

U.S. - RUSSIA Collaboration in Physics: An Example of Fermilab

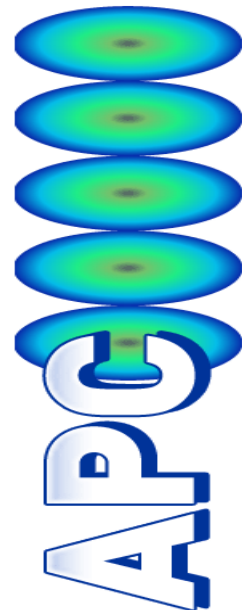
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Fermi National Accelerator Laboratory
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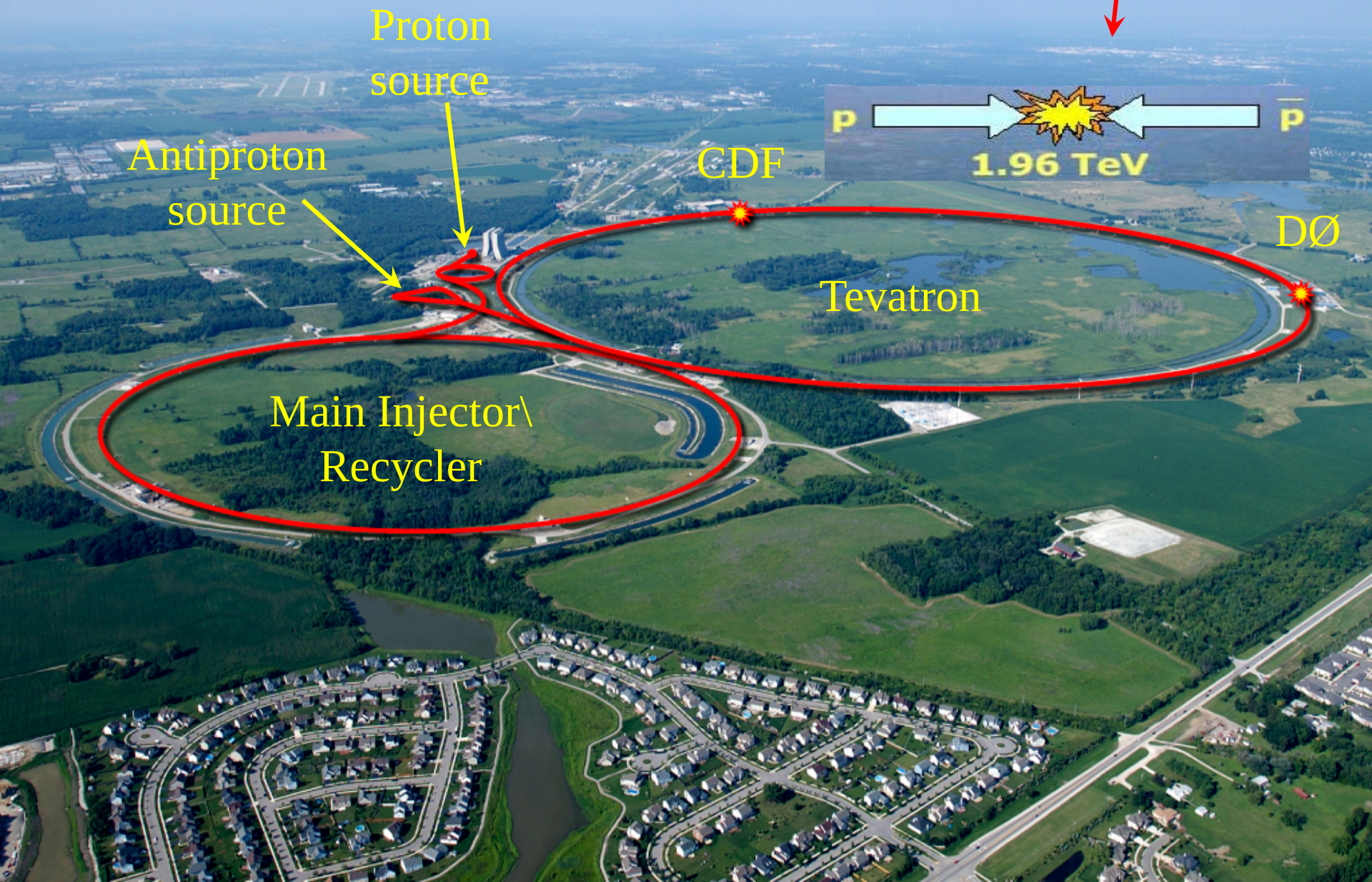
RASA Coordinating Committee



ИЯФ
СОРАН



What is Fermilab?



Fermi National Accelerator Lab

- ~2000 employees
- ~\$400M operating funds
- 2500 users of whom 1000 are from abroad
- 27.5 km², park-like site



- World's highest energy machine
- World's highest intensity ν beam
- World class astrophysics program
- World class theory & computation

Looking for Answers to “Big” Questions:

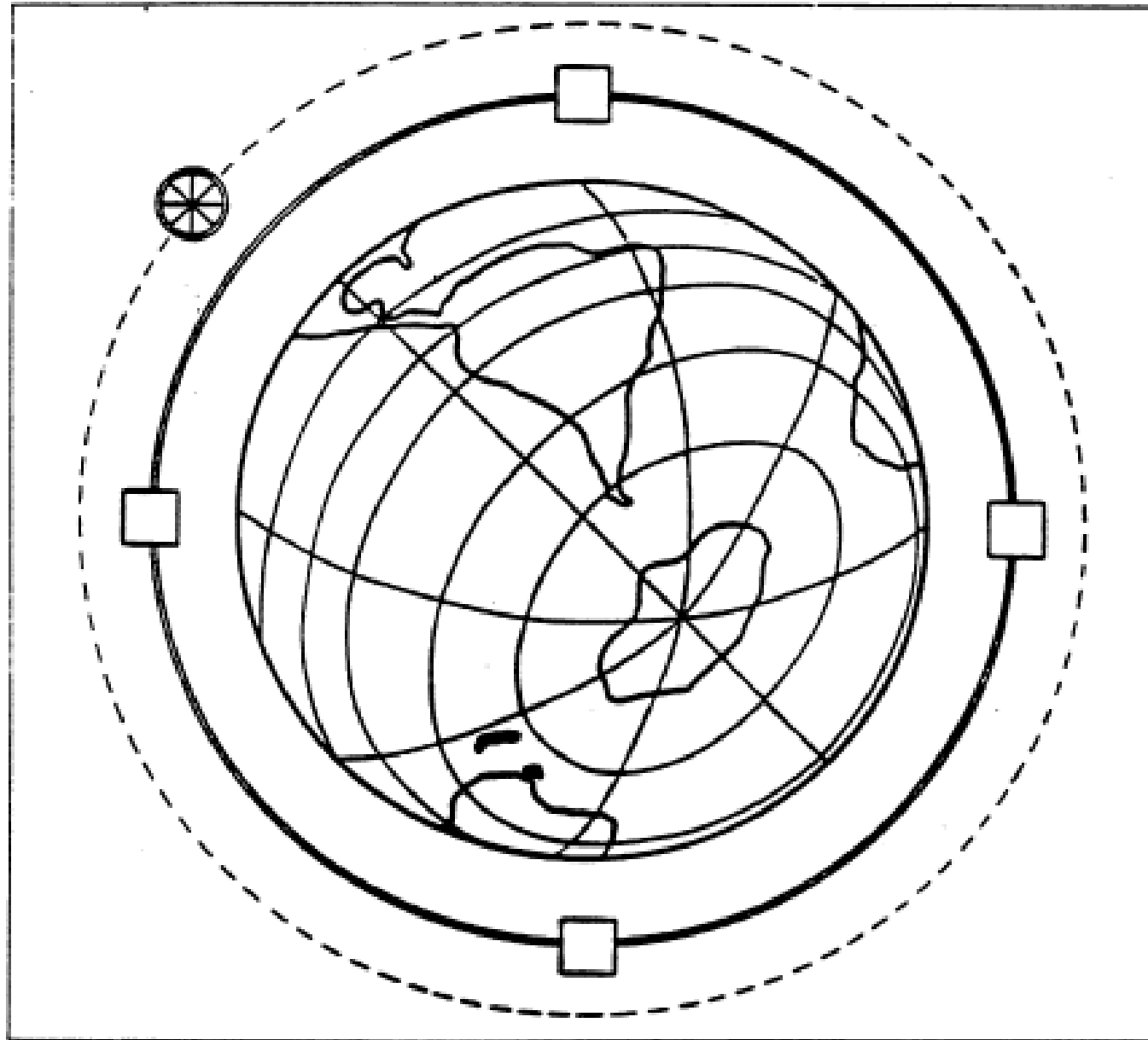
1. How does matter (particles) acquire mass?
2. What are the dark matter and the dark energy that make up almost all the Universe?
3. Why is the Universe as we know it made of matter, with no antimatter present?
4. How did the Universe form?

Comparison

To reach higher a



Muon Co
d=2km



HC
74km

From a 1954 Slide by Enrico Fermi, University of Chicago Special Collections.

Collaboration with Russia

- 10 Institutions:
 - JINR, Dubna
 - ITEP, Moscow
 - IHEP, Protvino
 - Budker INP, Novosibirsk
 - RRC Kurchatov Institute, Moscow
 - PNPI, St.Petersburg
 - Moscow State University
 - Lebedev Physical Institute, Moscow
 - Efremov Institute, st.Petersburg
 - INR, Moscow
 - Russian Universities (Moscow, Novosibirsk, St.Petersburg)
 - More than 200 people come to do research every year
 - Some 50 are in permanent staff of Fermilab
-

An example: Novosibirsk Alumni



- 15 accelerator scientists, alumni of Novosibirsk State University; trained at Budker INP (Novosibirsk)
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Summer Internship at Fermilab

annual program since 1999

PARTI 2009

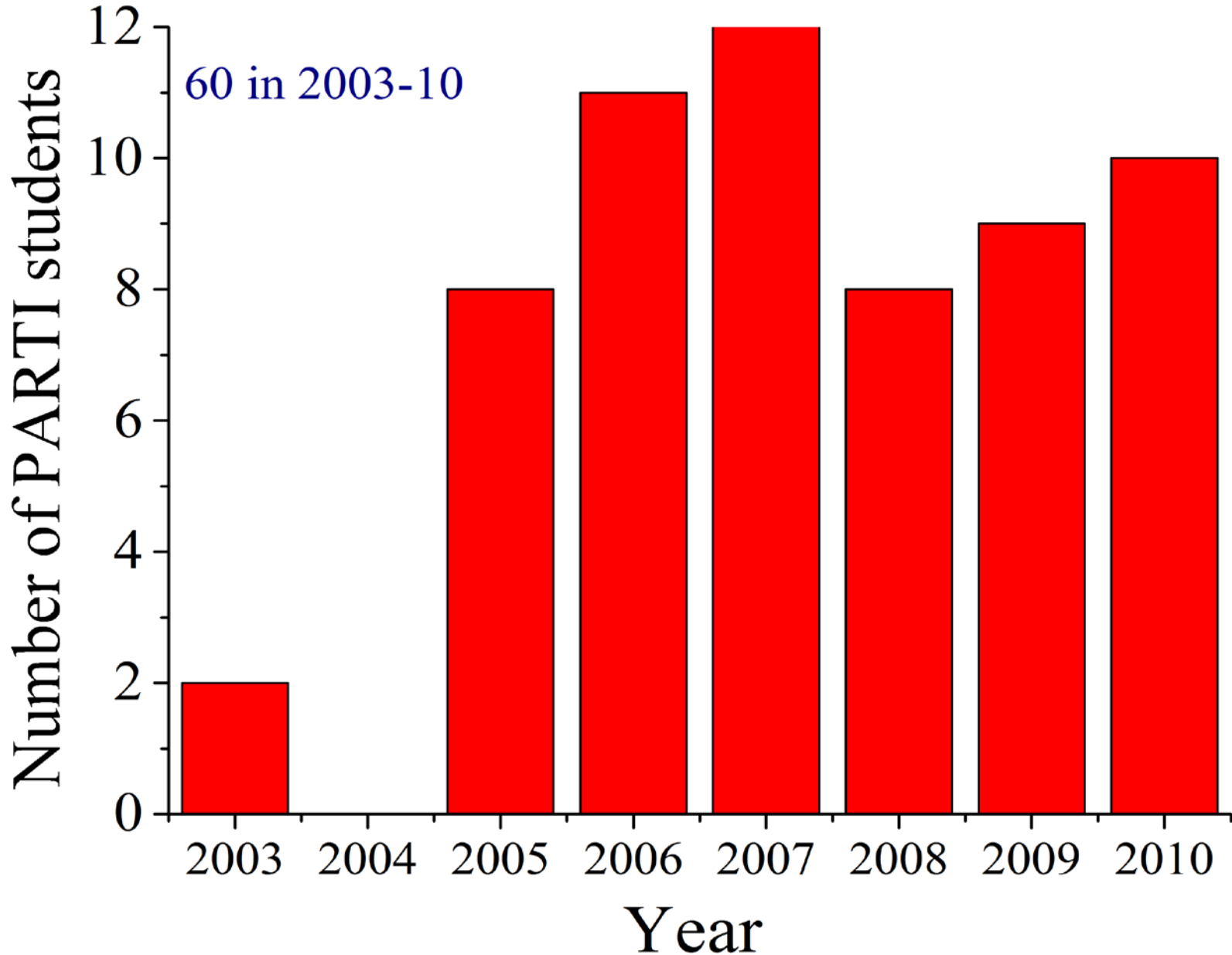
Internship in Physics of Accelerators and Related
Technology for International Studies



<http://apc.fnal.gov/parti/>

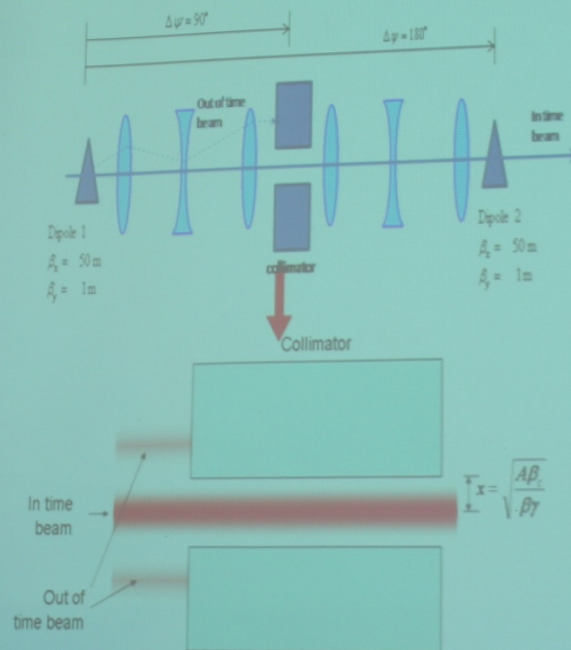
- The program accepts students from universities of the former Soviet Union majoring in Physics, Engineering, and Computer Sciences; ~10 undergraduate students; 3 mos.
- Another program on PhD in Accelerator Physics – research at FNAL (~3 years), the degree in Russia

Number of PARTI Participants

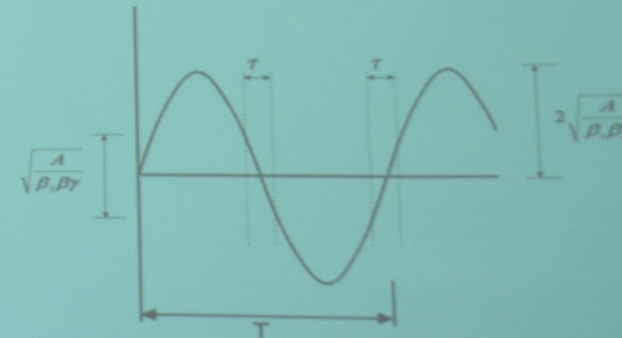


Students Report Their Results

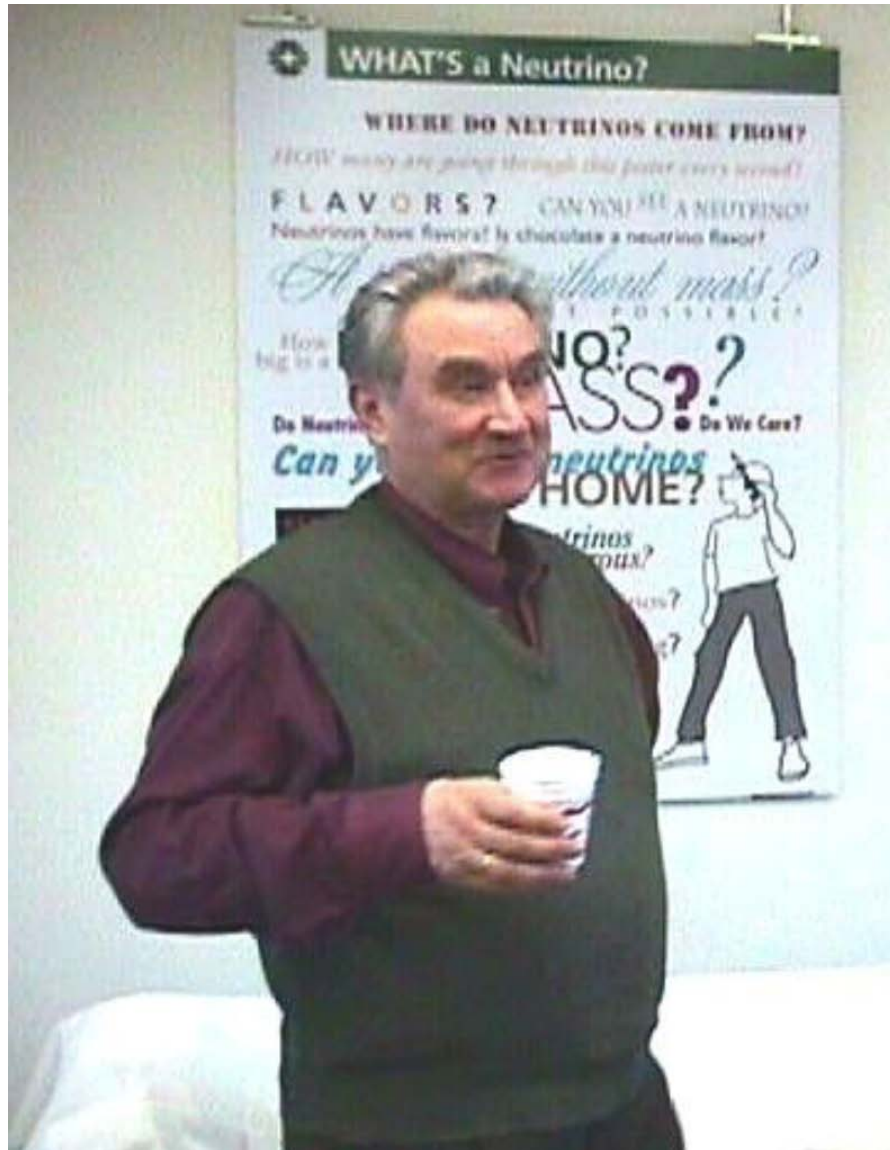
How to clean the beam



- 100 ns bunches separated with $1.7\text{ }\mu\text{s}$ gap
- $1.7\text{ }\mu\text{s} \sim 600\text{ kHz}$
- The bunches are moving on the nodes, so we have to generate only half of the frequency, that is 300 kHz



Founders of PARTI and PhD Programs



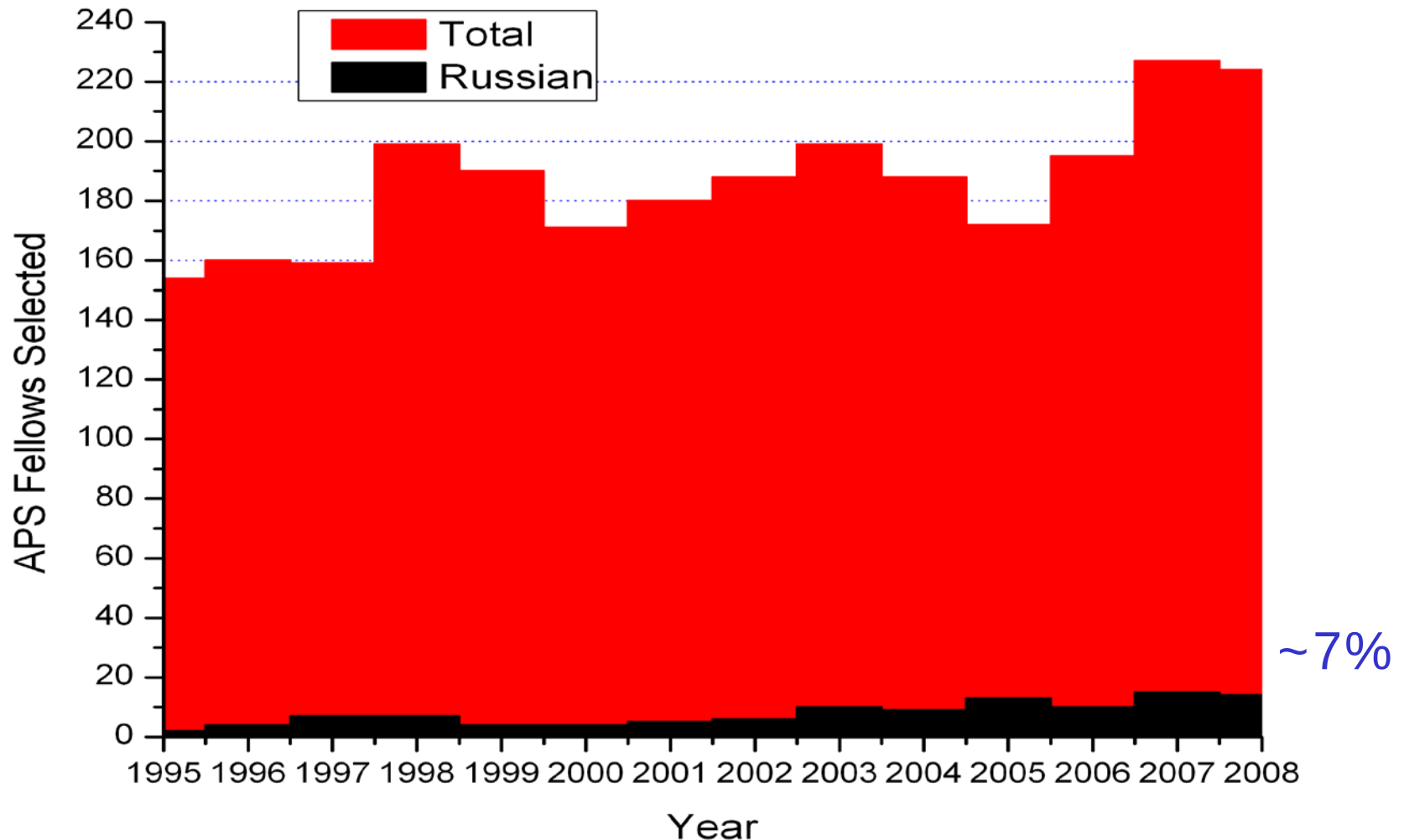
Victor YARBA (IHEP/MPhTI)



Sasha SHEMYAKIN (BINP/NGU)

Russian contribution to US science

Fellows (Honorary Members) of American Physical Society



Another Piece of Statistics

Number of APS Prize Winners

with "FSU Roots"

