

An aerial photograph of the KEK (High Energy Accelerator Research Organization) campus. The image shows a large complex of buildings, mostly with blue and white roofs, surrounded by green fields and some forested areas. A road or railway line runs along the left side of the campus. The text is overlaid in a bold, blue font.

Open Meeting for SuperKEKB Proto-collaboration

March 19-20, 2008

**4-gokan, Seminar Hall
KEK**

KEK Roadmap

2006 | 2008 | 2010 | 2012 | 2014 | 2016 | 2018

- **J-PARC**



- **KEKB**



- **LHC**



- **PF/PF-AR**



- **R&D for Advanced Accelerator and Detector Technology**



- ERL**



- PF-ERL**



- ILC**



Very Preliminary

High Energy Physics in the Next Decade



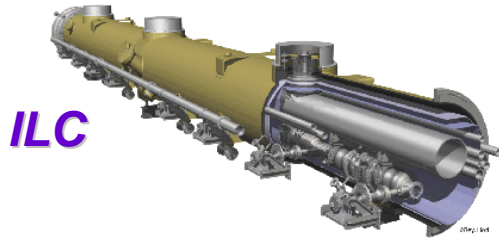
LHC

Energy frontier experiments
LHC, ILC, ...

Higgs, SUSY, Dark matter,
New understanding of space-time...

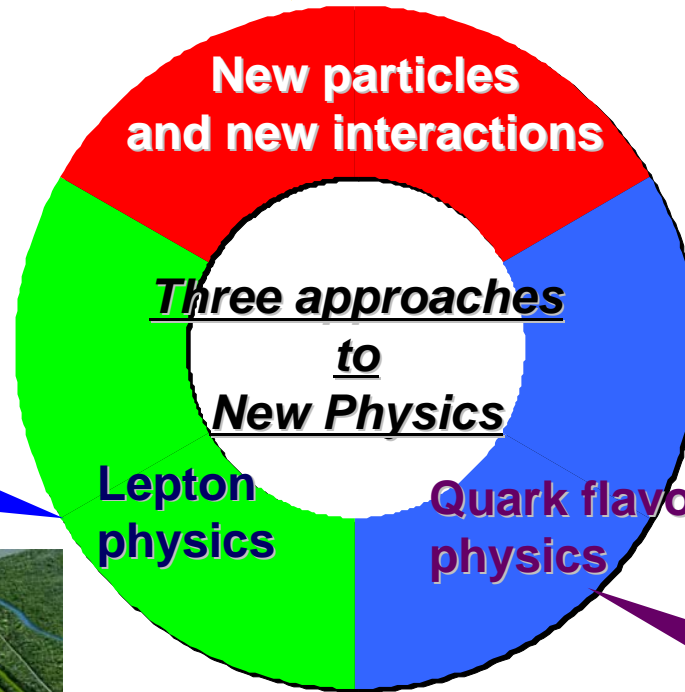


KEKB upgrade



ILC

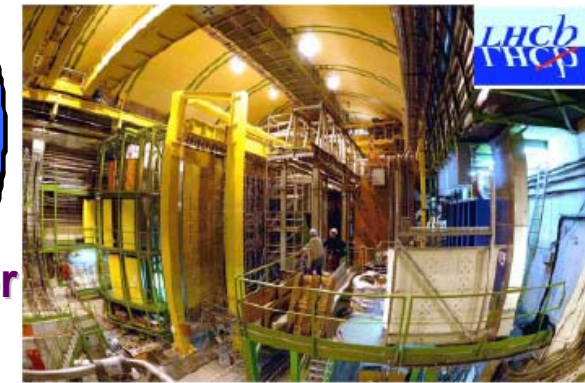
ν exp., μ LFV, τ LFV,
 $g_\mu - 2$, $0\nu\beta\beta$...



Three approaches
to
New Physics

Lepton
physics

Quark flavor
physics



B Factories, LHCb,
K exp., nEDM etc.



J-PARC

Neutrino mixing/masses,
Lepton number non-
conservation...

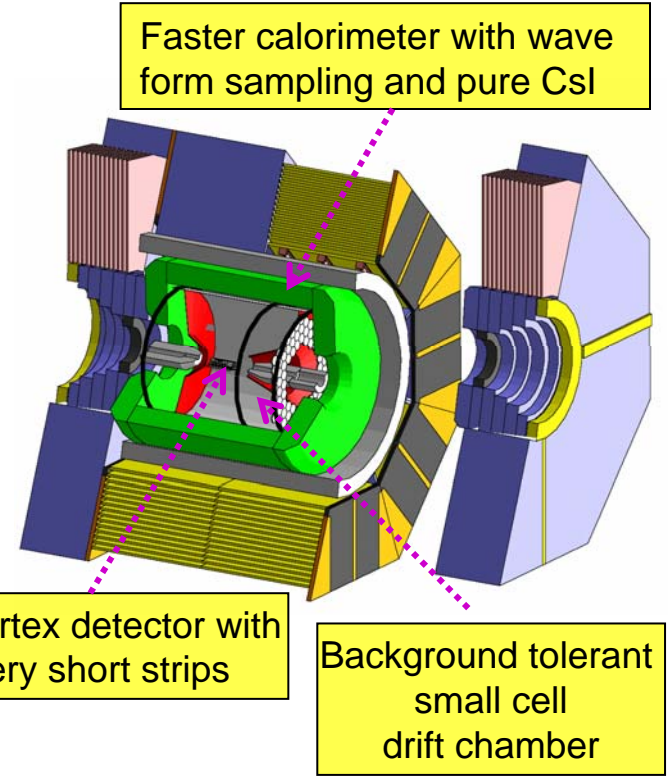
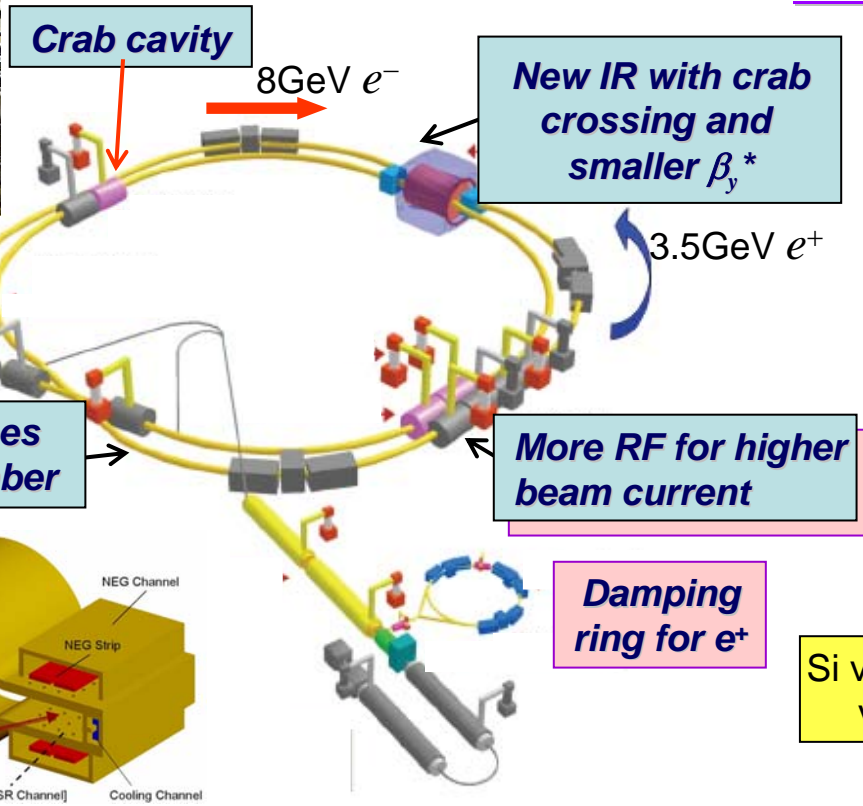
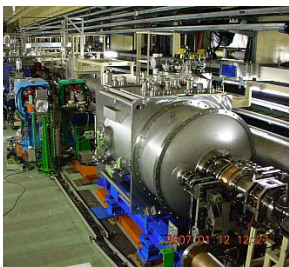
CP asymmetry, Baryogenesis,
Left-right symmetry, New sources
of flavor mixing...

KEKB Upgrade Plan

: Super-B Factory at KEK

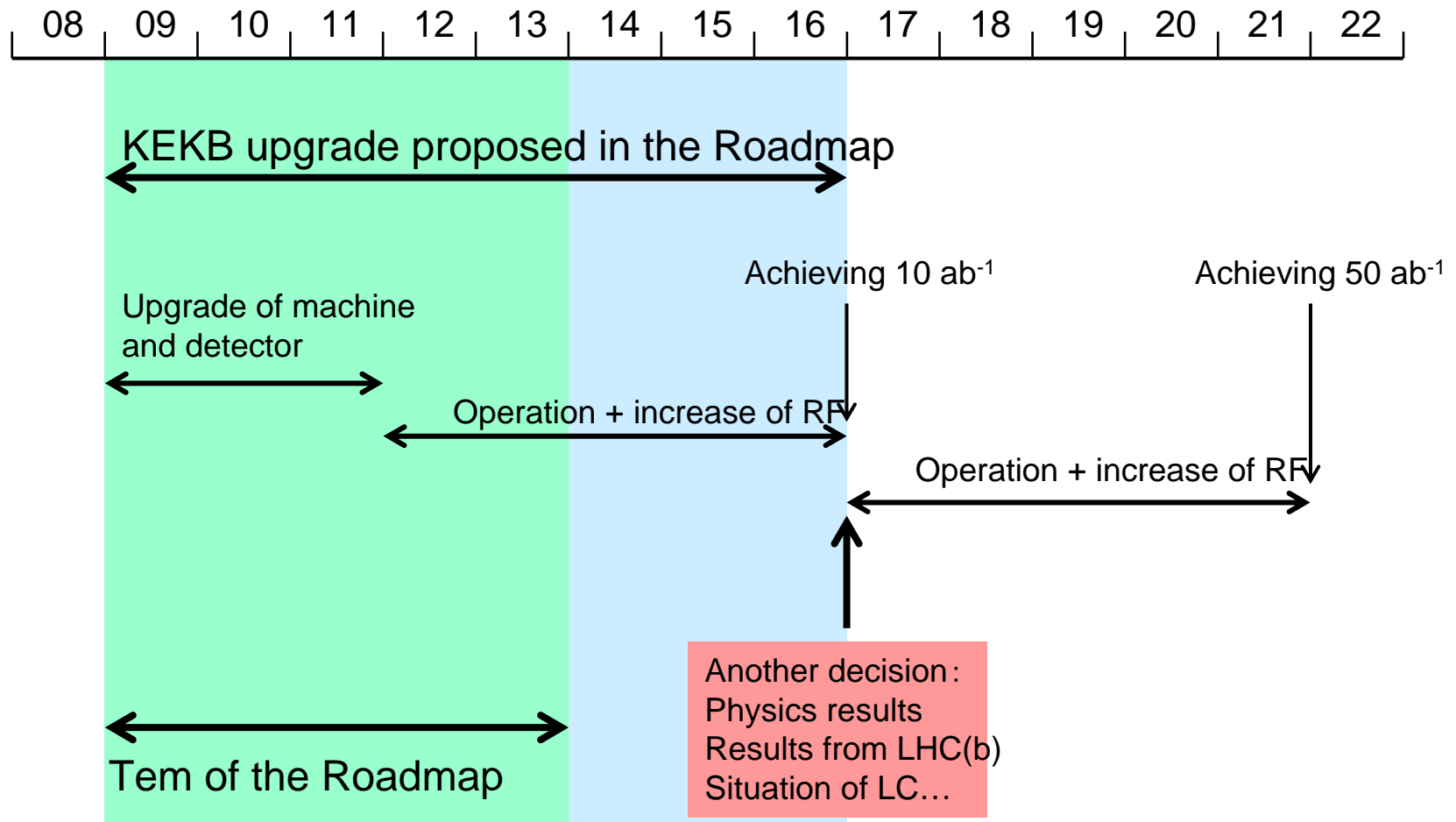
- Asymmetric energy e^+e^- collider at $E_{CM}=m(\Upsilon(4S))$ to be realized by upgrading the existing KEKB collider.
- Initial target: **10× higher luminosity** $\cong 2 \times 10^{35}/\text{cm}^2/\text{sec}$ after 3 year shutdown
 $\rightarrow 2 \times 10^9 \text{ BB}$ and $\tau^+\tau^-$ per yr.
- Final goal: **$L=8 \times 10^{35}/\text{cm}^2/\text{sec}$** and $\int L dt = 50 \text{ ab}^{-1}$

Belle with improved rate immunity



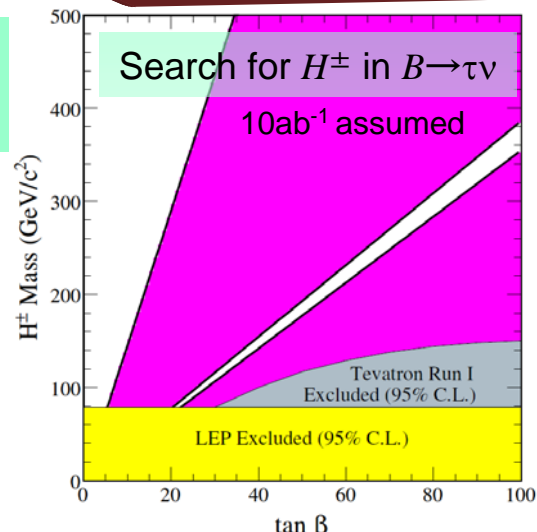
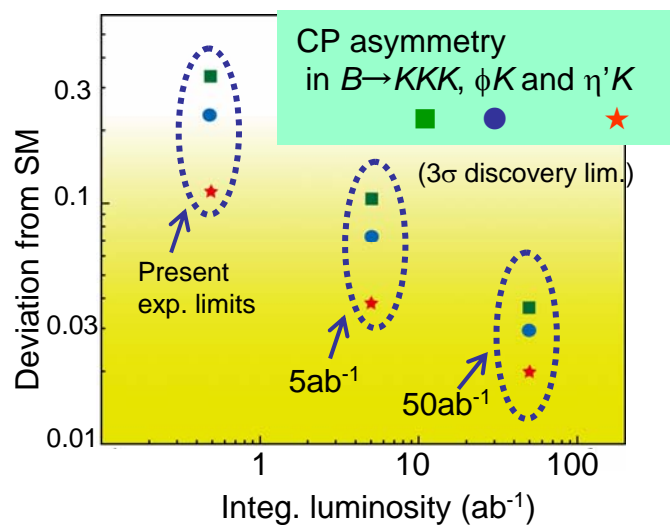
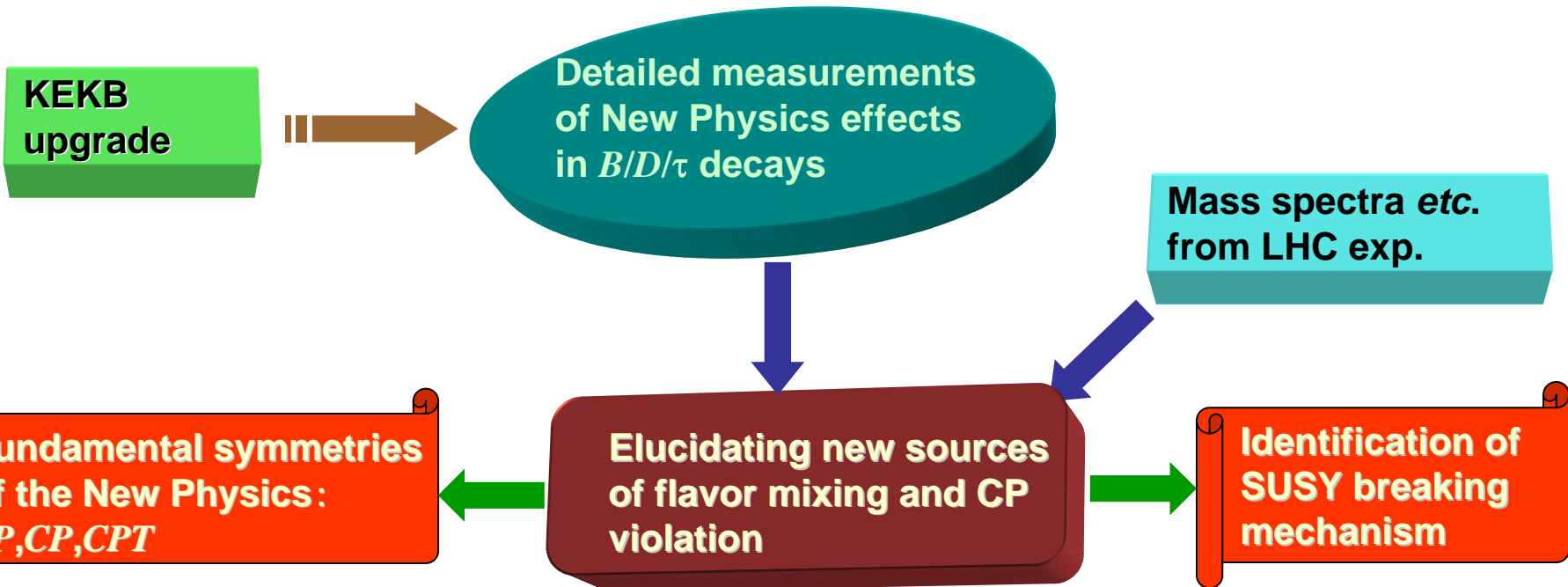
Long term strategy

- Assumption: Crab scheme works as expected.
- 10 ab^{-1} : Initial target 50 ab^{-1} : Final goal



Impact of KEKB upgrade in case:

“New Physics observed at LHC”



Y.Okada *et al.*

SUSY Model \ Obs.	Unitarity triangle	$B \rightarrow \phi K_S$	Time dep. CPV in $b \rightarrow s \gamma$	Direct CPV in $b \rightarrow s \gamma$	$\tau \rightarrow \mu \gamma$
mSUGRA	—	—	—	—	—
SU(5) SUSY GUT + ν_R (degenerate)	—	—	+	—	—
SU(5) SUSY GUT + ν_R (non-degen.)	+	+	++	—	++
U(2) Flavor symmetry	+	+	++	+	/

++: large +: sizable —: small

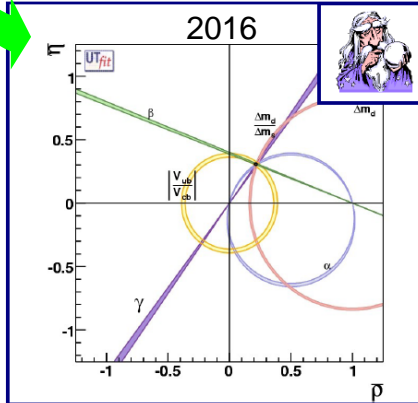
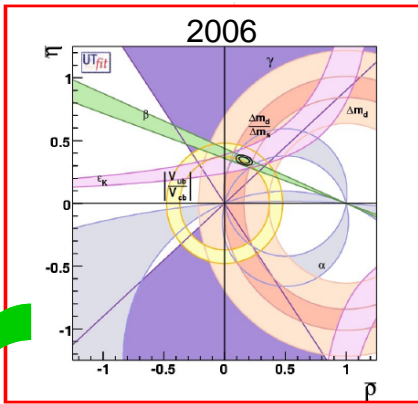
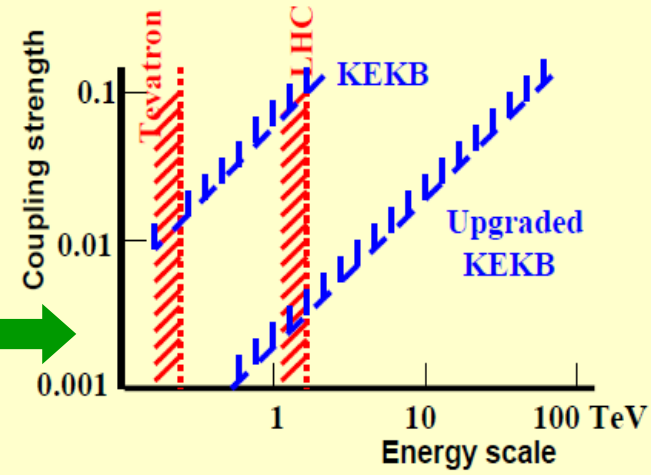
Impact of KEKB upgrade:

Flavor physics independent of LHC results

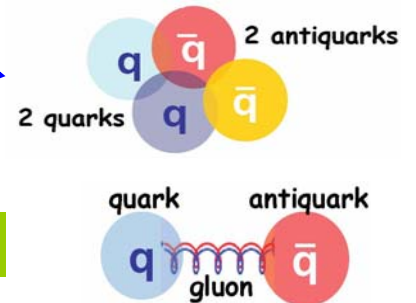
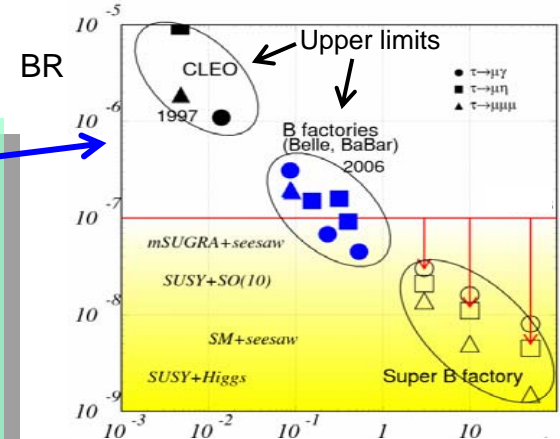
KEKB upgrade

Detailed measurements of $B/D/\tau$ decays

Search for New Physics in precision meas.



- ▶ Search for lepton number violating τ decay
- ▶ Precision test of KM scheme
- ▶ $D^0\bar{D}^0$ oscillation and CP violation in charm
- ▶ Test of CPT symmetry
- ▶ Multi-quark resonances
- ▶ Precision meas. of $\sin^2\theta_W$ and α_S at $\sim 10\text{GeV}$



Running nature of the fundamental parameters