
Neutrino Projects in Japan

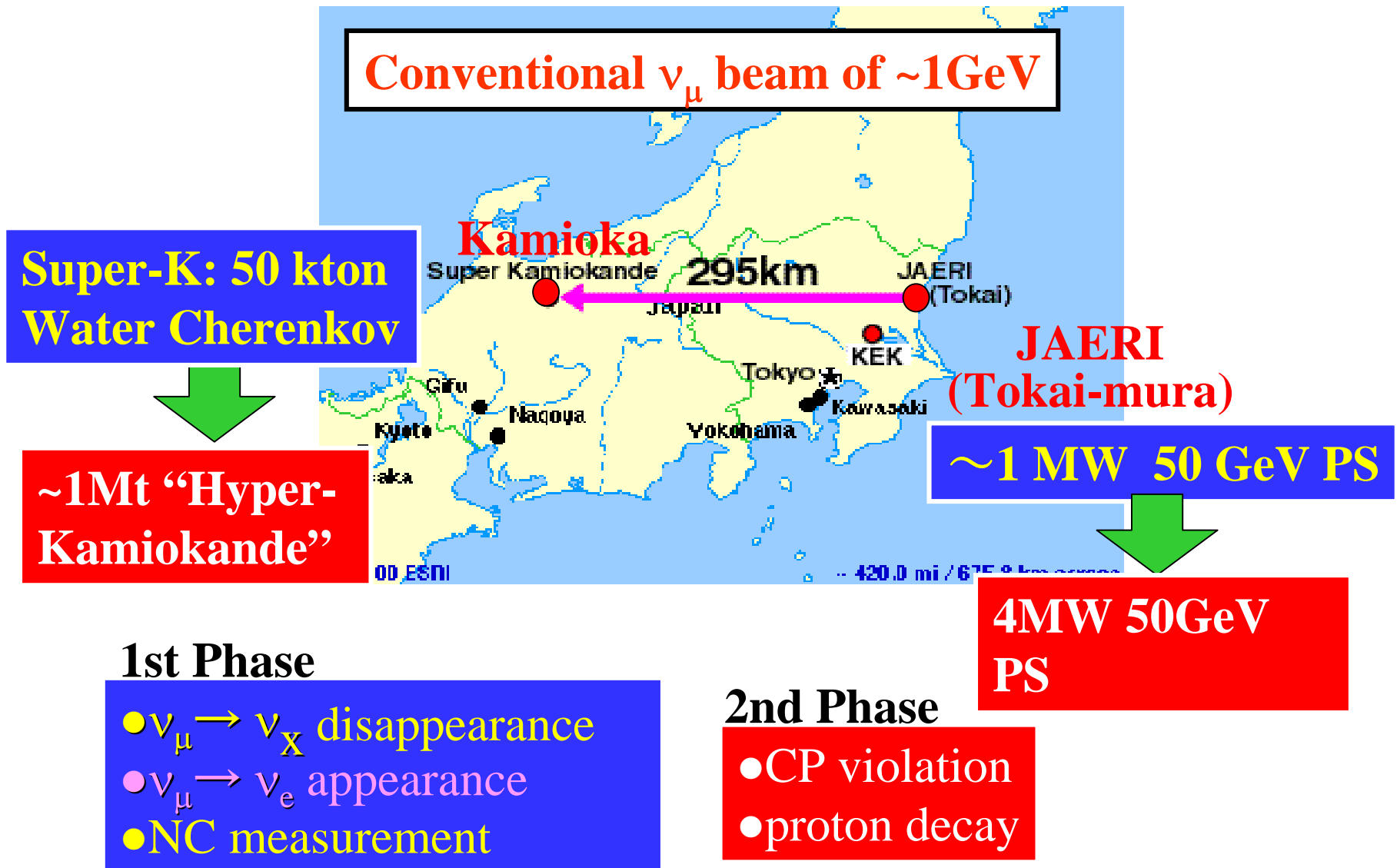
K. Nakamura

KEK

NNN02, CERN

January 18, 2002

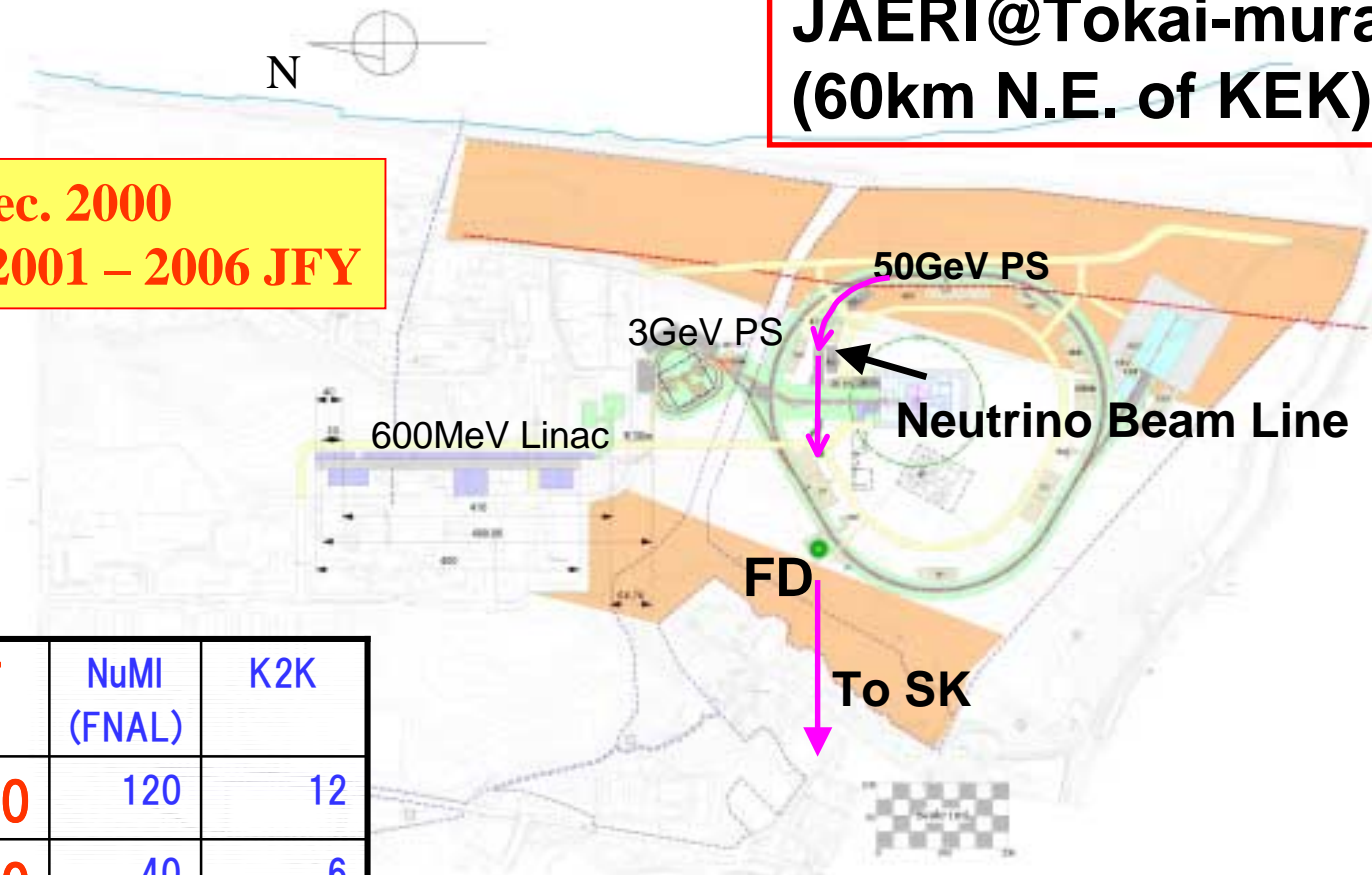
Overview of JHF-Kamioka ν Project



JHF Project and Neutrino Beam Line

**JAERI@Tokai-mura
(60km N.E. of KEK)**

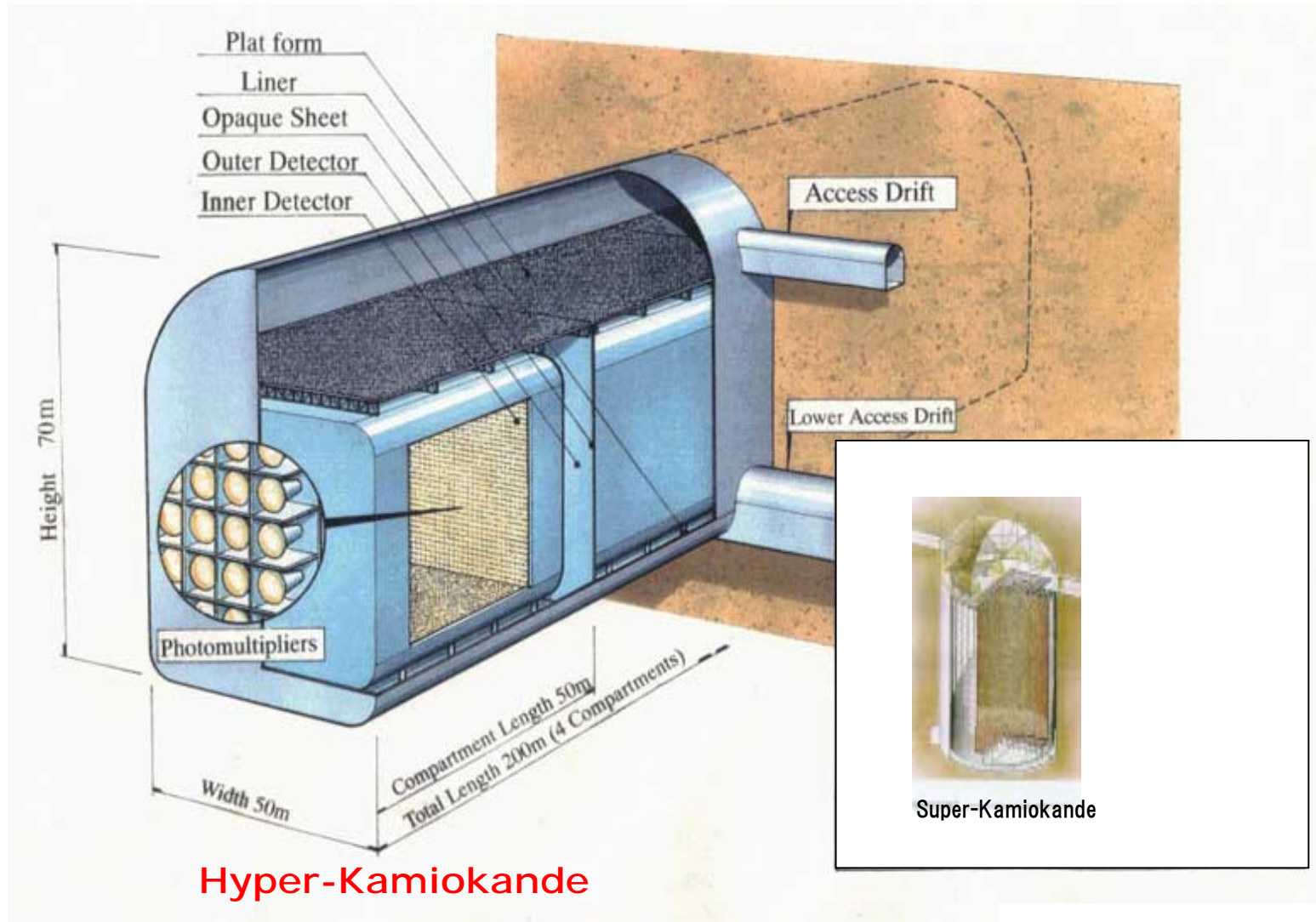
- **Approved in Dec. 2000**
- **Construction: 2001 – 2006 JFY**



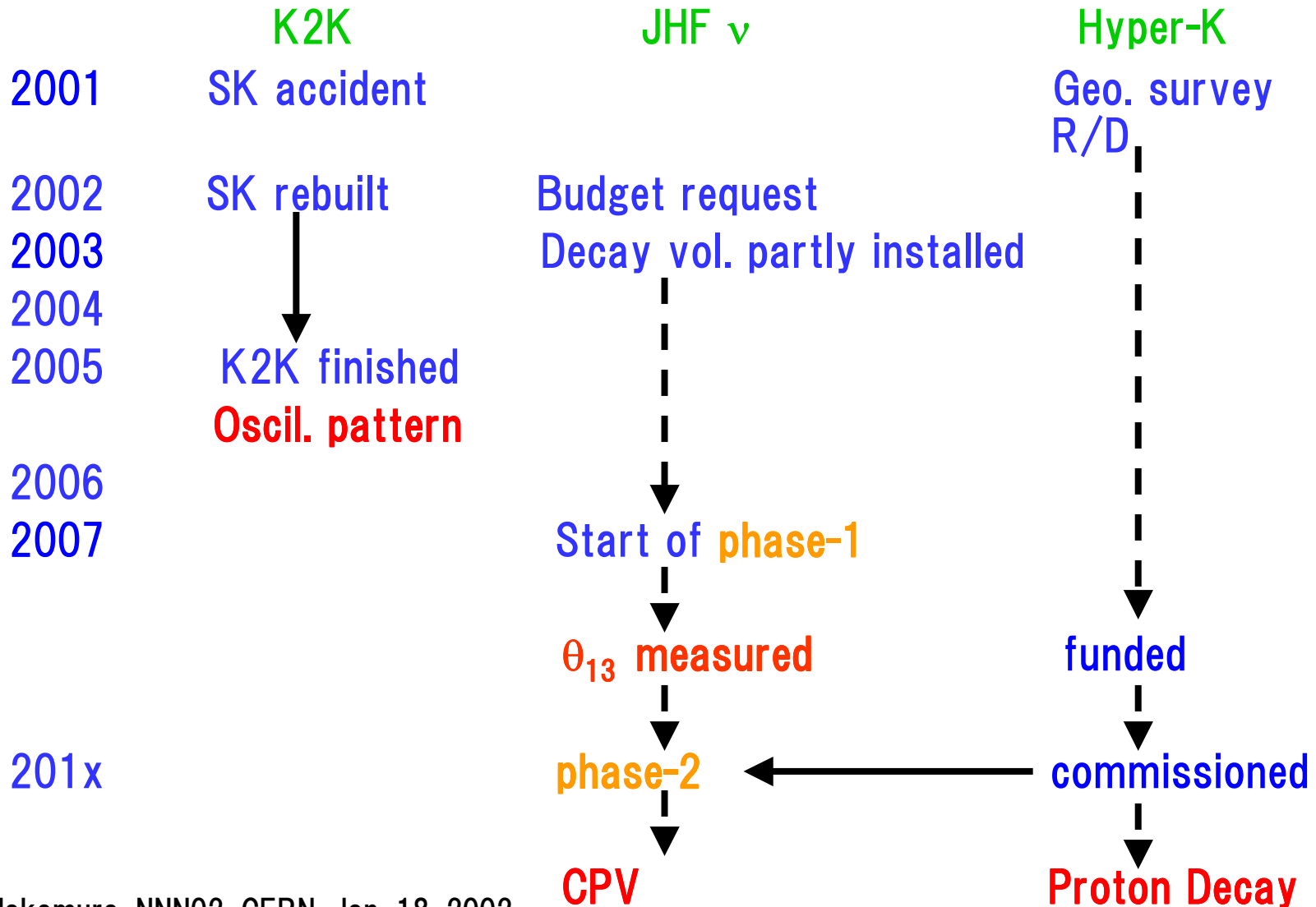
	JHF	NuMI (FNAL)	K2K
E(GeV)	50	120	12
Int.(10^{12} ppp)	330	40	6
Rate(Hz)	0.292	0.53	0.45
Power(MW)	0.77	0.41	0.0052

10^{21} POT (130day) \equiv “1 year”

Hyper-Kamiokande



Road Map (Wished by K2Kers)



Call to Form the JHF2K Collaboration

Meeting at Kyoto University on March 9

Those who are interested, please contact Prof.
K. Nishikawa (nishikaw@neutrino.kek.jp)

LOI can be found at <http://neutrino.kek.jp/jhfnu>

A Study of Neutrino Factory in Japan

Yoshitaka Kuno/Joe Sato

Snowmass 2001

May 9th, 2001

Energy vs. Distance - Options

■ Direct CP measurement

- Muon Energy : 10 GeV
- Long-baseline length : < 1000 km

■ Indirect CP measurement

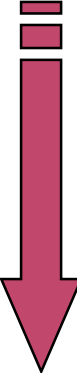
- Muon Energy : 20 - 50 GeV
- Long-baseline length : 2000 - 3000 km

■ Japanese Approach

- Circular machine-acceleration based
- FFAG (Fixed Field Alternating Gradient synchrotron)
 - Large transverse and longitudinal acceptance
 - A fixed field allows quick acceleration
- Low Frequency RF (~ 1 MV/m)
 - Large aperture

Japanese Neutrino Factory Parameters

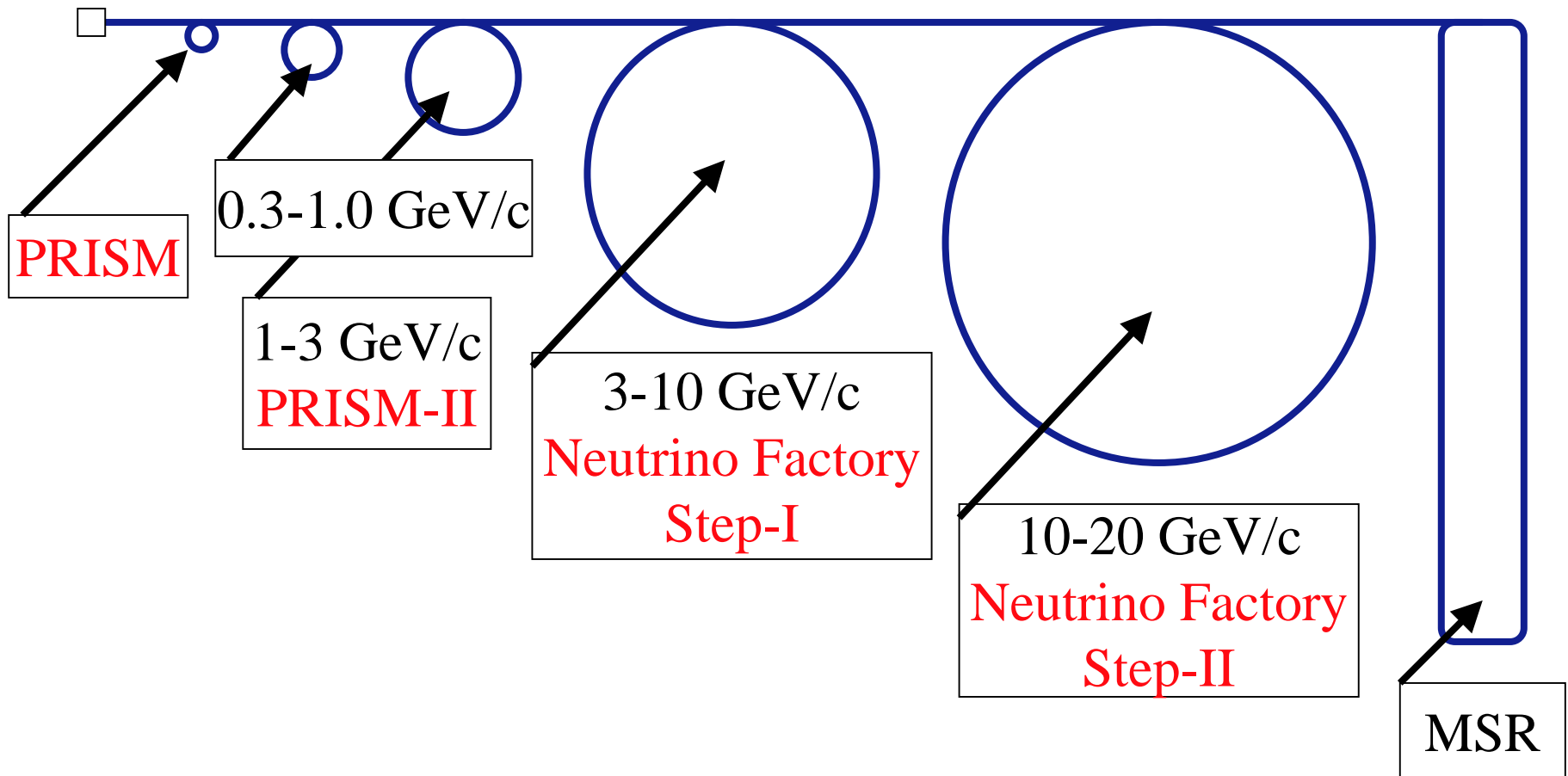
Neutrino Factory-I

- 
- 1×10^{20} muon decays/year at one straight section
 - Based on 1-MW 50-GeV PS
 - Muon energy: 10 GeV
 - Energy is determined by cost and physics topics.
 - Location: JAERI Tokai campus

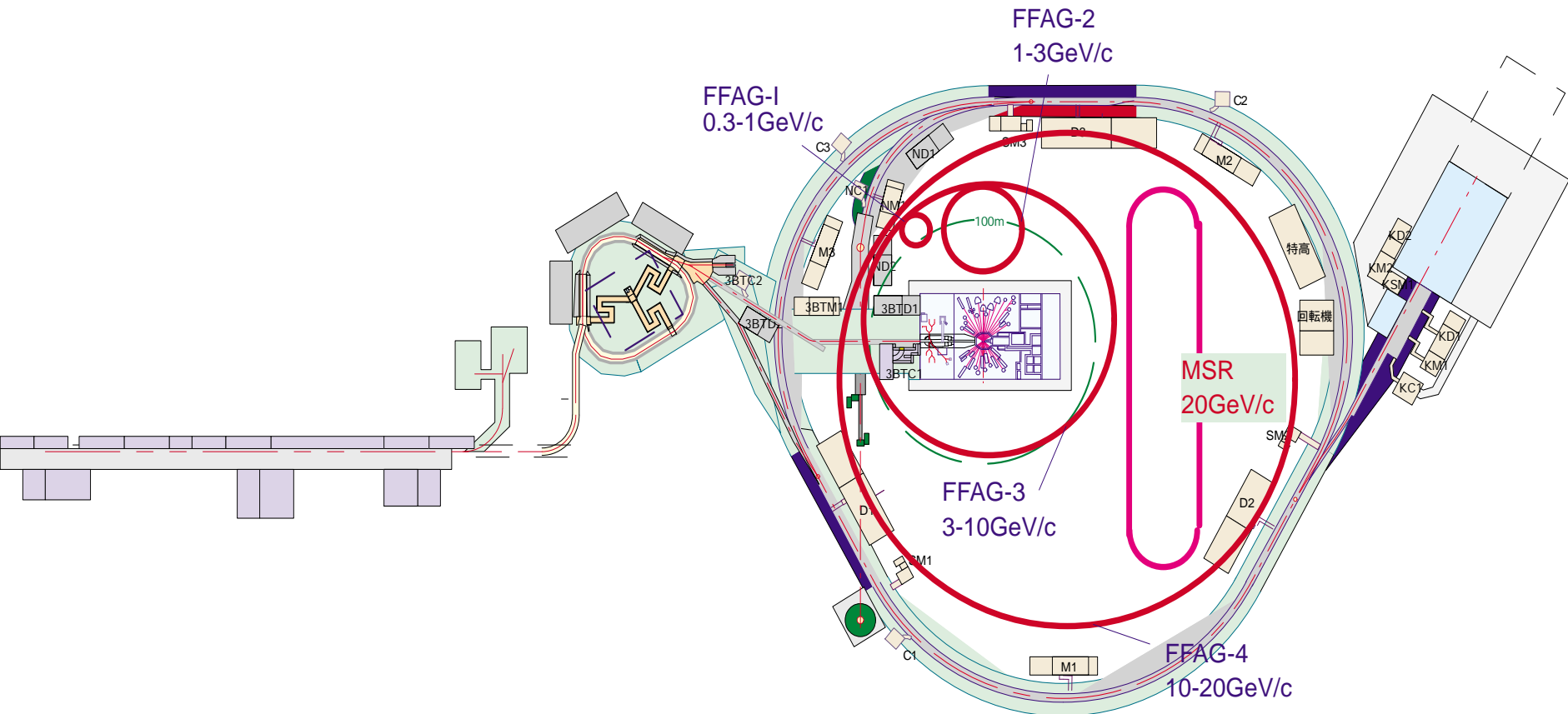
Neutrino Factory-II

- 4.4×10^{20} muon decays/year at one straight section
- Based on upgraded 4.4-MW 50-GeV PS
- Muon energy: 20 - 50 GeV

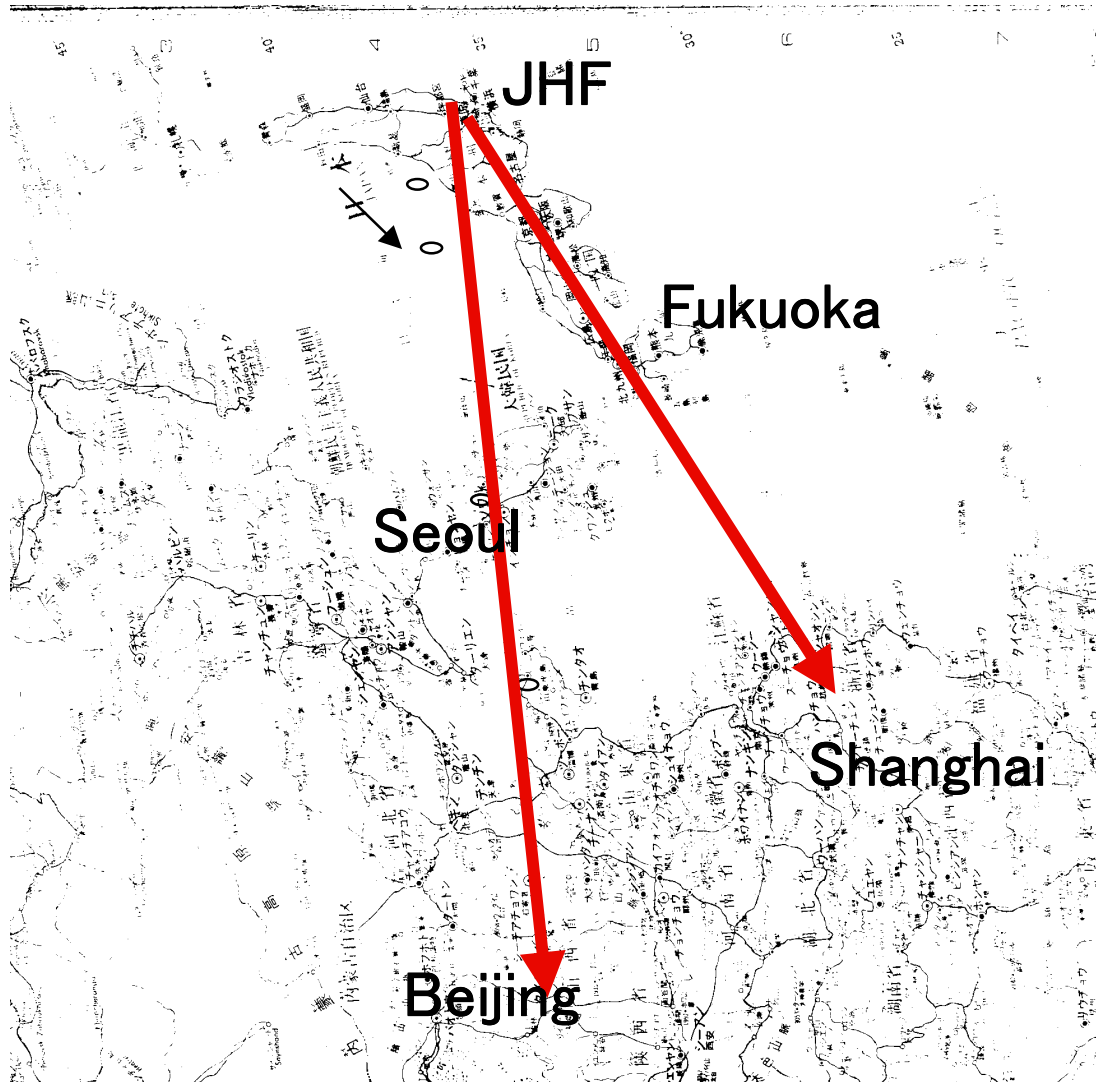
FFAG-based Staging Scenario



FFAG based Neutrino Factory



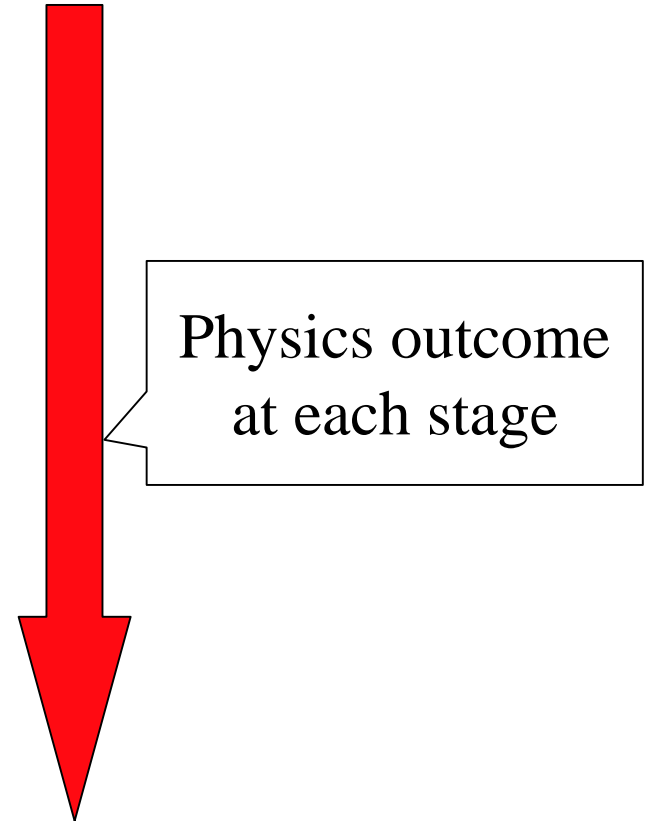
Long Baselines ?



Or Hawaii ?

Staging (FFAG-Based)

- Muon Factory (PRISM)
 - For stopped muon experiments
- Muon Factory-II (PRISM-II)
 - Muon moments
- Neutrino Factory
 - Based on 1 MW proton beam
- Neutrino Factory-II
 - Based on 4.4 MW proton beam
- Muon Collider



(Wished) Time Line

- 2001: JHF (phase-1) construction starts
- 2006: JHF (phase-I) completed
- 2007: JHF-SK starts
- 2007: PRISM starts
- 2007: JHF(phase-II) construction starts
- 2010?:JHF upgrade
- 2010? HK?
- 2010? Neutrino Factory-I

My Personal View: JHF ν Phase I

- JHF ν Phase I is yet to be funded by the Japanese Government.
- I am not very much optimistic, but at the same time not very much pessimistic.
 - In the Ministry of Education, Culture, Science and Technology, and also even in the Ministry of Finance, there are officers who have understanding in this project.
 - However, at the moment they unanimously say that the JHF2K Project should be covered within the entire budget for JHF Phase I.
 - But, the JHF Project has been started as a future project of the Japanese Nuclear Physics Community. The Project Leader is a nuclear physicist. Also, there are a lot of users who wish to do hypernuclear physics, kaon rare decay physics, etc. They do not agree to convert the budget for the slow-extraction facility and experimental hall to that for the neutrino project.
 - So, we have to get an additional funding from the government, but the present situation of the Japanese economy would make it not easy. In addition, the Japanese policy for the promotion of science has more and more oriented to applications.
 - I believe that the JHF ν Phase I will be funded, but whether it can be ready at the time of the 50-GeV PS commissioning (expected in March, 2007) is not yet clear.

My Personal View: Further Future

The future high-energy physics program in Japan is strongly coupled with the fate of the linear collider project.

- If Japan is to host JLC, it would be impossible for other major high-energy physics project to get funded.
 - The first priority for the future projects of the Japanese high-energy physics community is JLC.
 - JLC most probably costs more than 10 times the Hyper-K, and probably a few times more than the neutrino factory at JHF.
- Therefore, the future beyond JHF ν Phase I is not very clear. However, the bottom line is that Japan will have a proton driver, high-intensity 50-GeV PS, in near future, and it has a great potential for promoting neutrino physics further.