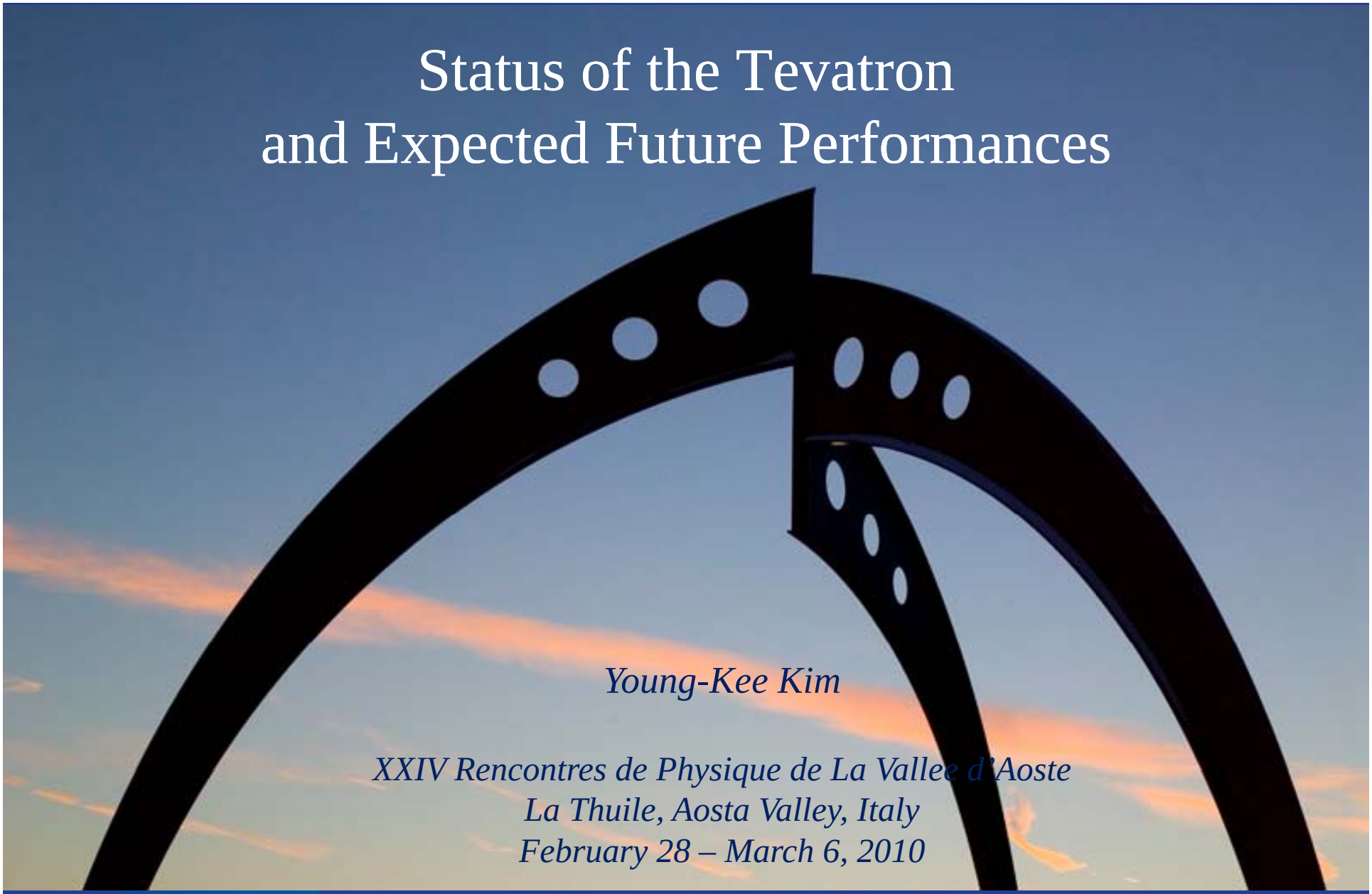
# Status of the Tevatron and Expected Future Performances



*Young-Kee Kim*

*XXIV Rencontres de Physique de La Vallee d'Aoste*
*La Thuile, Aosta Valley, Italy*
*February 28 – March 6, 2010*

U.S. DEPARTMENT OF ENERGY

Fermilab

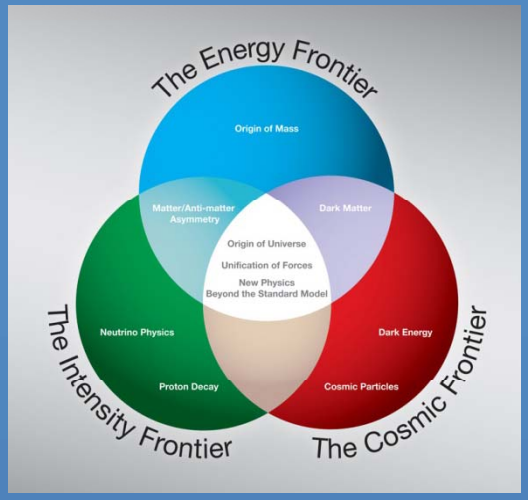
# Around Fermilab

~65 km from Chicago

# Fermilab

at

the Three Frontiers




Energy & Intensity Frontiers (Accelerator Based Experiments) for this presentation

# Planning Strategy

Flexible to adopt changes:
both physics landscape and
status and schedule for new projects in the world

What I am presenting today is the present plan under discussion.

# Tour of Accelerator Complex at Fermilab

# Cockroft-Walton

# Linac

# Booster

# Main Injector (Recycler)

# Tevatron

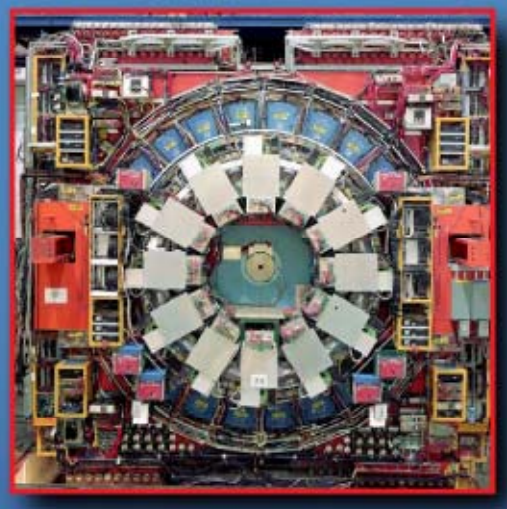
## Antiproton

Production &
Accumulation

Storage Ring
(Recycler)

# Tevatron

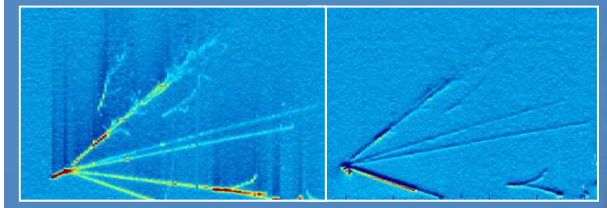
CDF and DZero



## ν's from Main Injector

MINOS (on-axis)
MINERvA

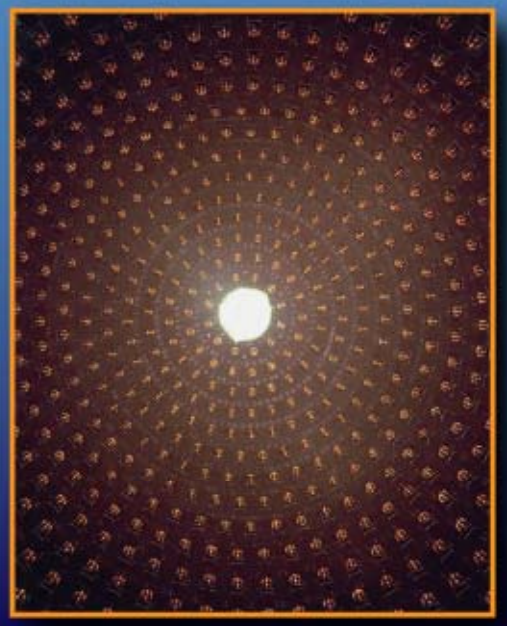
ArgoNeuT (LAr TPC)



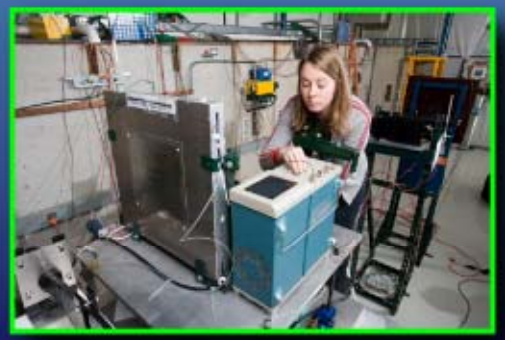

735 km
250 kW

## ν's from Booster

MiniBooNE
(SciBooNE)



# Testbeam for Detector Development

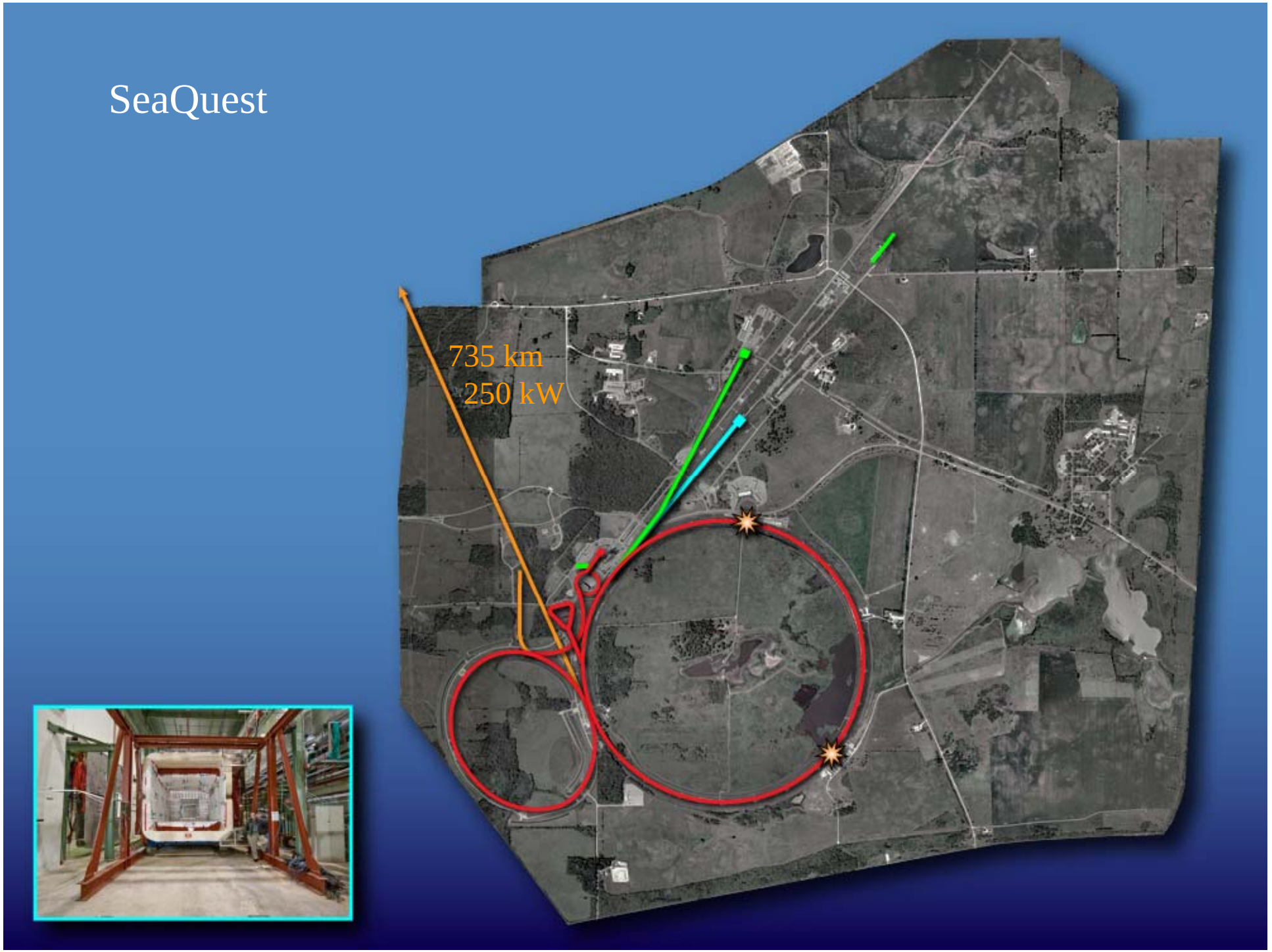


# Test Facility for Accelerator Development

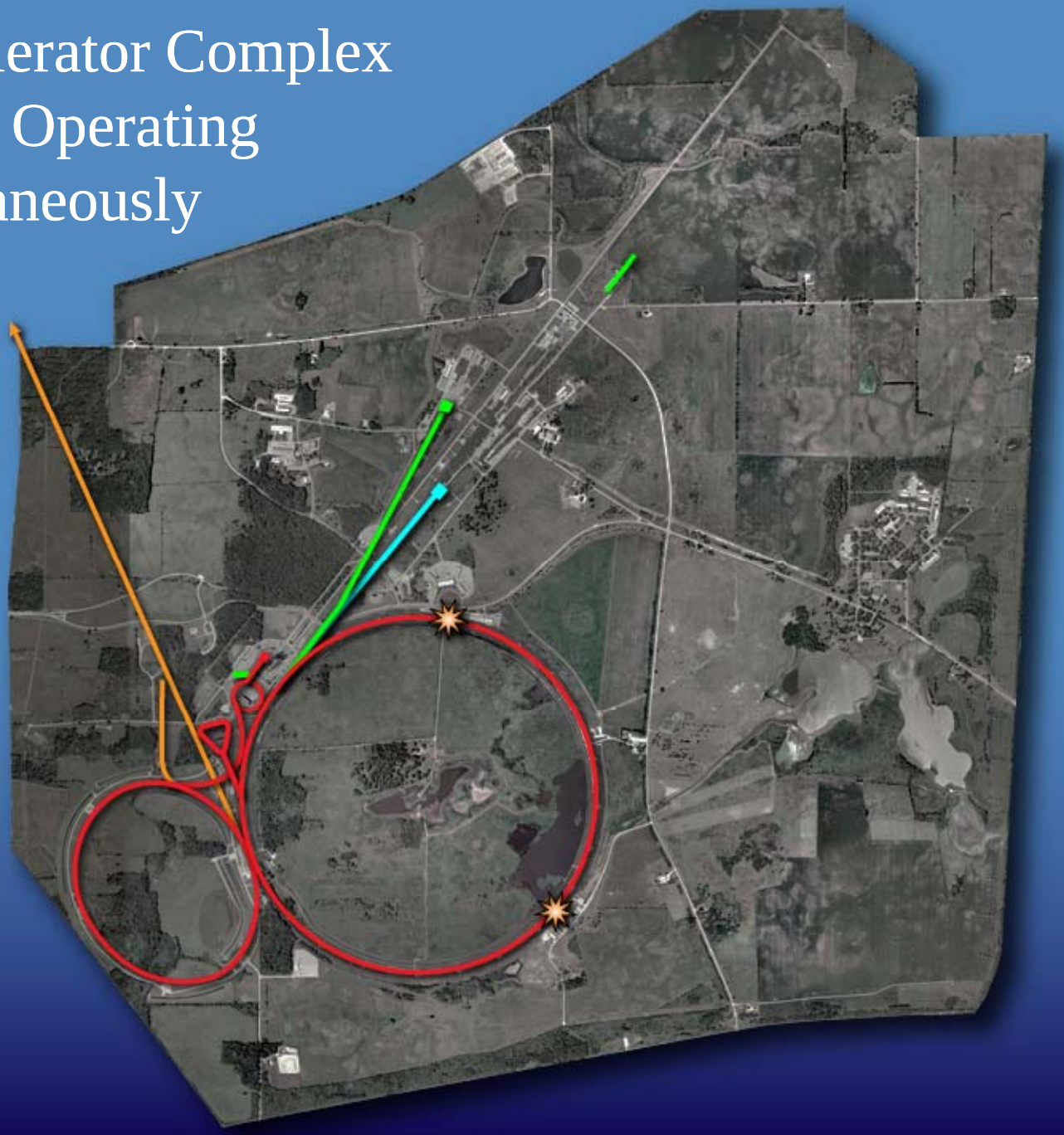
Super Conducting RF Technology

# Test Facility for Muon Cooling (MuCOOL)

# SeaQuest



# Fermilab Accelerator Complex Currently Operating Simultaneously



# LHC (Construction/Commissioning/Operations/Physics/Upgrades)

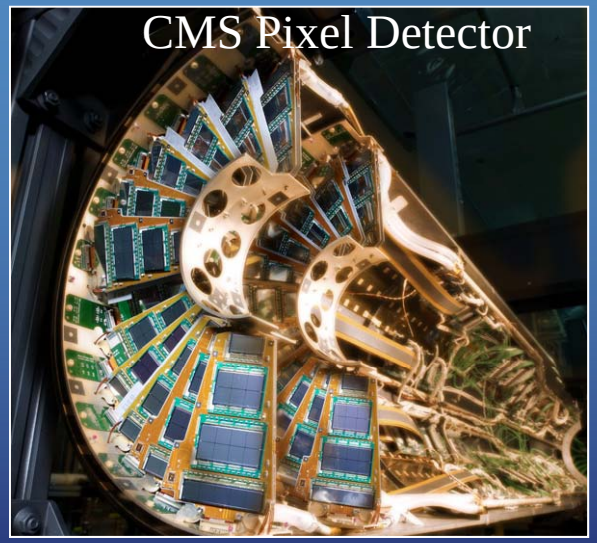
## Accelerators

LHC IR quadrupoles

LHC upgrade 3.4m
Nb3Sn prototype

## Detectors/Computing


CMS Calorimeter
Muon Chamber
Silicon Tracker


CMS Pixel Detector

## Operations/Physics


Remote Operations Center

LHC Physics Center
CMS Tier-1 Computing Center
US CMS Host Laboratory

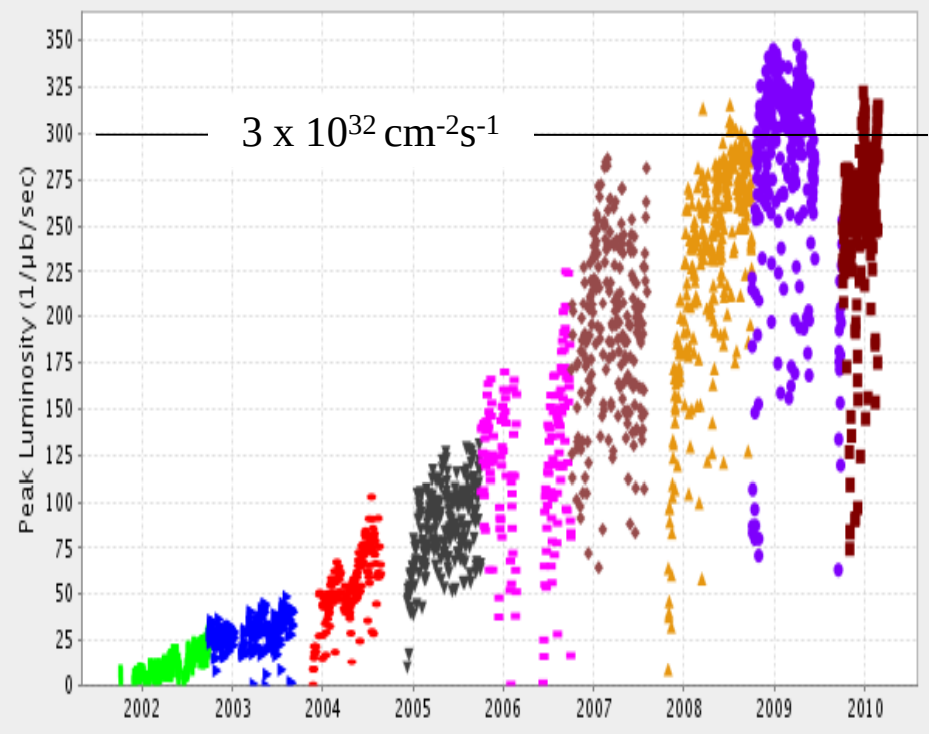

German vs. US+UK

Final: Italy+France+Spain
vs. rest of the world

CERN-Fermilab Summer School Since 2006

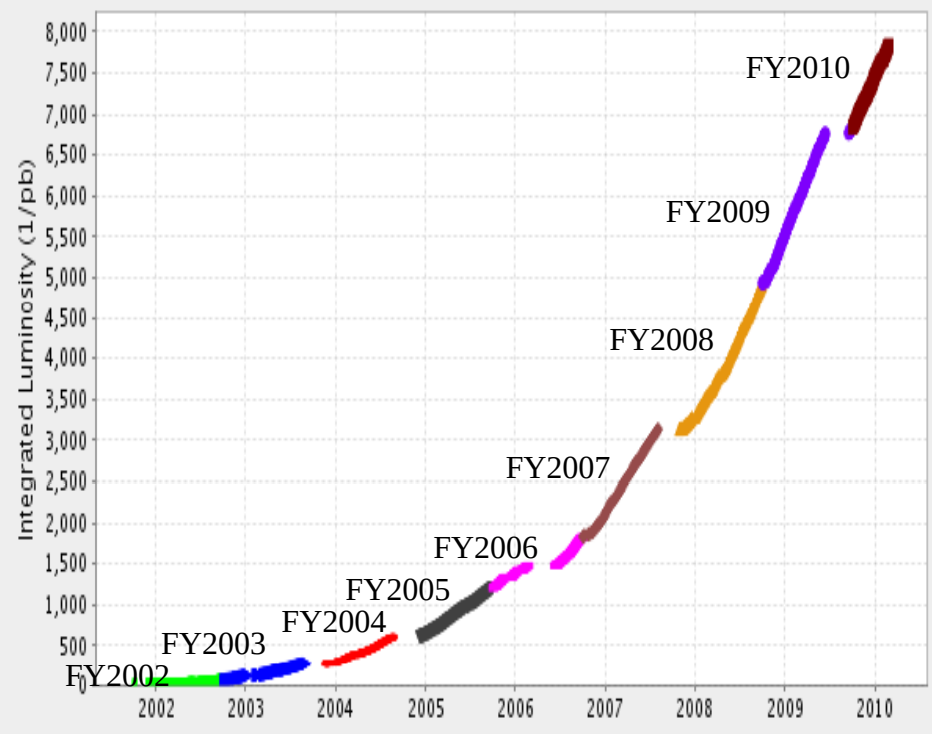
# Tevatron Performance so far (Run II since 2002)

Peak Luminosity



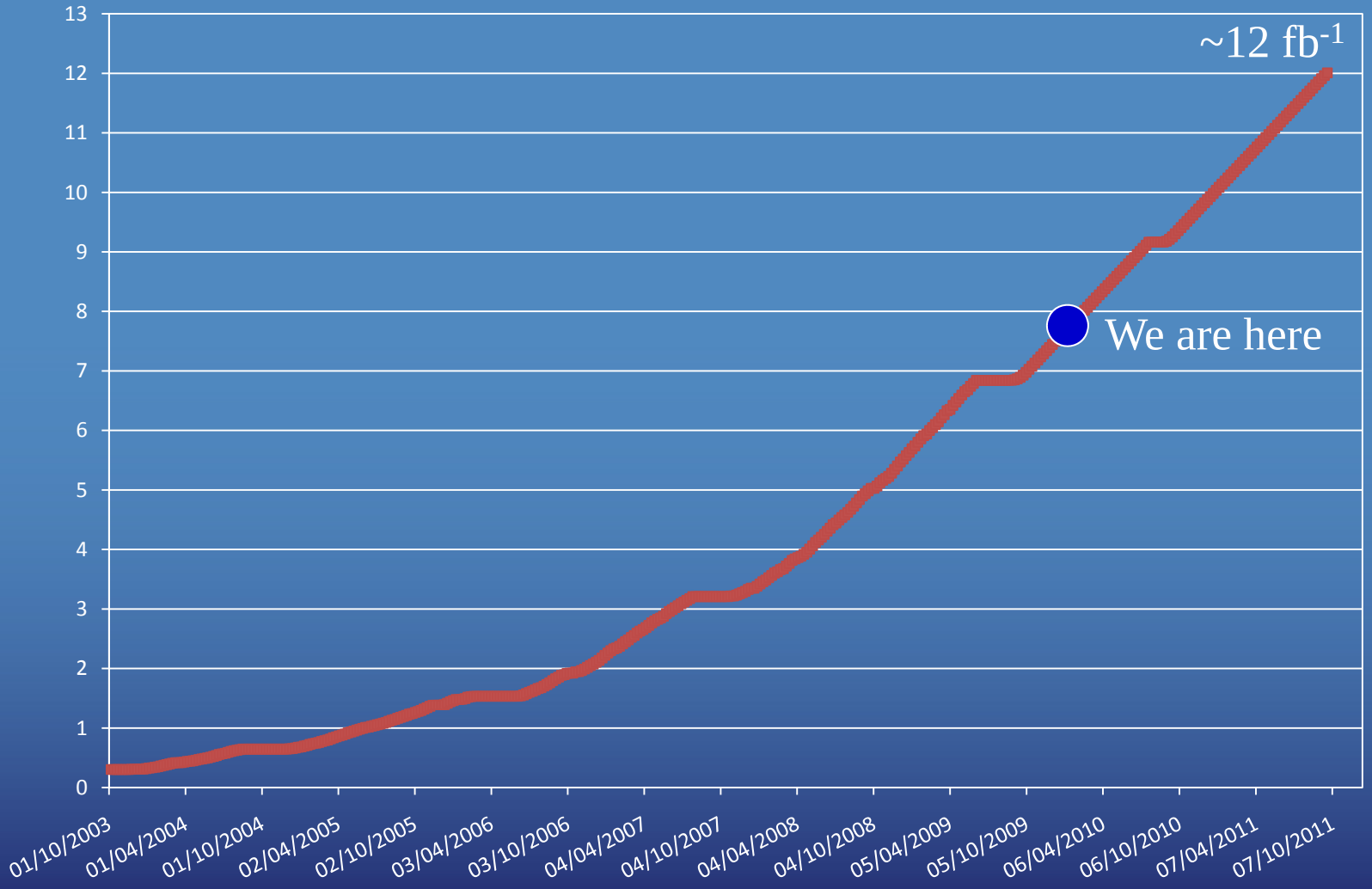

Fiscal Year

Total Integrated Luminosity (7.8 $fb^{-1}$ /expt.)




Fiscal Year

# Tevatron Expected Performances through FY2011 (Sept. 2011)



Accelerator Shutdown
March 2012 – February 2013
to upgrade neutrino beam from Main Injector
(250 kW → 700 kW)

NOvA Detector Construction & Installation
Plan: MicroBooNE Detector Construction & Installation

# Neutrinos

NOvA (off-axis)

MINERvA

MicroBooNE (LAr)


## Neutrinos

NOvA (off-axis)

MINERvA

MicroBooNE (LAr)

## Muons

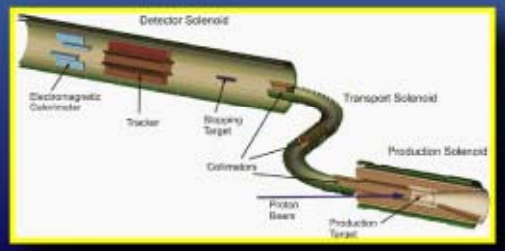
Mu2e

(DOE 1st stage approval)

## Under consideration

Muon g-2/EDM

$K^+ \rightarrow \pi^+ \nu\nu$




## Neutrinos

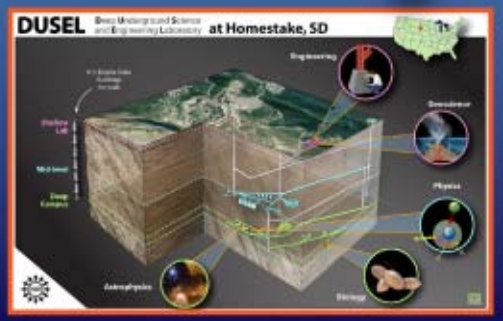
LBNE(to DUSEL)

(DOE 1st stage approval)

## Muons

Mu2e

(DOE 1st stage approval)

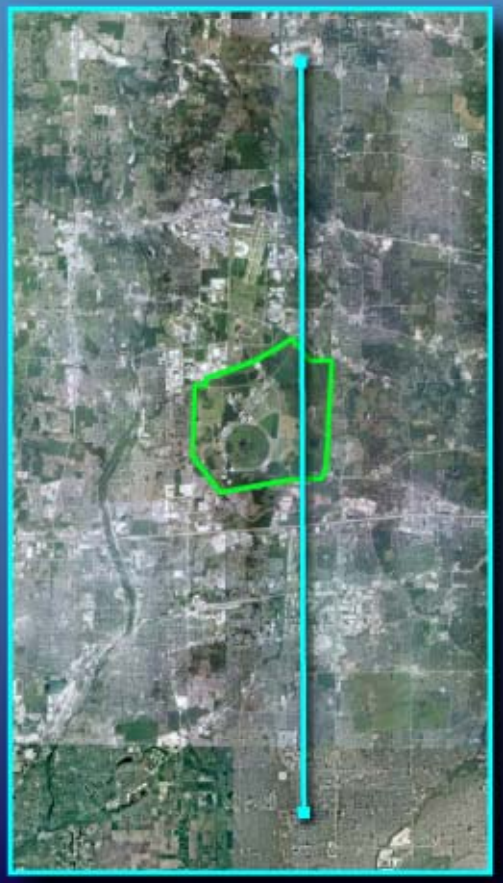



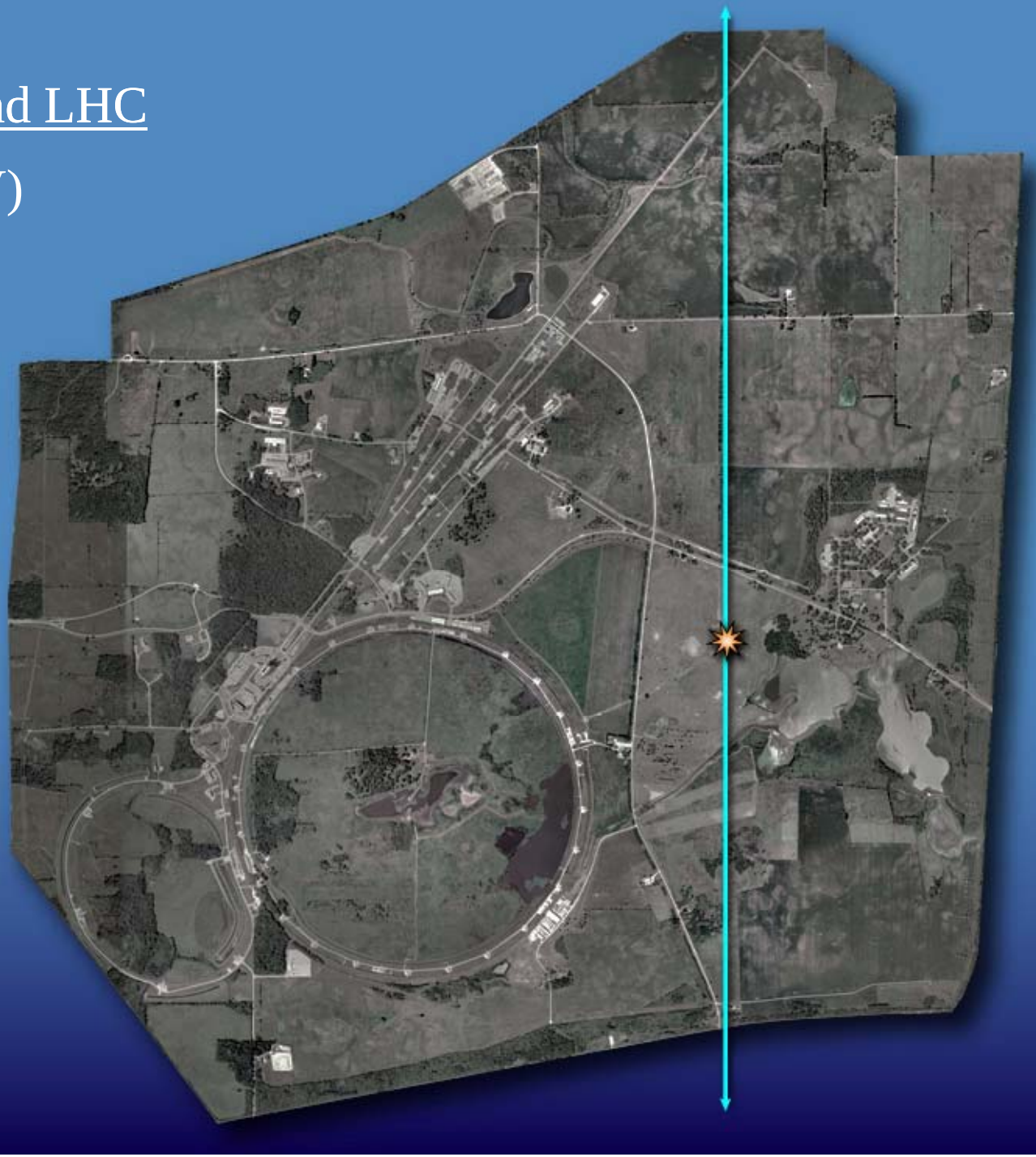

# Project X

Neutrino physics
Muon physics
Kaon physics
Nuclear physics
“simultaneouly”

## Beyond Project X and LHC

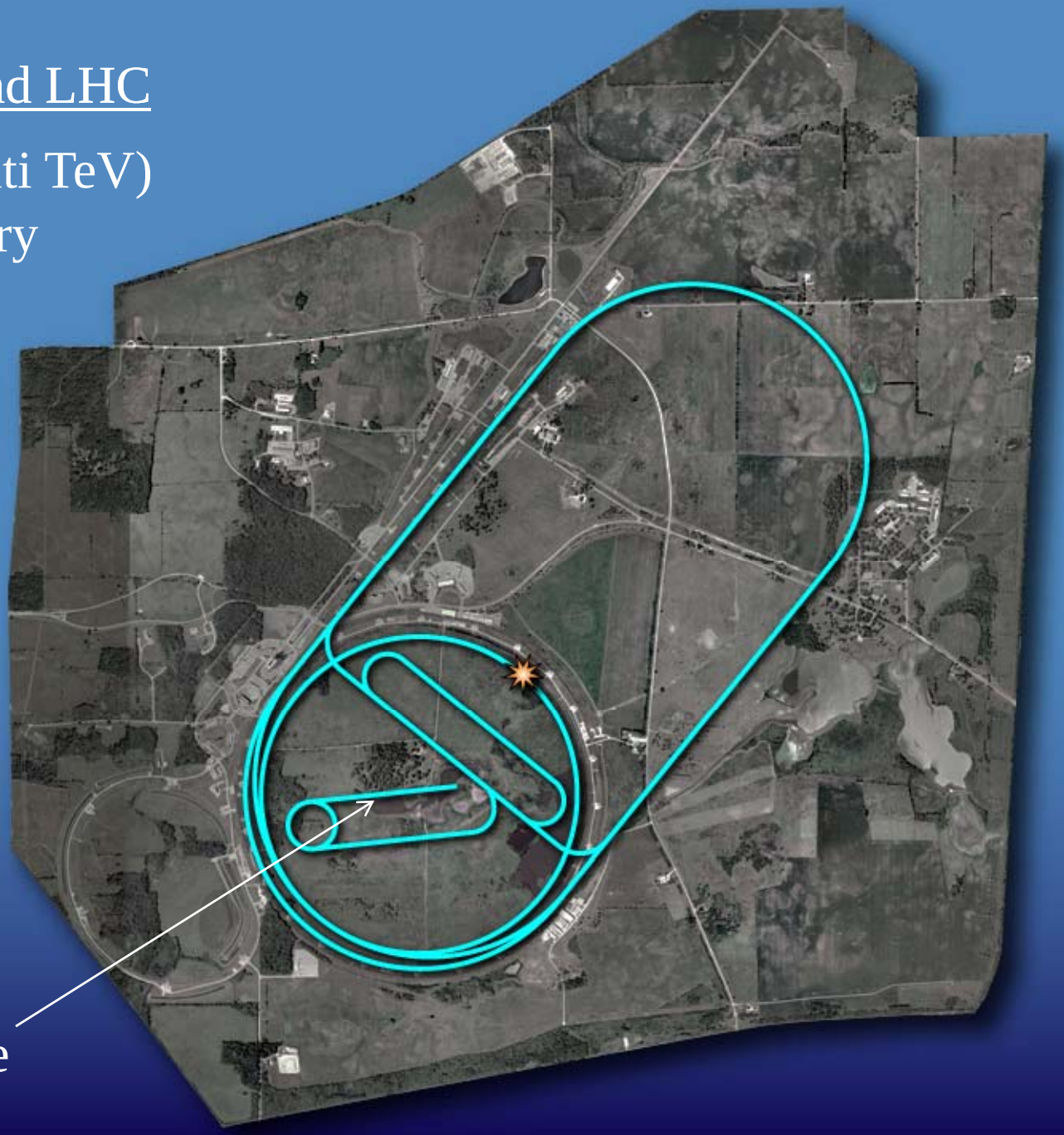
ILC (< ~1 TeV)





## Beyond Project X and LHC

Muon Collilder (multi TeV)
Neutrino Factory



# Project X

- Would be a fantastic machine at the intensity frontier for neutrino, kaon, muon, nuclear physics, …
- Would develop and exercise the technologies to position the US to host a global facility at the energy frontier (or contribute to one elsewhere)
  - ILC and muon collider