Response to the P5 report

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HEPAP meeting

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Run II

- P5: “The Tevatron is the worldís highest energy accelerator and, until the LHC produces physics, it will have an unparalleled opportunity to address the major questions in elementary particle physics.
  The Run II program attacks the most fundamental questions facing particle physics.”

- I decided to cancel the silicon upgrades from the CDF and D0 detector upgrades.

- P5: “*P5 strongly endorses the upgrades of the trigger, DAQ and offline systems*.”

Run II

- The prospects for discovery in Run II will remain brighter than anywhere else in particle physics until the LHC produces major new results.

- To realize these prospects, the Laboratory needs at minimum $288.5 M in FY 2004, the President's budget request.

- The university groups need continued support consistent with the high priority given to this program by the HEPAP Subpanel and P5.

Quark Flavor Physics in 2009

Y. Grossman at Lepton Photon 2003:

- The Standard Model flavor structure is special
  - Universality of the charged current interaction
  - Flavor Changing Neutral Currents are highly suppressed
- Any New Physics model must reproduce these successful SM features.

Many proposed models of new physics lead to observable anomalies in the mixing and decays of K, B_d, and B_s mesons.

BTeV

- BTeV will have a very broad particle physics program, including charm physics, but the primary motivation is the search for new physics through CP violation in the B_d and B_s systems.

- BTeV represents a breakthrough in designing collider experiments.

- P5: "The strength of the BTeV experiment comes from the combination of its vertex trigger with precision mass measurements for both charged and neutral decay modes and excellent particle identification capabilities."

BTeV

- P5: "*P5 supports the construction of BTeV as an important project in the world-wide quark flavor physics area*."

- Fermilab is developing the BTeV project with custom IR optics to optimize the luminosity.
- BTeV will be the first construction start this decade for a major experiment at a US HEP accelerator.
  - It will be a flagship for the US program.
- Fermilab and DOE must move quickly in FY04 to get the BTeV project approved for a fast FY05 start.

CKM

- $K \rightarrow \pi \nu\nu$ are the golden s-quark modes in looking for new physics.
- P5: "CKM is an elegant world-class experiment, which would be able to produce important physics results."
- P5: "*Based on current budgetary models, P5 does not recommend proceeding with CKM.* "

- We agree that, under the assumption the Fermilab budget for Fermilab grows at no more than 2% per year, we cannot build both CKM and BTeV on the same schedule.

CKM

- CKM got very high marks in an extremely rigorous review and evaluation process: PAC and P5.
  - It should be part of the world program for HEP.
- The fact that it cannot be built now because of funding sets a standard for getting experiments started that is higher than ever – and too high for the good of the field.

- Over the next year Fermilab will take a critical look at the possible experimental program for the future, in addition to MINOS and BTeV.
  - We will consider CKM carefully in this process. Its importance and feasibility are already demonstrated.
  - We will use the Physics Advisory Committee.
  - We will consider whether external funding sources can have a major impact.

HEPAP Subpanel about P5

- "The successes in particle physics over the last fifty years were built on a foundation of scientific breadth."
- "P5 should meet on a regular basis and serve as the guardian of the roadmap. It should continually review the program, update the roadmap, look to the future and identify problems and opportunities…"

P5: The Roadmap in the intermediate term

1. LHC
   - Atlas
   - CMS
2. Quark Flavor
   - BTeV
   - KOPIO
   - (CKM)

Fermilab is host laboratory of those in red.

(opportunities not yet recommended for funding)

3. Particle Astrophysics
   - Auger
   - GLAST
   - Ice Cube
   - CDMS +other DM searches
   - (SNAP)
4. Lepton flavor
   - NuMI-MINOS
   - MECO
   - (additional neutrino opportunities)