DOE Office of Science
Planning Meeting for Fermilab

Pier Oddone, Director
Young-Kee Kim, Deputy Director / CRO
Jack Anderson, COO / Associate Lab Director for Operations
June 10, 2013
## Outline

<table>
<thead>
<tr>
<th>Topic</th>
<th>Slide #s</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mission</td>
<td>3 – 17</td>
<td>Pier Oddone</td>
</tr>
<tr>
<td>• Overview</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Lab-at-a-Glance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Science Strategy for the Future</td>
<td>18 – 36</td>
<td>Young-Kee Kim</td>
</tr>
<tr>
<td>• Major Initiatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Mission Readiness</td>
<td>36 - 50</td>
<td>Jack Anderson</td>
</tr>
<tr>
<td>• Human Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Work for Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cost of Doing Business</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fermilab’s Vision and Mission

• Fermilab: America’s particle physics laboratory

• Vision: inspire the world and enable its scientists to solve the mysteries of matter, energy, space and time for the benefit of all.

• Mission: drive discovery in particle physics by:
  • building and operating world-leading accelerator and detector facilities
  • performing pioneering research with global partners
  • transforming technologies for science and industry.
Achieving our mission

- **Science and Technology R&D**
  - Produce world-class particle physics results

- **Particle Physics Research**
  - Operate accelerators, detectors, and computing facilities at the highest levels of performance, efficiency and safety

- **Future Facilities**
  - Maximize capabilities through human resources development, system improvements and upgrades

- **Capability Development**
  - Design and build the next generation of facilities

- **Operations**
  - Develop, nurture and advance basic understanding of the technologies that will drive future facilities
support 4,300 users
(2012 statistics: 2,200 onsite users + 2,100 offsite users)
A simplified picture of global particle physics

- **Europe** has the LHC. It will dominate the energy frontier for the next two decades and keep Europe occupied. Very large US participation in the detectors and contributions to the accelerator.

**Japan** likely to propose hosting International Linear Collider. Culturally important for Japan. Japan will have a SuperB factory and proposes a megaton neutrino detector. All three vastly exceed capacity of Japanese HEP community.
A simplified picture of particle physics

- **U.S.** is positioned to be the leader at the intensity frontier with world-class experiments in rare processes and neutrinos – both dependent on having the greatest flux of particles. A coherent plan for the next two decades that will bring international partners to a very strong and exciting program in the US. Big anchors of this program are LBNE (phased) and Project X (phased).
US at the three frontiers

- Participation in facilities hosted abroad (LHC, ILC?)
- R&D on future machines

DOE Leadership at the Intensity Frontier both in neutrinos and rare processes

Dark matter and dark energy experiments, shared leadership with other agencies (NASA and NSF)
ALL THREE FRONTIERS ARE ESSENTIAL, THEY ARE INTERCONNECTED AND WORK IN HARMONY
Is there anything within two to three orders of magnitude of the mass of the Higgs?

GUTs scale imprints patterns we can read in neutrinos and proton decay.

Experimental reach (model dependent)

Intensity Frontier
- Tevatron
- Charged Leptons
- Quarks

Energy Frontier
- LHC

Indirectly

Directly

Connection
Two important “pivots” for Fermilab

Tevatron

Entire focus on HEP

Multiple projects at the Intensity Frontier

Broader focus: adds applications of accelerators and detectors
Challenges in the first pivot

• Bringing the community along to a national program at the Intensity Frontier

• Convincing sponsors of the need for multiple projects: follows from the nature of the Intensity Frontier

• Unique opportunity to bring the world to invest in a major global facility hosted in the US: LBNE followed later by Project X

• Managing multiple projects while we are operating the largest accelerator complex in the country (even after the Tevatron shutdown), and while budgets are shrinking
Improving our game on project management

• Extremely good progress on NOvA and MicroBooNE: NOvA and MicroBooNE should finish on budget and on schedule. This would be 3\textsuperscript{rd} and 4\textsuperscript{th} projects after MINERvA and DES to finish on budget and on schedule.

• Thorough review by the best managers in the system: we are implementing recommendations to improve our systems, training, qualification of managers.

• Organizational changes to highlight integrated planning and performance management.

• An opportunity to develop a cadre of project managers both for DOE needs and positioning of our young people in a difficult job market.
Challenges in the second pivot

• Make Fermilab capabilities applicable to all Office of Science projects that would profit from our specialized expertise and test facilities (SC magnets and RF)

• Develop the capability of working effectively with industry as part of the accelerator stewardship mission of HEP

• To accomplish this, it is very important to finish the infrastructure that allows us to do this effectively:
  - The Illinois Accelerator Research Center (IARC)
  - Advanced Accelerator Test Facility (ASTA)
Fermilab organization to achieve the mission of the lab
The “Fermilab Agenda”

A planning & communications framework that:

• aligns Lab strategic objectives, critical outcomes and major initiatives in major mission areas of science & operations;

• provides top-level focus for Program Execution Plans that flesh out annual actions and performance plans to make progress toward the strategic vision; and

• stimulates improvement (sustain good ideas, end those not working out, innovate new ideas).

The ‘Agenda’ provides insight into key initiatives at Fermilab, but it does not encompass everything we do.
### Strategic Fermilab Agenda FY 2013 – FY 2018

**Mission**

Fermilab's mission is to drive discovery in particle physics by building and operating world-leading accelerator and detector facilities, performing pioneering research with global partners, and transforming technologies for science and industry.

---

<table>
<thead>
<tr>
<th>Strategic Objectives</th>
<th>Excellence in Particle Physics, Accelerator Science and Technology, and Large-Scale User Facilities</th>
<th>Excellence in Laboratory Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical Outcomes</strong></td>
<td>Intense particle beams reveal new physics through neutrino, muon and rare-decay experiments.</td>
<td>The Fermilab complex efficiently and safely delivers the highest levels of performance to worldwide users.</td>
</tr>
<tr>
<td></td>
<td>High-energy particle colliders discover new particles and probe the architecture of nature's fundamental forces.</td>
<td>Theoretical insights and new technologies support a future particle physics program.</td>
</tr>
<tr>
<td></td>
<td>Underground experiments and ground-based telescopes uncover the nature of dark matter and dark energy.</td>
<td></td>
</tr>
<tr>
<td><strong>Strategies</strong></td>
<td>Establish a world-leading program by leveraging international partnerships.</td>
<td>World-class scientific, engineering, computing and support staff use well-integrated, efficient business and management systems to operate a safe, modern suite of facilities and infrastructure.</td>
</tr>
<tr>
<td></td>
<td>Fully exploit the scientific potential of Fermilab's accelerator complex.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exploit the full scientific potential of LHC, and support CMS and LHC upgrades.</td>
<td>Modernize the Fermilab accelerator complex to support future world-leading physics research.</td>
</tr>
<tr>
<td></td>
<td>Prepare the scientific case for future Energy Frontier exploration.</td>
<td>Strengthen US and international partnerships in advanced accelerator and detector technology development and construction.</td>
</tr>
<tr>
<td></td>
<td>Compete for next-generation dark matter experiments.</td>
<td>Compete for funds and establish CRADAs and WFO agreements to strengthen core competencies.</td>
</tr>
<tr>
<td></td>
<td>Prepare to play a key role in next-generation dark energy experiments.</td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Major Initiatives and Deliverables</th>
<th>1. Deliver NOvA project within baselines.</th>
<th>1. Enhance performance through broad implementation of HP1 principles.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Plan and execute LBNE, Muon g-2, Mu2e and MicroBooNE projects within baselines.</td>
<td>2. Initiate and deploy enhanced support for Fermilab projects.</td>
</tr>
<tr>
<td></td>
<td>3. Exploit neutrino physics programs: NOvA, MicroBooNE, MINOS+ and MINERvA.</td>
<td>3. Fully implement CAS.</td>
</tr>
<tr>
<td></td>
<td>4. Develop Project X physics program.</td>
<td>4. Develop process and organizational framework for integrated planning and budgeting.</td>
</tr>
<tr>
<td></td>
<td>5. Develop concepts for future experiments: ORKA, nuSTORM and pEDM.</td>
<td>5. Establish strategic and critical hires list from OHAP.</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Enabling Capabilities</th>
<th>A premier detector R&amp;D program and expanded test beam capabilities.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Computing facilities, technologies and architectures that enable scientific output.</td>
</tr>
<tr>
<td></td>
<td>A world-class theory program.</td>
</tr>
<tr>
<td></td>
<td>Construction projects that are planned and executed within baselines.</td>
</tr>
<tr>
<td></td>
<td>Partner laboratory relationships that support work for others.</td>
</tr>
</tbody>
</table>

---

*April 24, 2013*
Strategy for the Future

Meets the following criteria:

• Address critical and exciting scientific questions
• Is bold and establishes world leadership
• Leverages the laboratory’s expertise and existing facilities
• Attracts international partners
• Fits within a global strategy for the field and within reasonable U.S. funding
• Is focused, yet broad enough to be resilient in the face of unexpected physics discoveries and funding fluctuations
Short- and medium-term efforts at the three frontiers fit together to support long-term strategy for science and facilities.
Twenty-year term vision

Must do

- Leading neutrino program (LBNE)
- Leading rare processes program

Enable

- Neutrinos
- Muons
- Kaons
- EDMs
- $\bar{\nu}$ oscillation
- Materials
- Energy app.

Project X

- ILC-like: technology alignment
- $\mu$ collider-like: proton source
- Application
- ν factory
Getting there: program this decade

Operating (existing facilities)

R&D Program

Leading \( \nu \) program (LBNE)

Leading rare processes program

Project X

ILC-like: technology alignment

\( \mu \) collider-like: proton source \( \nu \) factory

NGLS, … Application
Fermilab’s ten-year goals in executing its strategy

1. Lead the world at the Intensity Frontier

2. Be a world leader at the Energy Frontier, at the Cosmic Frontier, and in theoretical particle physics

3. Play a leadership role in developing the technology for next generation accelerator facilities and in advancing basic understanding

4. Play a leadership role in developing the technology for next generation detectors and computing facilities

5. Play a leading role in applying technologies to society’s problems by leveraging state and national investment in the IARC
Major Initiatives

1. **Accelerator Improvement Plan; Second-generation neutrino experiments; the Muon Program → 2020s and beyond: LBNE and Project X**

2. **Large Hadron Collider Physics and Upgrade; Searching for Dark Matter and the Origin of Dark Energy**

3. **Accelerator R&D User Facility at the Advanced Superconducting Test Accelerator (ASTA)**

4. **Play a leadership role in developing the technology for next generation detectors and computing facilities**

5. **Play a leading role in applying technologies to society’s problems by leveraging state and national investment in the IARC**
**Physics: Particle Experiments**

**Intensity Frontier**
- $\nu$: LBNE
- $\mu$: Mu2e
- $\nu$: NOvA
- $\nu$: MicroBooNE
- $\nu$: MINOS+
- $v$: MINERvA
- $v$: MINOS
- $v$: MINBooNE
- nucleon: SeaQuest

*Not included are the ORKA kaon experiment which received the Stage 1 approval from Fermilab, and experiments such as nuSTORM, proton EDM and neutron-antineutron oscillation experiments which are currently developing proposals with the encouragement of Fermilab Physics Advisory Committee.*

**Energy Frontier**
- LHC (14 TeV, Lum upgrade): CMS
- LHC (7-8 TeV): CMS
- Tevatron: CDF/D0

**Cosmic Frontier**
- Dark Energy: DES
- Dark Matter: Generation 2
- Dark Matter: Generation 1
- DE: LSST
- DM: Gen 3

**Physics: Theory and basic understanding of technologies**

<table>
<thead>
<tr>
<th>Theory</th>
<th>Accelerator</th>
<th>Detector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle and Particle Astro Theory</td>
<td>Accelerator Science at ASTA</td>
<td>Testbeam experiments</td>
</tr>
</tbody>
</table>

---

Continuously produce physics results (next 10 years)
Accelerator Improvement Plan

Main Injector (through 2013): double beam power by stacking beam in the Recycler and decreasing MI cycle time

Muon Program (2013-2018): convert antiproton source to meet needs of the muon program

Proton Improvement Plan (2012-2018): double beam power of the proton source by increasing rep-rate

Accelerator Science with ASTA (Advanced Superconducting Test Accelerator)

Illinois Accelerator Research Center (IARC)
Evolution of U.S. Accelerator-based Neutrino Experiments

Generation 2
(under construction)

Generation 1

NOvA (far)
surface
14 kton
700 kW
MINOS (far)
at 2340 ft level
5 kton
350 kW

Generation 3
(under development, CD-1)

LBNE Far detector
at 4850 ft level
10 kton → 35 kton LAr TPC
700 kW → 2.3 MW (Project X)

MINOS (near)
810 km (off-axis)

MicroBooNE
(LAr TPC)

NOvA (near)
735 km (on-axis)

MINERvA

Evolution of U.S. Accelerator-based Neutrino Experiments - Generation 2 (under construction)

NOvA (far)
surface
14 kton
700 kW
MINOS (far)
at 2340 ft level
5 kton
350 kW

Generation 3
(under development, CD-1)

LBNE Far detector
at 4850 ft level
10 kton → 35 kton LAr TPC
700 kW → 2.3 MW (Project X)

MINOS (near)
810 km (off-axis)

MicroBooNE
(LAr TPC)
2nd generation long-baseline neutrino experiment: NOvA will start taking data late spring 2013 with a partial detector.
LBNE: Physics and Collaboration

• Neutrino oscillation, proton decay, supernova neutrinos
• Collaboration (keep growing): 384 members from 67 institutions, 5 countries
• News: This week, LBNO (European “LBNE”) leadership proposed to merge LBNO and LBNE. This is consistent with the 2013 European strategy.
• This opens the door for CERN and European institutions to partner with U.S. on this project.
• Between CD-1 (Dec. 2012) and CD-2, with European participation in the far detector and Indian participation in the near detector, we hope to extend the physics scope, attracting a strong community support
The Muon Program

Groundbreaking, May 8, 2013
Accelerators in 2020s – Project X

Superconducting RF technology
- > 6 MW total
- 1, 3, 8, 60-120 GeV beams
- Exquisite beam structures

MOUs:
- 12 US labs + universities
- 4 Indian institutions (DAE, …)
SCRF Technology Development
in support of Project X, ILC, NGLS, and industry

1300 MHz Dressed Cavities
Cold Mass Assembly
1300 MHz Cryomodule Tests in NML

1300 MHz EP

CM2 High Gradient Module
325 MHz BCP

1300 MHz 9-cell
650 MHz 1-cell
Spoke Test Cryostat 325 MHz
Bare and Dressed 325 MHz SSR1

Cold Mass Assembly

ANL/FNAL Cavity Processing
325 MHz BCP

1300 MHz Cryomodule Tests in NML

Spoke Test Cryostat 325 MHz
Advanced Accelerator R&D / Science

- Build on the existing program and the substantial investments in the SRF infrastructure

- A user facility with unique capabilities for advanced accelerator R&D based on SC linac technology at ASTA

- This will enhance accelerator technologies and facility developments across DOE Office of Science
LHC: U.S. CMS Detector Upgrades

- Fermilab is the lead lab and intellectual home of the U.S. CMS collaboration.
- LHC Physics Center serves as a resource and physics analysis hub for U.S. inst.s
  - > 350 users
  - > 100 residents
  - ~ 700 computing users
- Remote Operations Center
- Computing support
- Manage the CMS detector upgrade project
LHC: Machine Upgrades

Developing and then building, in partnership with U.S. labs, Nb$_3$Sn magnets, crab cavity cryomodules and associated technology for LHC Upgrade as part of LHC Accelerator Research Program and Accelerator R&D Program.
Dark Energy and Dark Matter

• Dark Energy: Progression SDSS → DES → DESI → LSST

• Dark Matter: CDMS, COUPP, DarkSide → Generation 2 expt.
Fermilab infrastructure summary

- $1.8 billion Replacement Plant Value
- 6800 acres; 36 miles of roads, 122 acres of parking lots
- 2.4 million gross square feet
- 2 primary electrical substations, 241 secondary substations, 115 miles of underground electrical cable, 3 miles of overhead transmission lines
- 27 miles of underground industrial cooling water piping
- 19 miles of underground domestic water piping
- 14 miles of underground sanitary piping
- 18 miles of underground natural gas piping

<table>
<thead>
<tr>
<th>Core Capability</th>
<th>Current</th>
<th>5-year</th>
<th>10-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle Physics</td>
<td>C</td>
<td>C</td>
<td>P</td>
</tr>
<tr>
<td>Accelerator Science</td>
<td>C</td>
<td>C</td>
<td>P</td>
</tr>
<tr>
<td>Large Scale User Facilities/Advanced Instrumentation</td>
<td>C</td>
<td>C</td>
<td>P</td>
</tr>
<tr>
<td>Utilities</td>
<td>M</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

*C = Capable, P = Partially Capable, M = Marginally Capable, N = Not Capable*
Science Laboratories Infrastructure (SLI)
Priority investment -- Utilities Upgrade Project

• Scope ($35M)
  • High Voltage Electrical includes replacing one of two electrical substations (42 years old)
  • Industrial Cooling Water piping replacement

• Schedule
  • CD-1 achieved in November 2010
  • PED in FY13 PBR at $2.5M - CR delayed receipt
  • FY14 PBR supports project at $35M
  • Master Substation Bypass GPP at $2.7M underway in interim

• Urgency
  • FY14 funding is critically important in order to meet the electrical requirements of the Mu2e project to be served from the Master Substation in FY17

This utility project helps to improve performance by mitigating the Lab’s highest infrastructure vulnerabilities.
Fermilab Campus Master Plan

- Twenty-year time horizon
- Focus on intensity frontier initiatives, facility/staff consolidation & centralization
- Eliminates dispersed & inefficient support facilities
- Improves mission readiness for core capabilities

SLI Project Proposals
- Industrial Facilities Consolidation (existing project in SLI queue)
- Integrated Engineering Research Building
- Wilson Hall Modernization
Campus Master Plan: Future SLI proposals

- **Industrial Facilities Consolidation**
  Modernization and relocation of accelerator and detector technology development functions

- **Integrated Engineering Research Building**
  Consolidate outdated and geographically-dispersed technical, assembly, machining, lab and office space into a new multi-disciplinary building close to Wilson Hall. Demolish vacated space, including flood-prone buildings in the village

- **Wilson Hall Modernization**
  Transform Fermilab’s largest building into flexible and adaptable workspaces; improve occupancy, functionality and efficiency; promote collaboration; accommodate new technologies
Sustainability (SSP Dec 2012)

- **Scope 1 & 2 GHG**: Good
- **Energy Intensity**: Good
- **Renewables**: Good
- **Fleet Petroleum**: Good
- **Scope 3 GHG**: Good
- **Water Usage**: Good
- **Guiding Principles**: Good
In the last two years, 180 regular staff reduction including 20 scientists. Additional reduction of many guests/visitors.
Human resources: Fermilab scientists

Transition: Energy Frontier dominant → Intensity Frontier dominant

Actual (dotted) and anticipated activities (solid)  Data: Nov. 2012

- Experiments
- Accelerators
- Lab management
- Theory
- Generic R&D

Data: Nov. 2012
Human resources - Challenges and actions

Challenges

• Morale issues (staff reductions and budget austerity).
• Hiring and retaining employees with key skills (impact of salary freeze).
• Matrixed staff within a portfolio of new projects (with dynamic funding profiles).

Actions

• Invest in training and development opportunities for key staff.
• Increase workforce planning capabilities with a new Human Capital Management system.
• Perform job family reviews/equity studies for critical skill positions.
• Attract early career staff through fellowships, internships and co-op programs.
• Increase employee skills through the development and deployment of new tools (e.g., Teamcenter).
• Succession planning for senior positions.
Project management initiative:
Enabling people and systems for successful project delivery

**Revitalize**
People & Performance

- **People**: developing leaders & teams with appropriate experience, training and certification. Establishment of Project Management Planning Board to set standards/reconcile enterprise issues.
- **Performance**: emphasis on risk management, metrics and productive inquiry

**Re-tool**
Systems, Services & Information

- **Systems**: modernize and standardize systems & tools
- **Services**: refocused Integrated Planning and Project Support Services offices, resourcing (e.g., project controls, procurement staffing)
- **Information**: standardized, trendable information for accountable staff

**Review**
Accountability & Oversight with Transparency

- **Accountability**: expectations expressed at all levels
- **Oversight**: engage at multiple levels (PMG’s, POG) including monthly reviews w/direct interaction between project and Lab leadership
- **Transparency**: inclusive of DOE and open to independent review
Director’s review of project management

External team of experts [BNL, PNNL, SLAC, DOE (ret.])

• Assessed:
  • Project managers & deputies
  • Line managers
  • Project Support Services
  • Systems

• Six overarching recommendations
  • 30 specific actions

• General observations
  • “Fermilab has made progress…improvements made over the last six months were both needed and valuable.”
  • “Project Managers are competent and have the appropriate leadership attributes.”
  • “The Fermilab matrix management system has an inordinate number of requirements and constraints.”
Work For Others

- Fermilab has a modest, but important, WFO program that is aligned with the Lab’s core capabilities
  - Beam instrumentation and diagnostics
  - Accelerator design and technology
  - Superconducting technology

DOE SC Lab Planning Meeting, Fermilab, June 10, 2013
Illinois Accelerator Research Center Building
(State funded)

- New Building -> 48,000 gross square footage (145 offices); 3,700 SF Light Tech Space.
- Repurposed CDF -> 42,000 sq. ft.: 50 T crane; deep pit for radiation shielding of accelerators; cryogenic, electrical and cooling water infrastructure.
- Construction in Progress, estimated beneficial occupancy for outfitting Mar 2014.
- Business Plan and operating model under development; informed by collaboration with industry and University of Chicago; coordinating details with OHEP and FSO. Business Plan delivery scheduled for July 2013.
## Cost of doing business

<table>
<thead>
<tr>
<th>Cost driver</th>
<th>Actions to manage/mitigate effects</th>
</tr>
</thead>
</table>
| Electric power               | • Energy Saving Performance Contract (in progress)  
• Competitive procurements through DoD Defense Energy Support Center  
• Participation in utility power curtailment programs                                                                                                                                 |
| IT services                  | • Improved management system performance (ISO2000 certification)  
• SC Operations Improvement Council bulk pricing initiatives  
• Strategic roadmap for investment in critical technologies and systems                                                                                                                                 |
| Infrastructure modernization | • SLI Utilities Upgrade Project  
• Risk mitigation via judicious General Plant Project planning and investment                                                                                                                                                  |
| Campus Development           | • Essential investments to provide common infrastructure supporting muon program and repurposing science facilities  
• Aggressive materials recycling program (savings: $1M)                                                                                                                                                                        |
| Employee benefits            | • Transitioned medical/dental insurance funding arrangement to self-insurance model (est. saving: $1.3M)  
• Increased employee and retiree cost sharing (cost reduction: $2.8M)  
• Competing PPO/POS medical plans for cost and service improvements  
• Negotiated reduced 401(a) and 403(b) retirement plan administrative expenses (cost saving: $150K)                                                                                   |
Cost of doing business

Strategic focus on managing costs and managing risks

• Increasing rigor around integration of risk assessment with annual budget planning

Trade-offs

• Senior management team highly engaged in assessment of issues, risks and investments
• During FY13 process, ~30% of incremental requests approved for allocation.
  Priority assigned to:
  ▪ Health and safety
  ▪ Reducing risk to experimental project cost and schedule targets
  ▪ Advancing applied technology initiatives
  ▪ Scientific staff talent development

• Unfunded requests, ~70% predominantly in areas of:
  ▪ Deferred maintenance (re-evaluated in real-time during year)
  ▪ Equipment upgrades, spare parts
  ▪ Support staffing

Lab Agenda initiative (FY13/14) focusing on Cost Optimization study
Committed to management and operational excellence

• Continuing high level of attention to workplace safety and environmental protection

• Fermilab Agenda provides a central framework for focus and alignment of strategic initiatives in Science and Operations

• Leveraging ISM, contractor assurance and quality programs to improve operational performance