more shutdown: 4-6 weeks in summer 2010
 - Most likely integrated luminosity through FY2011: 11.5 – 12.0 fb⁻¹

Project X Update Since February Meeting

Integrated Luminosity (through 11/1/09)



Weekly Integrated Luminosity Run Integrated Luminosity

Project X Update Since February Meeting

Neutrinos



- FY2009 numbers
 - 2.2×10^{20} protons to NuMI
 - 6.9×10^{20} protons total
 - Typical operations at 260 kW simultaneous with antiproton production
 - Design goal is 320 kW
 - Limited by losses during injection
 - » “Gap-clearing kicker” under construction for mitigation
 - 1.4×10^{20} protons to Booster Neutrino Beam (8 GeV) in FY2009
 - 13.4×10^{20} protons total
- The current plan is to continue operations until NO ν A starts up in FY2013
 - 700 kW design goal

Project X Update Since February Meeting LHC



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- U.S. contribution to the LHC Accelerator Upgrade (Phase 1)
 - Accelerator Project for Upgrade of LHC (APUL) formally established
 - CD-0 issued in October 2008
 - CD-1 Review scheduled week of January 25, 2010
 - LARP continues to support commissioning and development of technologies for future upgrades
 - Successful testing of 1m Nb₃Sn magnets; 4 m is imminent
 - Support for LHC hardware commissioning, preparations for beam commissioning
 - Fermilab is providing significant assistance to CERN as they restart the accelerator over the next several months.



- Energy Frontier
 - Tevatron → ILC or Muon Collider as options for the Fermilab site
- Intensity Frontier
 - NuMI → NOvA → very long baseline/mu2e → multi-MW Proton Source
 - Initial stages supported by ANU (NOvA): 700 kW
- A very high intensity proton source, Project X, is the linchpin of this strategy
 - Intensity Frontier: World leading program in neutrinos and rare processes; Fermilab as potential Neutrino Factory site
 - >2 MW at 60-120 GeV, simultaneous with up to 2 MW for rare processes program
 - Energy Frontier: Aligned with ILC technology development; Fermilab as potential site for ILC or a Muon Collider
 - Upgradable to 2-4 MW at 8 GeV

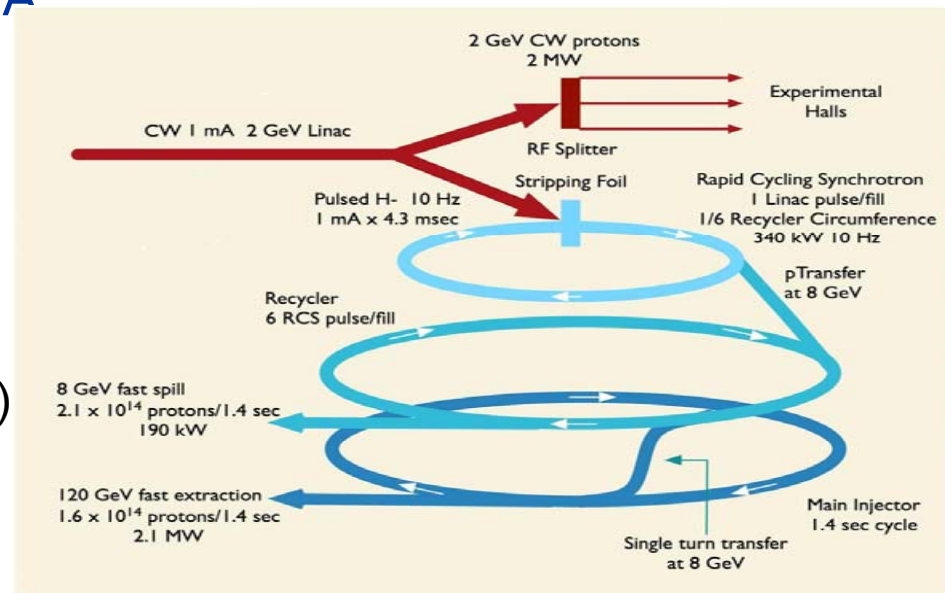


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- Goals:
 - Complete R&D and establish project baseline (CD-2) by 2013
 - Execute RD&D phase via multi-laboratory collaboration
 - Coordinate development with ILC/GDE and the Muon Collaborations
 - Construct over time period ~2015~2019
 - Design Criteria based on mission need established by P5
 - Long Baseline Neutrinos: 2 MW at 60-120 GeV
 - Rare Processes: \geq few \times 100 kW at 2.x – 8 GeV
 - Muon Platform: upgradable to 4 MW at 5 – 15 GeV

Strategic Planning Project X since May 2009



- Acknowledge/accept that IC-1 does not provide a suitably flexible platform for mounting a world-leading rare processes program
- Developed a second configuration (IC-2) based on a CW linac operating at 2.x GeV and 1 mA
 - Documented in ICD-2
 - Associated cost estimate developed
- HINS
 - RFQ repaired and close to accelerating beam (2.5 MeV)
 - New strategy to more closely align with PX goals





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- Complete ICD-2 and associated estimate: mid-October
 - DOE OHEP/OPA briefing October 29
 - Project X Physics Workshop: November 9-10
 - ⇒ White paper
 - PAC discussion of physics: November 12-14
 - AAC technical evaluation of IC-2: November 16-18
 - Director's Review of cost estimate range: Jan/Feb 2010
 - Validate IC-2 estimate
 - Validate a cost range
 - DOE observers
 - DOE OHEP/OPA briefing on cost range: February 2010
 - Establish a preferred configuration: winter/spring 2010
 - Submit Mission Need (CD-0) document: winter/spring 2010
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- We need to identify preferred configuration at time of CD-0
 - Could be a hybrid scheme
 - Central features to preserve are the low energy cw linac, and multi-MW beam power to LBNE
 - Need to identify X in 2.X GeV
 - Metrics:
 - Cost
 - Performance
 - Technical risk
 - Upgradability/flexibility
 - Interactions with other programs
- } Weighting TBD



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- Goals:
 - Complete, with international partners, a Reference Design Report for a muon-storage-ring-based Neutrino Factory by ~2013
 - Complete, with national partners, a Design Feasibility Study for a Muon Collider with a center of mass energy in excess of 1 TeV by ~2014
 - Strategy
 - 5-year proposal submitted to DOE December , 2008 covering above goals
 - Response (~1 month ago):
 - Organize as national program with Fermilab as Host Lab
 - Edit and resubmit 5 year proposal for DOE review in early 2010
 - Workshop on Physics and Detectors November 10-12 (at Fermilab)



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- Review and comment on activities related to the ongoing high intensity proton development programs
 - Project X ICD-2 and R&D Plan
 - High Intensity Neutrino Source Program

Charge to the Committee (cont.)



Project X ICD-2 and R&D Plan

- The Committee is asked to review and offer comment/recommendations relative the ICD-2 and the accompanying Project X RD&D plan. In particular we request specific comments/recommendations in the following areas:
 - Does ICD-2 describe a configuration that is likely to meet the proposed mission objectives (reference to Tschirhart's report)? Does it meet broader and more flexible physics demands on beams?
 - What are the primary technical risks associated with ICD-2? In particular, are there areas in which ICD-2 is regarded as either more or less technically risky than ICD-1? Are these risks recognized and addressed effectively in the RD&D plan?
 - Is the RD&D plan appropriately integrated with the ILC, SRF, HINS, and Muon programs?
- More generally, we would be happy to receive comments and suggestions from the AAC on how the initial configurations and associated RD&D program could be strengthened.

Charge to the Committee (cont.)



High Intensity Neutrino Source (HINS) Development

- The committee is asked to review and offer comments and recommendations relative to the current status of the HINS program and the strategy for achieving alignment of the HINS and Project X programs. More specifically we would like the Committee to comment on:
 - Are the technical goals of the HINS program well aligned with the needs of Project X? What are the primary technical risks within Project X that can and should be addressed within the HINS program?
 - Does the execution strategy of HINS mesh with the requirements of Project X? What modifications to the HINS program would be effective in aligning with either ICD-1 or ICD-2?
 - Are there other approaches, beyond those being explored in the HINS program, that should be investigated as the front end of the Project X facility?
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Charge to the Committee (cont.)



Fine Print

As usual the committee is invited to issue comments or suggestions on any aspect of the programs discussed beyond those specifically included in this charge. It is requested that a concise report responsive to this charge be forwarded to the Fermilab Director by January 1, 2010. Thank you.