NuFACT Study Region 3: Asia

Yoshitaka KUNO
Osaka University

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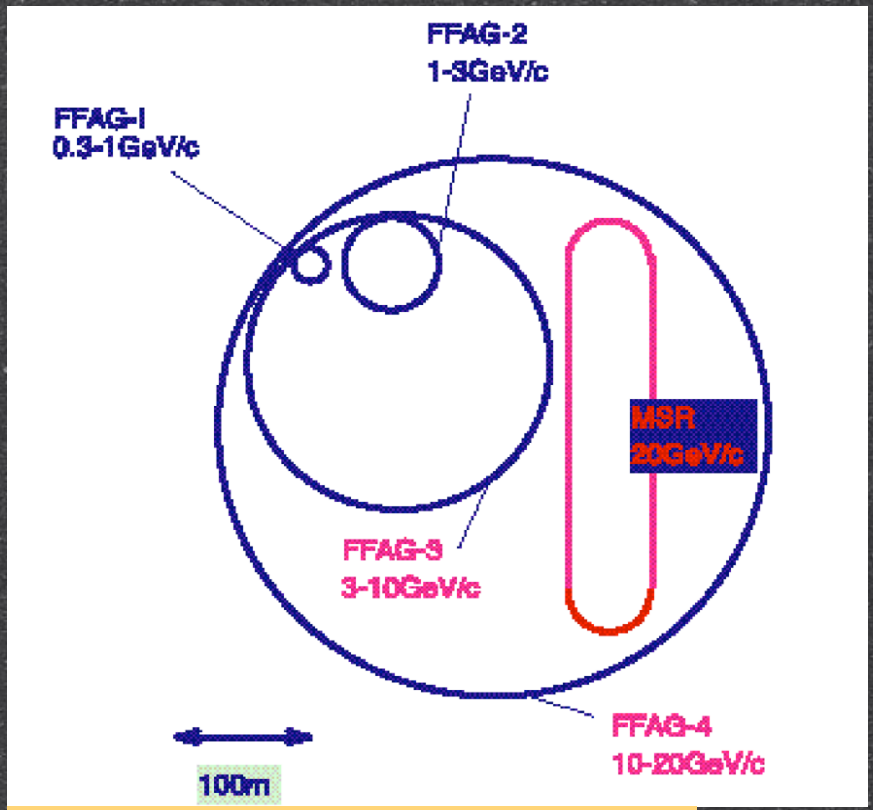
FFAG-based Acceleration

- FFAG
  - Large acceptance
  - Fast acceleration
  - Muon cooling is not mandatory (better if available).
- Advantages
  - less RF cavities and power.
  - simple and compact
  - less R&D item

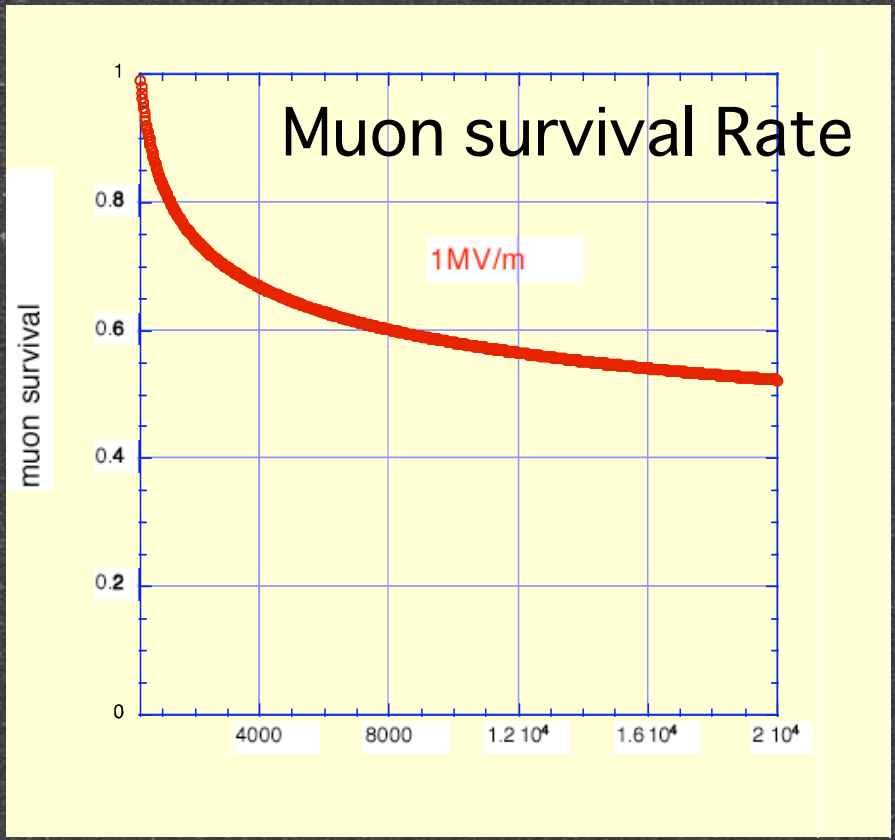
A series of 3-4 FFAG rings



Muon Acceleration based on a series of FFAGs

Muon Yield Estimation

- Muon Capture: 0.3 muons/proton
- Proton intensity: 2×10^{21}/year
- Muon survival rate:0.5 for E=1MV/m to 20 GeV
- Fraction of one straight section: 0.3



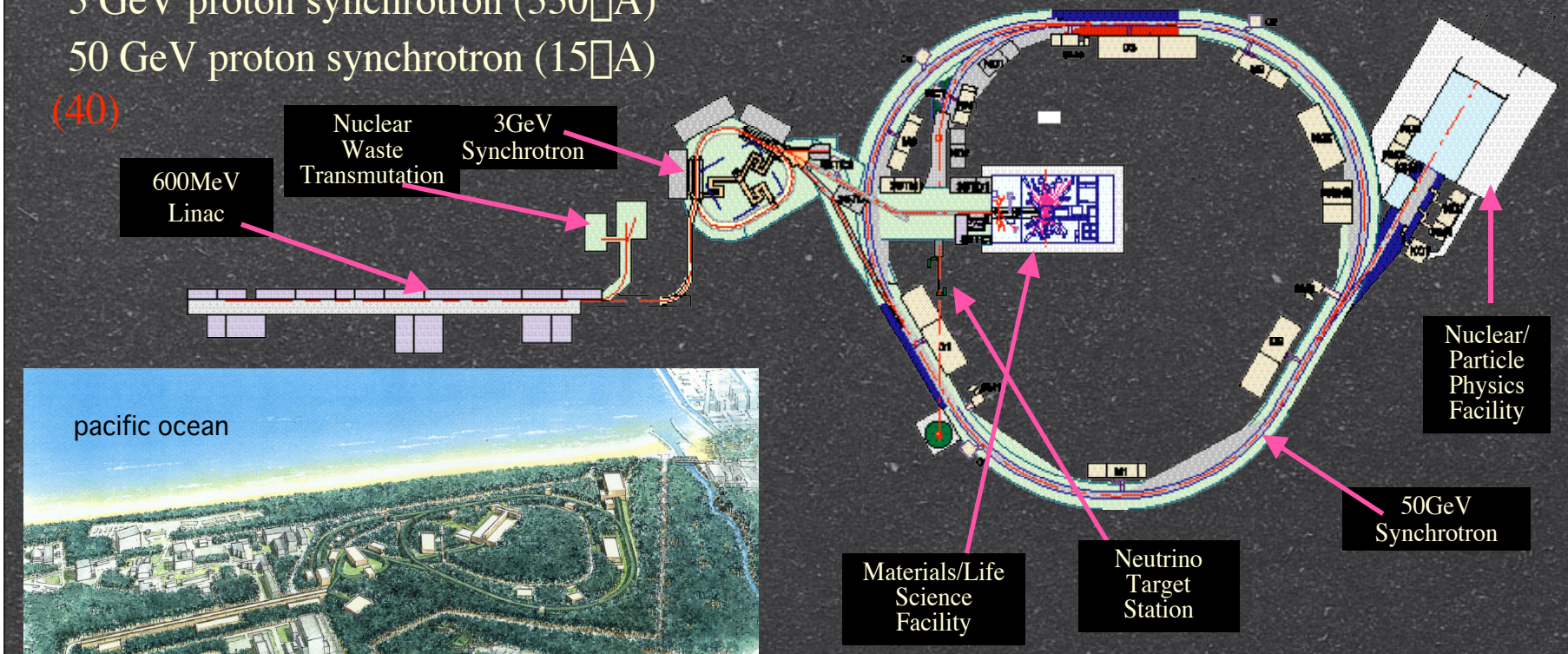
Yield = $2 \times 10^{21} \times 0.3 \times 0.52 \times 0.3$
= 1×10^{20} muons/decay/year

Proton Driver

J-PARC = Japan Proton Accelerator Research Complex

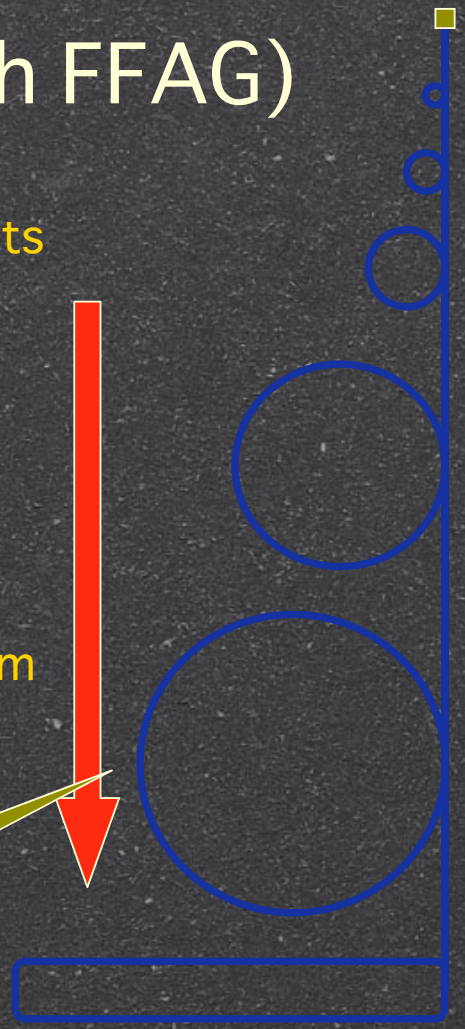
400 (200) MeV proton linac
3 GeV proton synchrotron (330□A)
50 GeV proton synchrotron (15□A)
(40)

At Tokai



Staging Scenario

- Staging scenario (with FFAG)
  - Muon Factory (PRISM)
    - For stopped muon experiments
  - Muon Factory-II (PRISM-II)
    - Muon moments (g-2, EDM)
  - Neutrino Factory-I
    - Based on 1 MW proton beam
  - Neutrino Factory-II
    - Based on 4.4 MW proton beam
  - Muon Collider



70 MeV/c
PRISM

0.3-1 GeV/c

1-3 GeV/c
PRISM-II

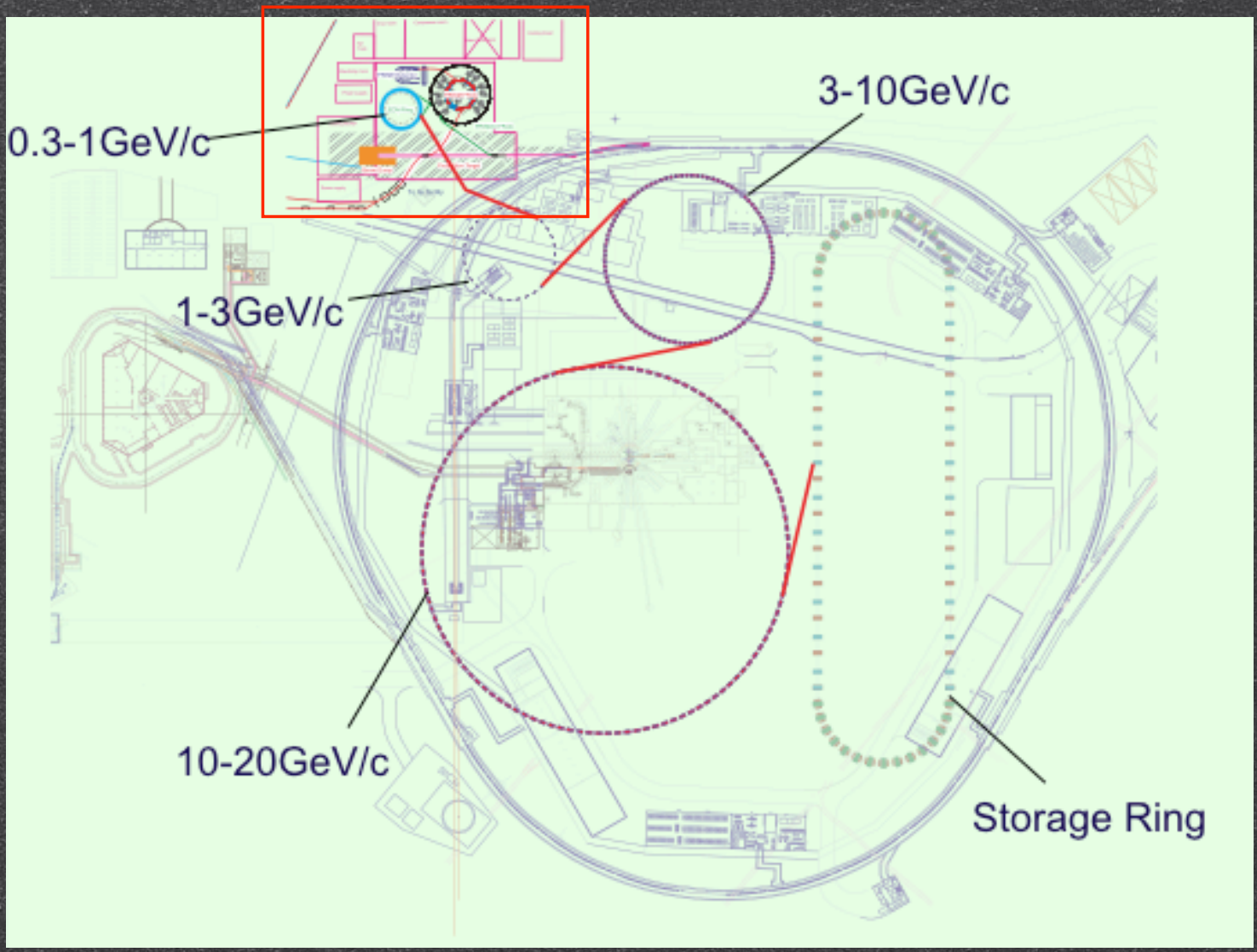
3-10 GeV/c
Nufact-I

10-20 GeV/c
Nufact-II

Muon
Storage Ring

Physics outcome
at each stage

NuFACT at J-PARC

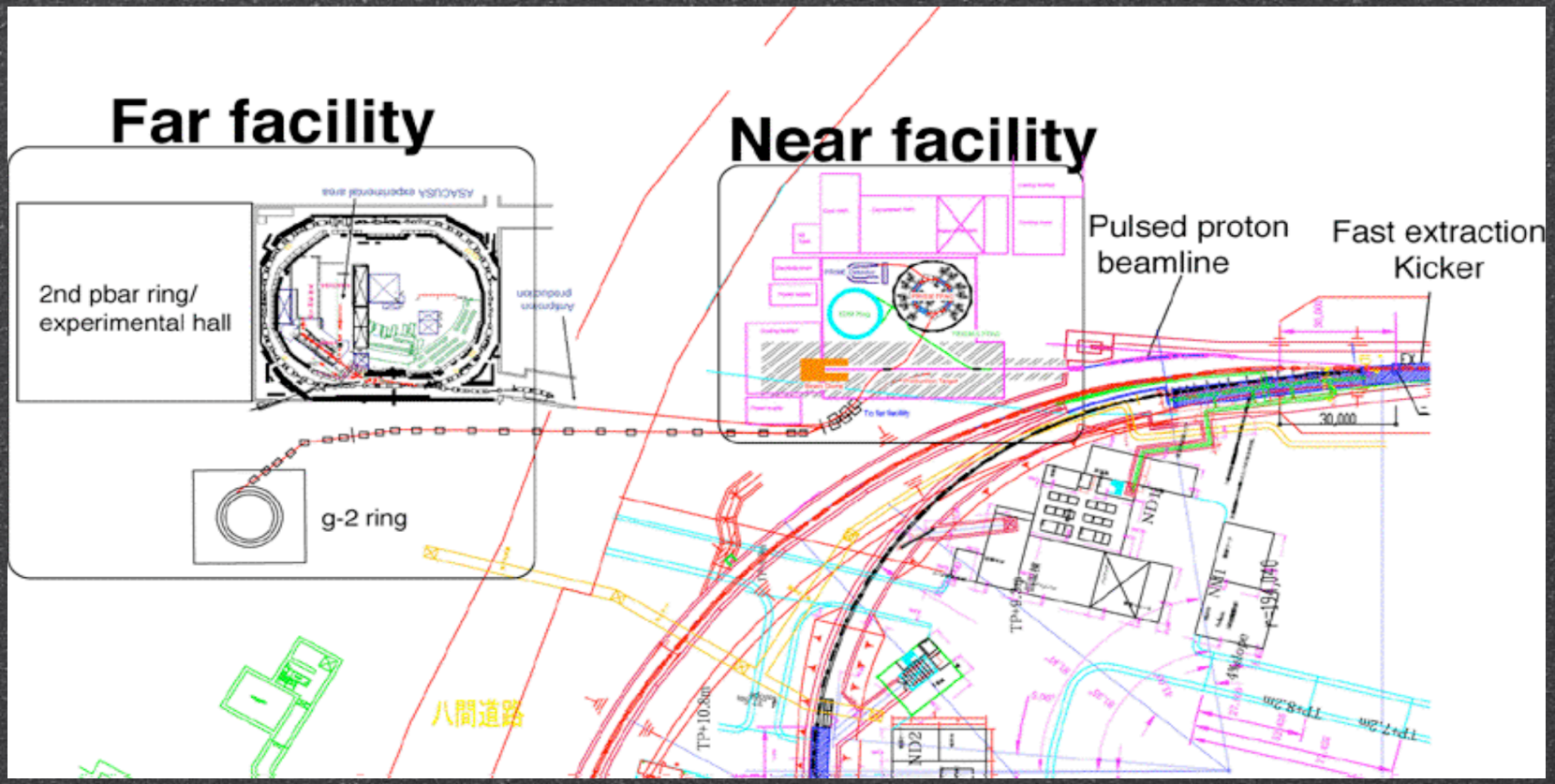


Pulsed Proton Beam Facility

Pulsed Proton Beam Facility is newly requested to J-PARC.

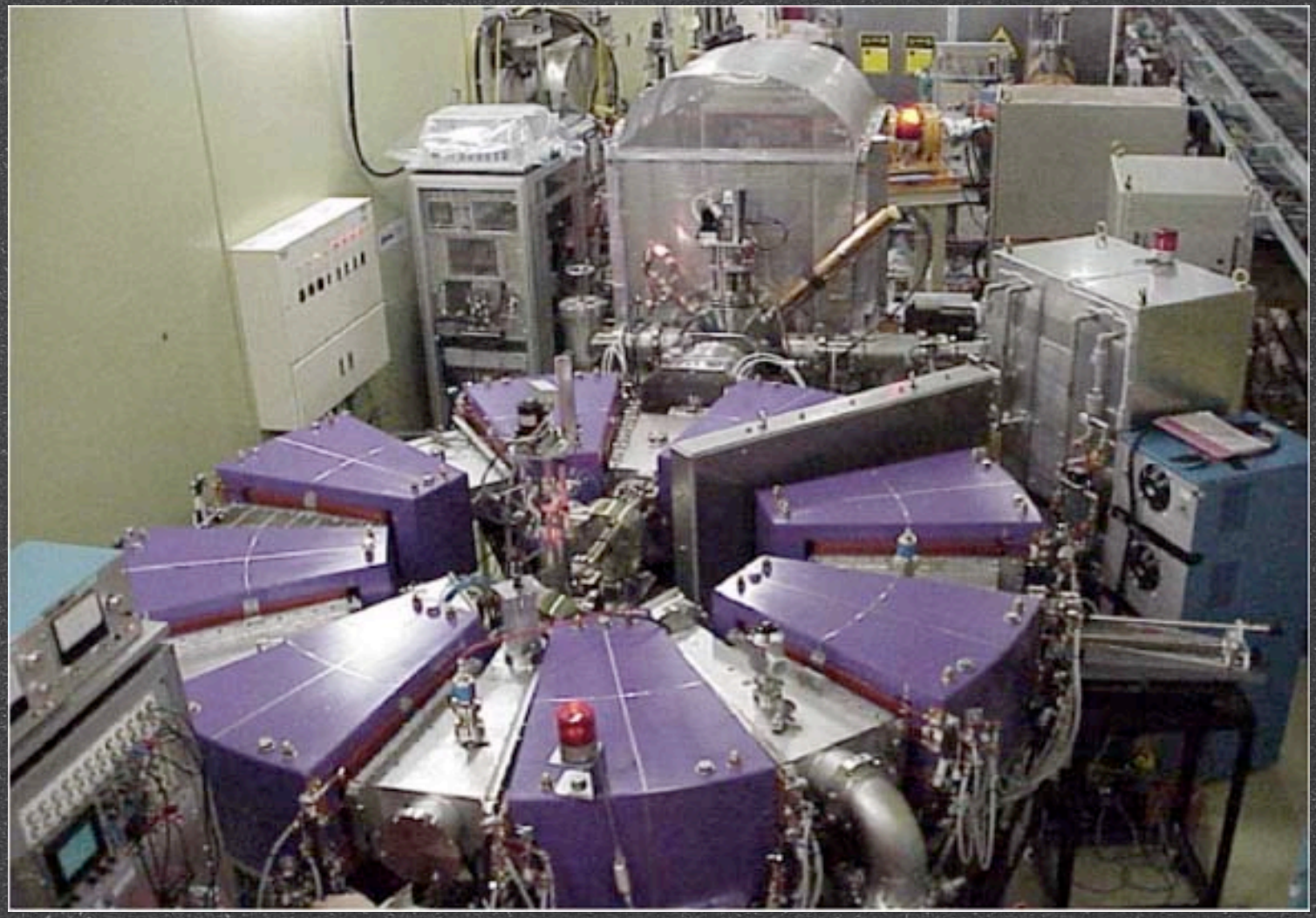
muon g-2
and anti-protons

PRISM and
PRISM-II(muon EDM)



FFAG R&D

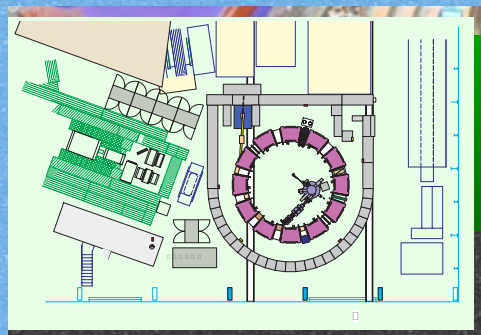
POP 500-keV Proton FFAG

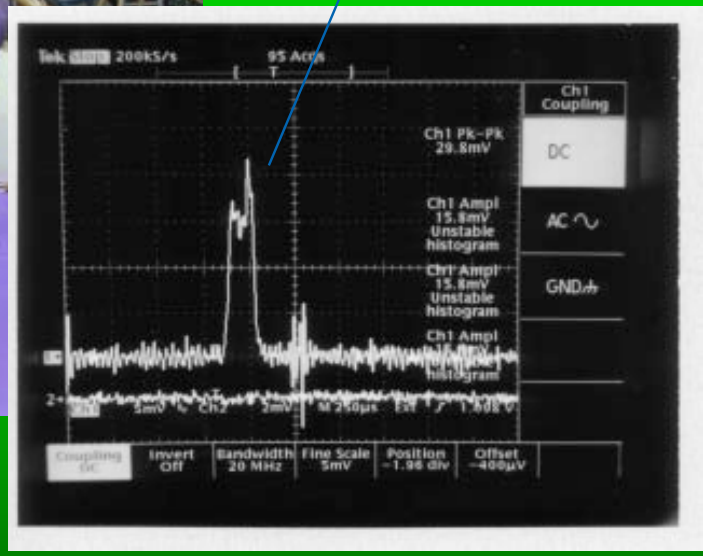


150-MeV Proton FFAG

under commissioning

150-MeV FFAG floor plan

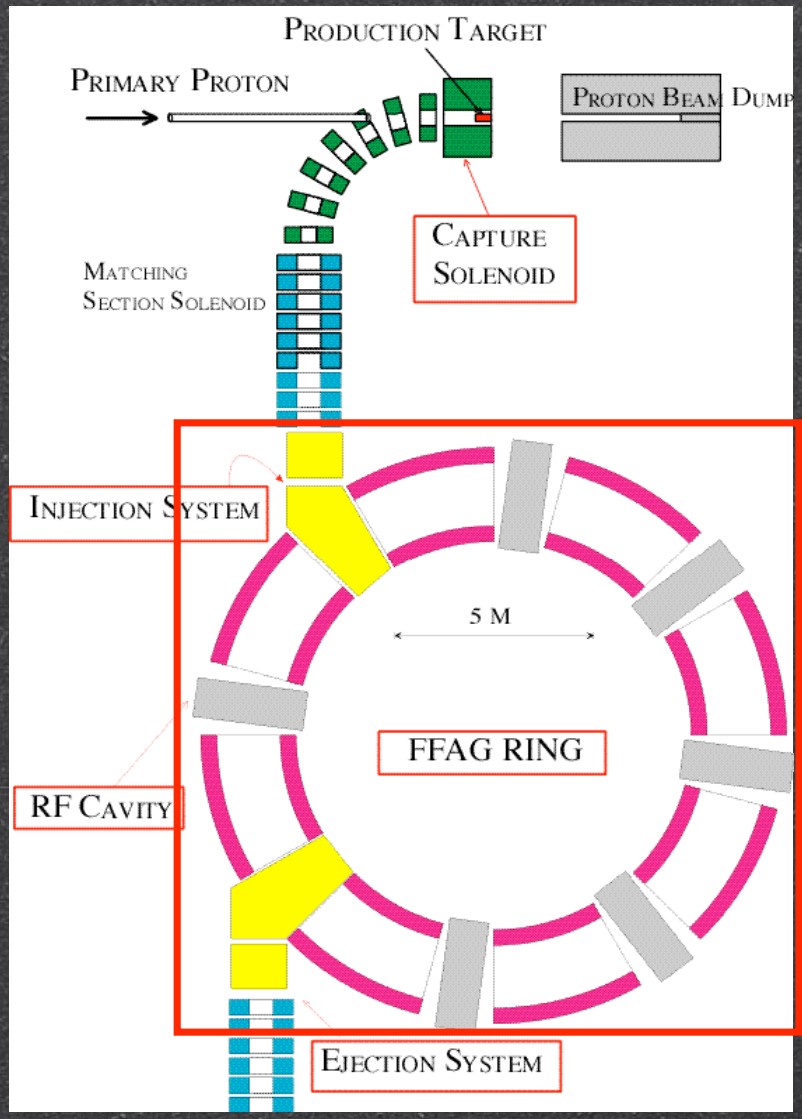




PRISM

PRISM=Phase Rotated Intense Slow Muon source

- Specifications
  - muon intensity: 10^{11}~10^{12} /sec
  - central momentum: 67-120 MeV/c
  - momentum width: 3 % (<--- 30 %)
    - phase rotation

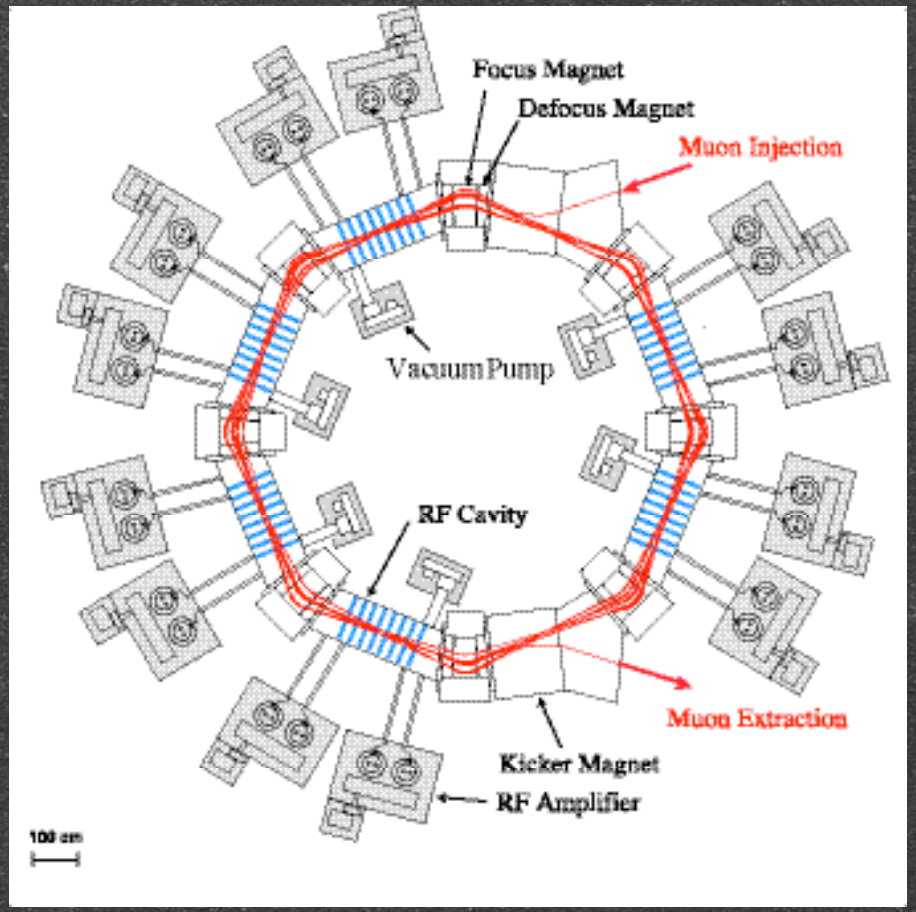


PRISM ring construction has been approved.

PRISM

PRISM=Phase Rotated Intense Slow Muon source

- Components
  - 8 FFAG magnets
  - 1 RF
  - 1 kicker magnet
- 5 year plan
  - 3-year construction
  - 2-year tests
  - demonstration of muon acceleration, muon phase rotation, and muon cooling.



The first FFAG for muon acceleration

New FFAG Study

Design Activities

- The original idea was presented at NuFACT'02 (May, 2001, Monterey).
- The first Japanese study report, May 2002.
  - "A Feasibility Study of Japanese Neutrino Factory in Japan"
- Recent Activities
  - Monthly international FFAG vide conferences
  - Annual international FFAG workshops

There is the time of another FFAG-based Study.

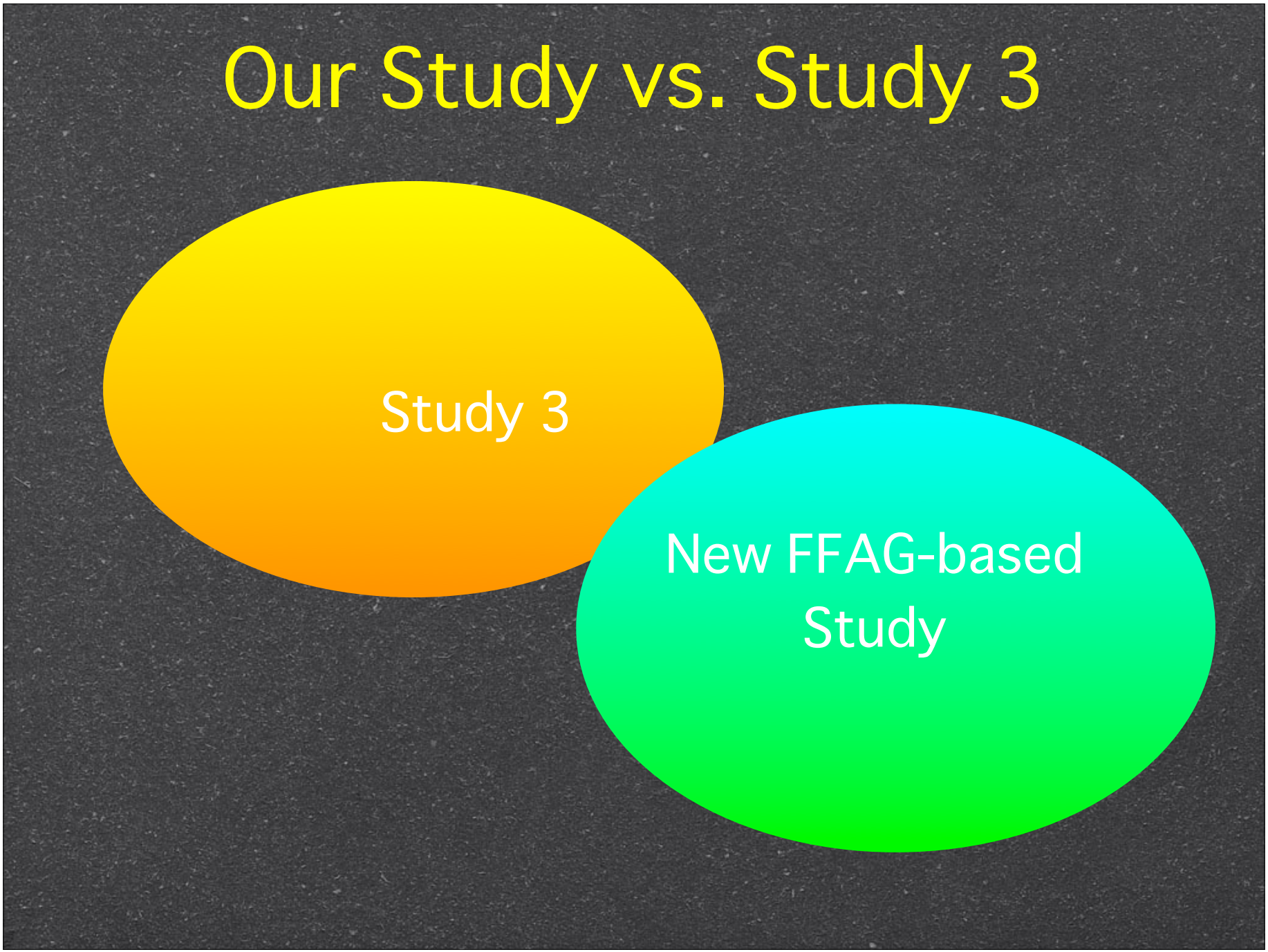
Our New Study Will...

in a year or so.

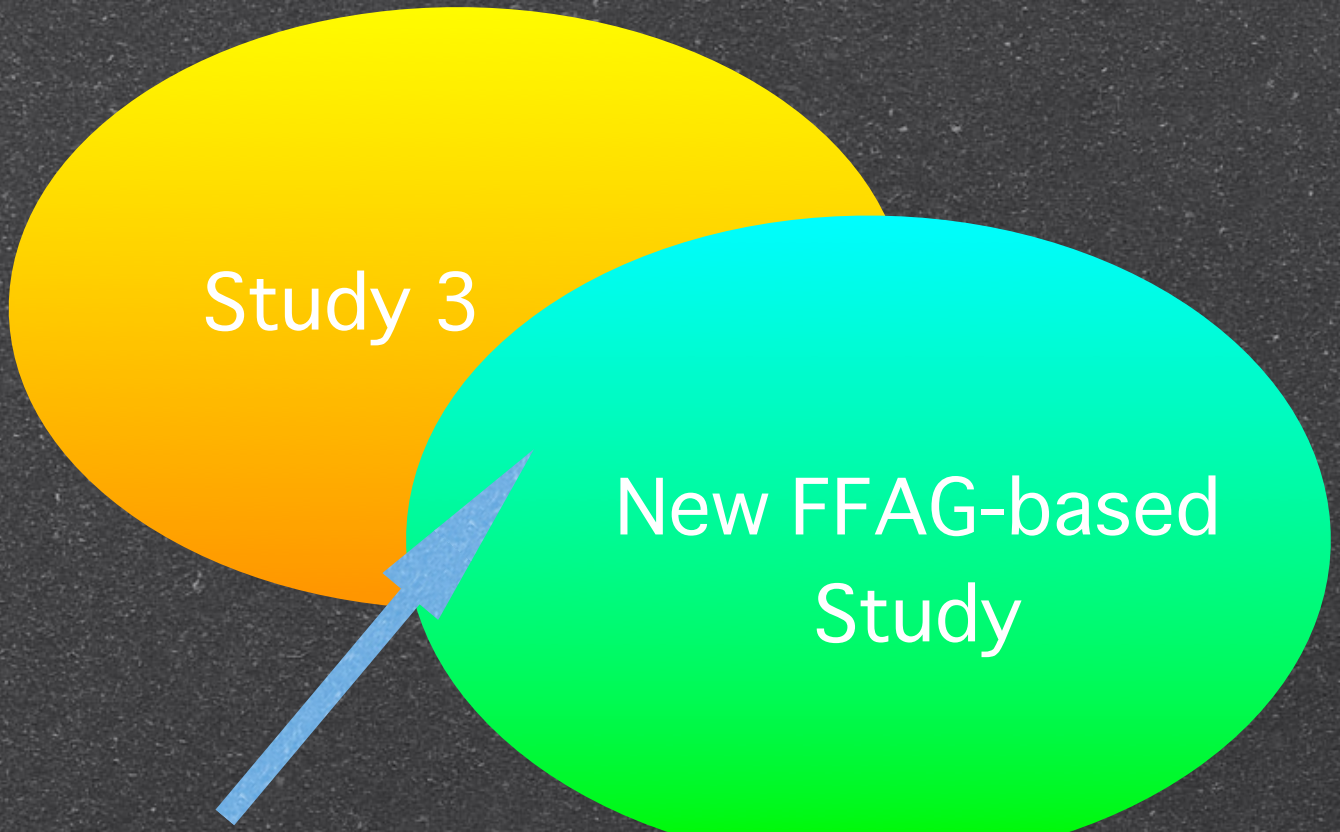
- Compare
  - scaling vs. non-scaling FFAGs,
  - high freq. RF (with multi-bunches) vs. low freq. RF,
- Be site-independent,
  - no default assumption of J-PARC proton driver,
- Be international (US, Europe and Asia), and
- Aim possible hardware prototyping.

Details will be discussed at the KEK FFAG workshop, July 4-11, 2003.

Our Study vs. Study 3



Our Study vs. Study 3



If FFAG-acceleration is considered.

Summary

- The Japanese group has been studying a FFAG-based neutrino factory (since 2001).
- Hardware studies
  - 150 MeV proton FFAG in commissioning.
  - Construction of PRISM-FFAG ring has just began (the first muon-dedicated FFAG).
- Design study activities
  - FFAG video conferences and workshops
- We like to start a new international, site-independent study on a FFAG-based NuFACT.

Welcome to Join !