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# Run II

**Michael Witherell**

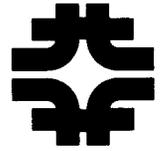
**Run II Accelerator Review**

**July 21, 2003**

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# Importance of Run II

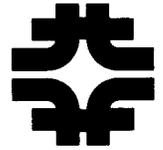
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- It is critically important for the field that we aggressively push the only program now addressing many of the central scientific questions.
  - Any discovery would clearly reshape our understanding of particle physics.
  - Even in the absence of discovery, the Standard Model will be challenged by improved top and W mass measurements combined with results from Higgs searches that could exclude the mass region allowed in the Standard Model.

# The Fermilab program

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## Physics at the Electroweak Energy Scale

- The Tevatron program: CDF and D0
- US-LHC and US-CMS
- Linear collider R&D

## Neutrino and Lepton Flavor Physics

- The US accelerator-based neutrino program: MiniBooNE and NuMI/MINOS

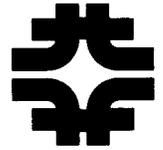
## Quark Flavor Physics and CP violation

- Quark flavor physics experiments planned to operate in 2009: BTeV and CKM

## Particle Astrophysics and Cosmology

- Sloan Digital Sky Survey
- The Auger Cosmic Ray Observatory
- The Cryogenic Dark Matter Search

# A gold mine of physics



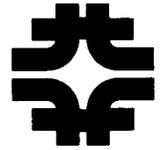
- Top quark physics
- Electroweak physics
- Supersymmetry
- Extra Dimensions & Other Exotics
- Bottom and charm quark physics
- Quantum Chromodynamics
- Higgs Physics

Number of theses  
in each area

<b>Physics</b>	<b>CDF</b>	<b>D0</b>
<b>Top quark</b>	<b>35</b>	<b>24</b>
<b>Electroweak</b>	<b>13</b>	<b>12</b>
<b>Supersymmetry</b>	<b>16</b>	<b>17</b>
<b>Extra dimensions &amp; Exotics</b>	<b>10</b>	<b>11</b>
<b>QCD</b>	<b>9</b>	<b>4</b>
<b>Quark Flavor</b>	<b>45</b>	<b>17</b>
<b>Higgs Physics</b>	<b>13</b>	<b>17</b>
<b>All Thesis Topics</b>	<b>141</b>	<b>102</b>

John Womersley will discuss the physics results and prospects.

# Fermilab Long-Range Schedule

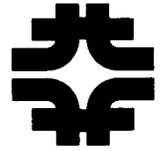


Year	2003		2004		2005		2006		2007	
Tevatron Collider	CDF & DZero									
	BTeV									
Neutrino Program	B	MiniBoone	MiniBooNE		MiniB	OPEN	OPEN		OPEN	
	MI	MINOS								
Meson 120	MT	Test Beam	Test Beam		Test Beam		Test Beam		Test Beam	
	MC	E907/MIPP	E907/MIPP		E907/MIPP		OPEN		OPEN	

Year	2008		2009		2010		2011		2012	
Tevatron Collider	BTeV									
	CDF & DZero									
Neutrino Program	B	OPEN	OPEN		OPEN		OPEN		OPEN	
	MI	MINOS	MINOS		OPEN		OPEN		OPEN	
Meson 120	MT	Test Beam	Test Beam		Test Beam		Test Beam		Test Beam	
	MC	E906	E906-DrellYan		E906-DrellYan		E906-DrellYan		OPEN	
	ME/P	OPEN	CKM		CKM		CKM		CKM	OPEN

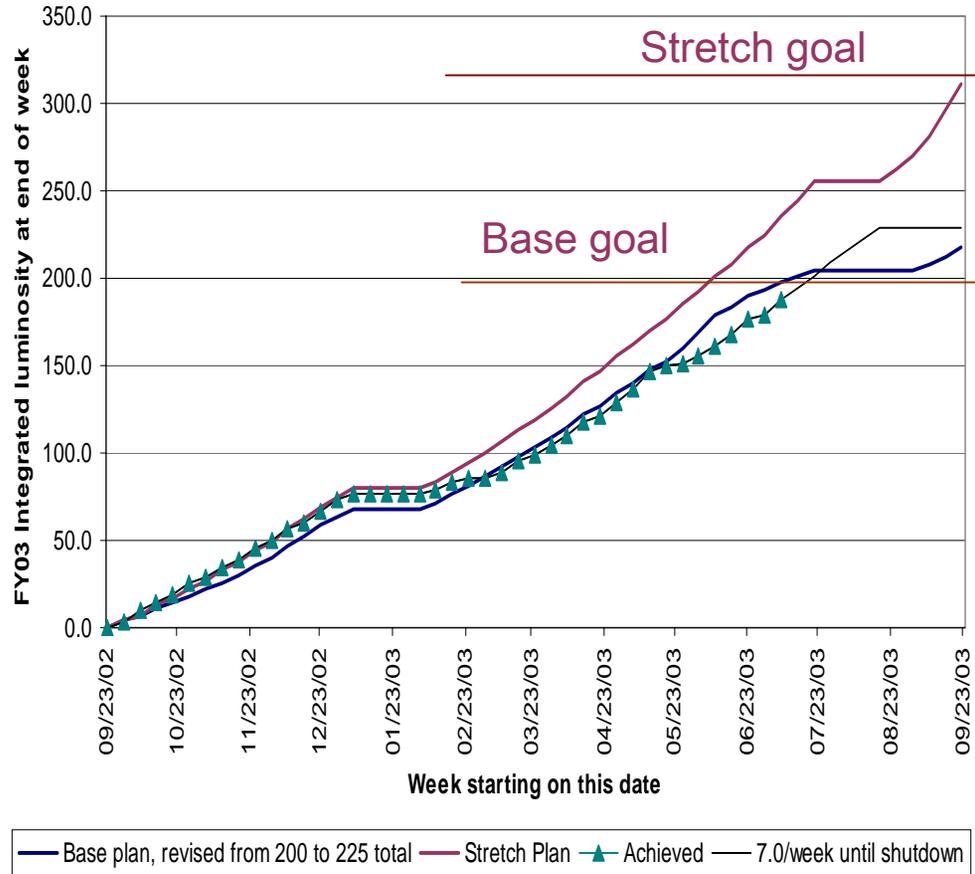
- RUN or DATA
- STARTUP/COMMISSIONING
- INSTALLATION
- M&D (SHUTDOWN)

# FY 2003 Plan



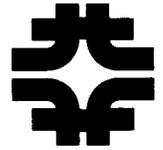
Date	July-02	July-03
Best Week ( $\text{pb}^{-1}$ )	3.7	9.1
Typical Week ( $\text{pb}^{-1}$ )	2.4	6.5
Best luminosity ( $10^{31} \text{ cm}^{-2} \text{ s}^{-1}$ )	2.6	4.5

The total integrated luminosity in Run II is  $\sim 300 \text{ pb}^{-1}$ , 2x Run I total.



# The present year

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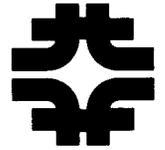


## Accomplishments

- Weekly integrals of luminosity  $\sim 2.5x$  year ago
- Backgrounds and large losses at detectors mostly overcome
- Detailed Run II plan developed
- Better understanding of much of the accelerator complex
- Physics results

## Setbacks

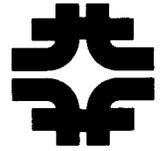
- Lost total of several weeks due to equipment failure and recovery
- Peak luminosity not improved as quickly as hoped
- Average luminosity often well below record luminosity
- Setback in Recycler commissioning



# Near future

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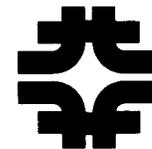
- We will invest the intellectual effort, organization, and resources needed to address immediately the major limitations to integrating luminosity.
- We will focus on
  - understanding and fixing limits to present luminosity, including several connected with the Tevatron,
  - reliability and maintenance issues,
  - Recycler commissioning, and
  - the upgrade program.
- The prospects for new physics depend on the time it takes to double the integrated luminosity.
  - We now have a sample about twice that of Run I.
  - We will double the total sample in about a year
  - We will double it again by late in 2005.



# Longer future

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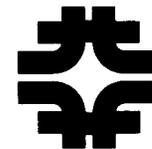
- We have developed a well-designed plan to optimize the integrated luminosity throughout the period FY 2004-9, consistent with resources.
  - The goal was to be suitably bold in drawing up the plan of work, with new applications of accelerator physics, and then to be realistic in assessing the performance achievable with that plan.
  - The upgrade plan is integrated with near-term operational planning, and with the plans for maintenance and increased reliability.



# Managing Run II

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- Roger Dixon has set up a strong management team in the Beams Division to direct the effort.
- Since June 30, 2003, Steve Holmes chairs a new daily meeting at 8:30 to focus on maximizing the delivered luminosity in the short run.
  - All the principals on Run II attend, about 12.
  - This is in addition to the broader operations meeting MWF at 9:00 and monthly meetings on the longer-term strategy.
- I have formed and will chair a Run II task force to monitor Run II progress and to optimize the lab-wide effort. Members:
  - S. Holmes, R. Dixon, H. Edwards, B. Kephart, J. Peoples



# Summary

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- The physics program of the CDF and DZero experiments at the Tevatron collider represents the most important physics program now operating in particle physics.
- We will continuously increase the rate of integrating luminosity.
  - We have the right plan to optimize the science.
  - We have set up a new organization to focus the effort better on more reliability and higher luminosity in the short and long run.
  - We are bringing available resources, including people, from the entire laboratory to the accelerator effort.
- We look forward to the output of your review.