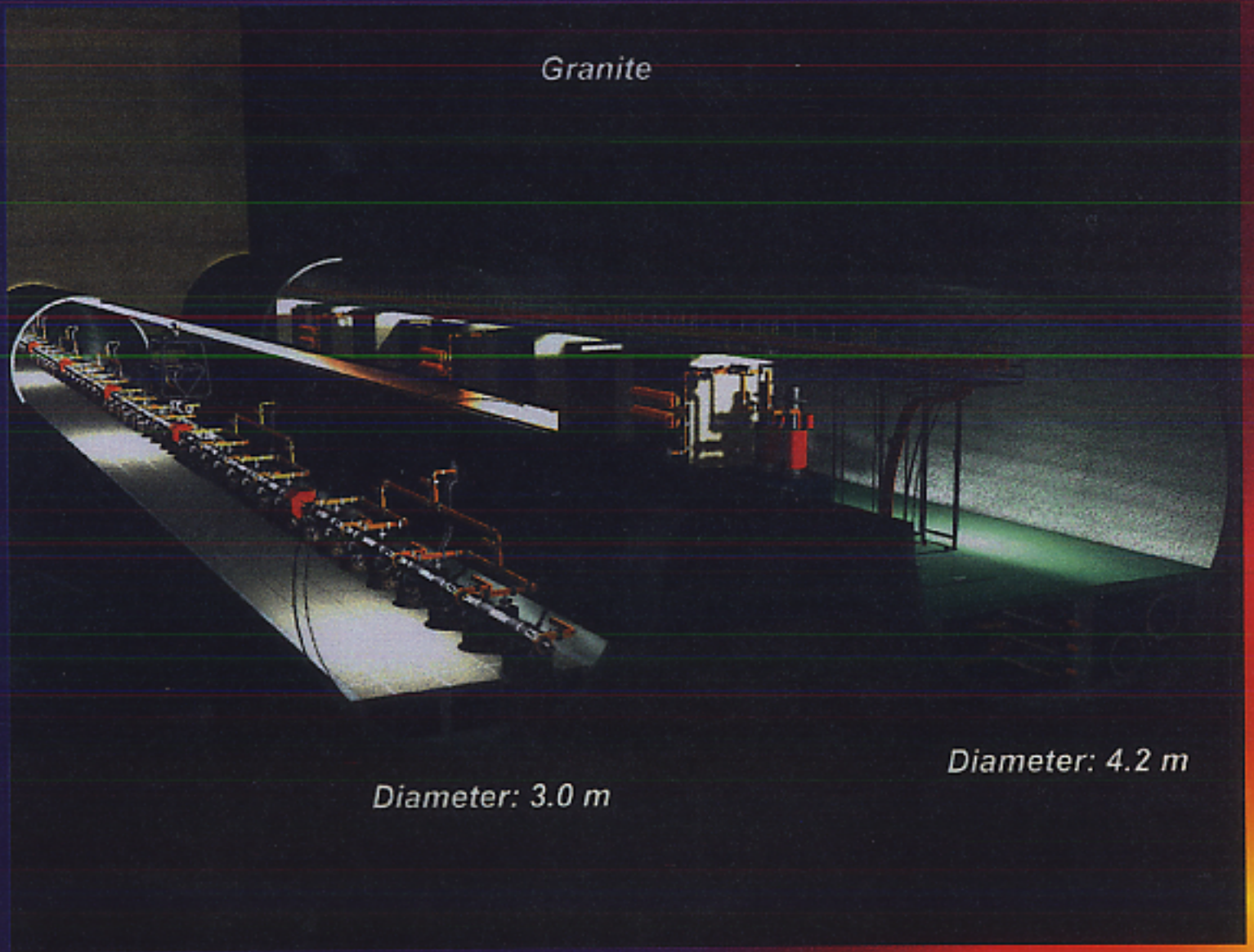
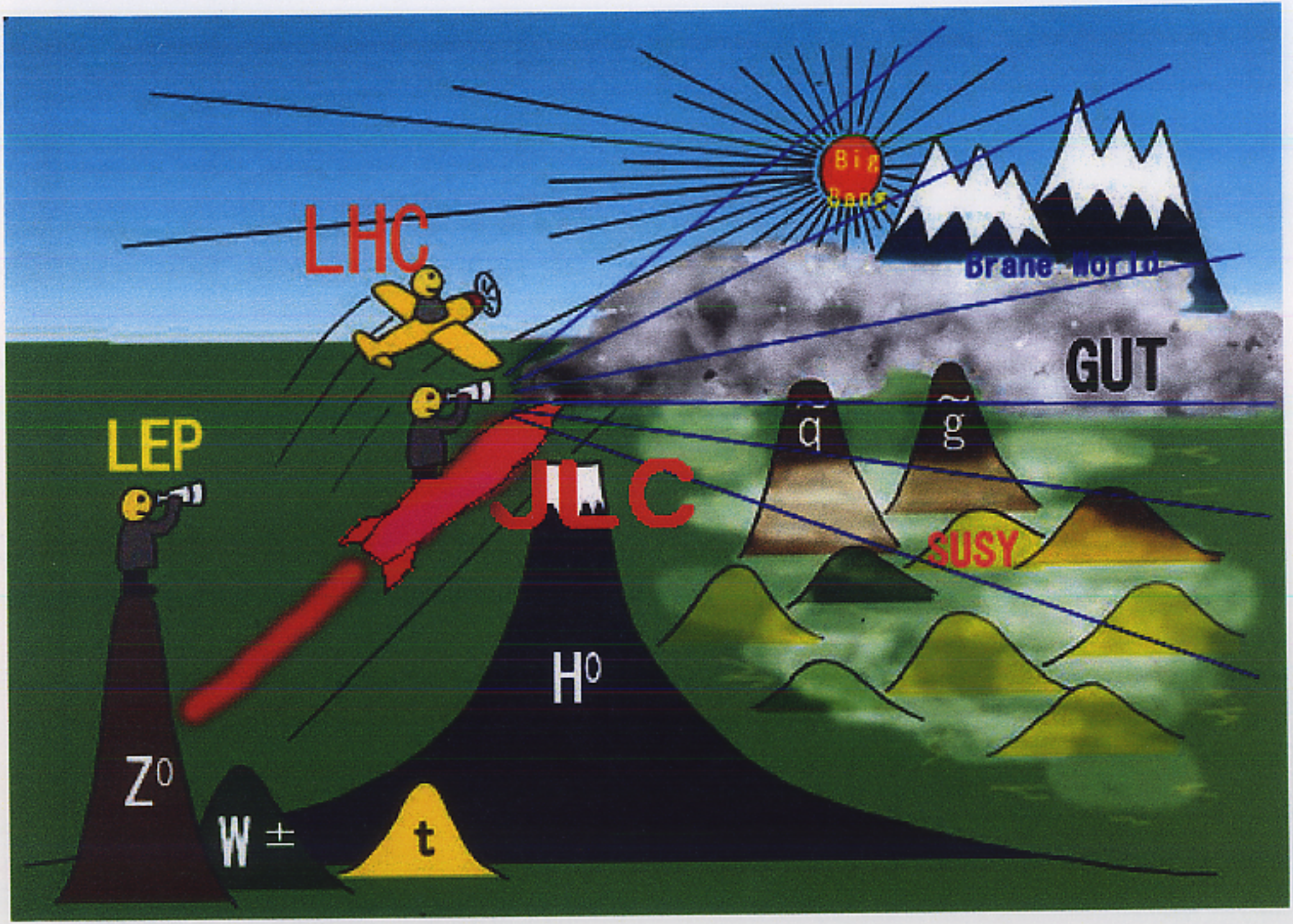
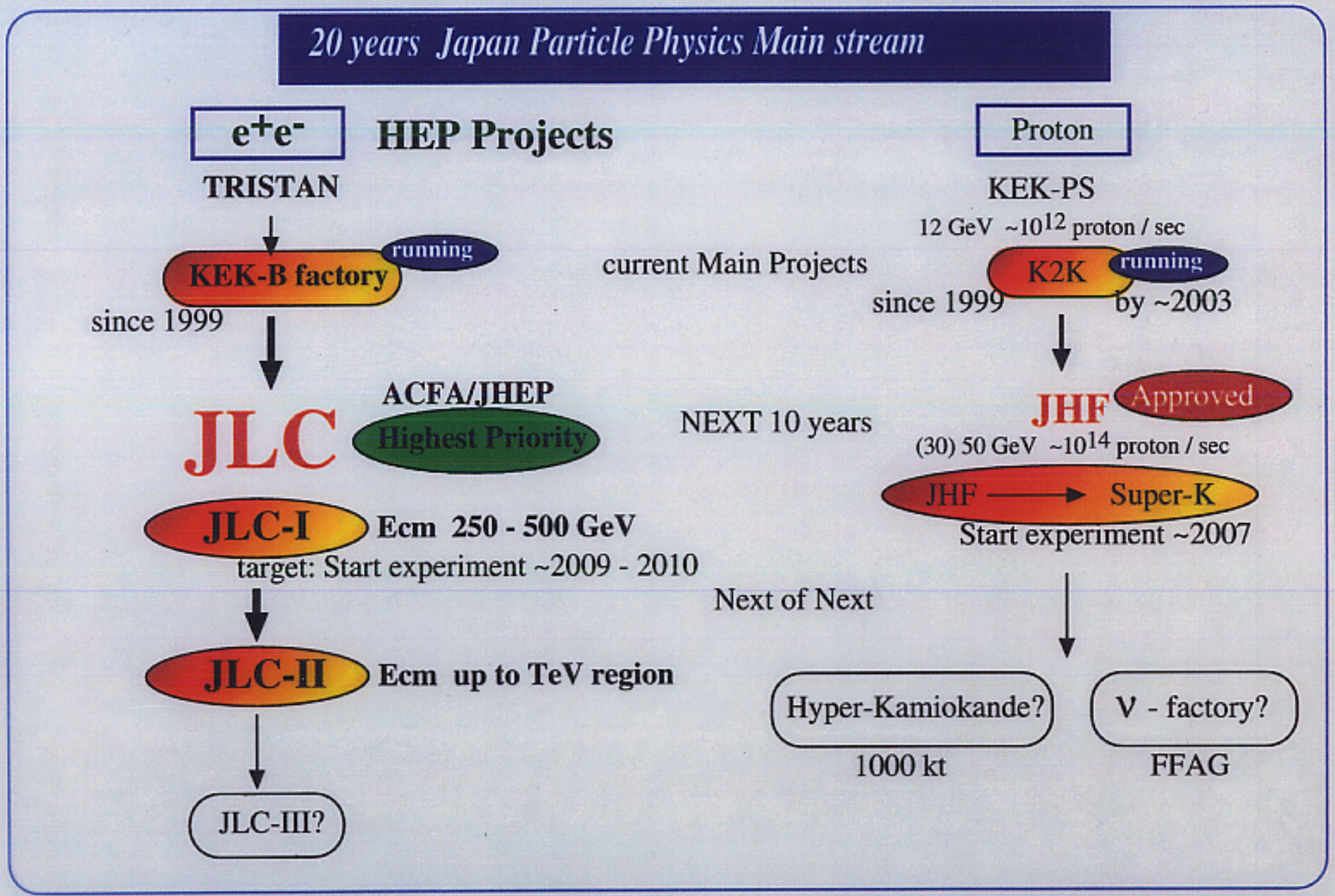
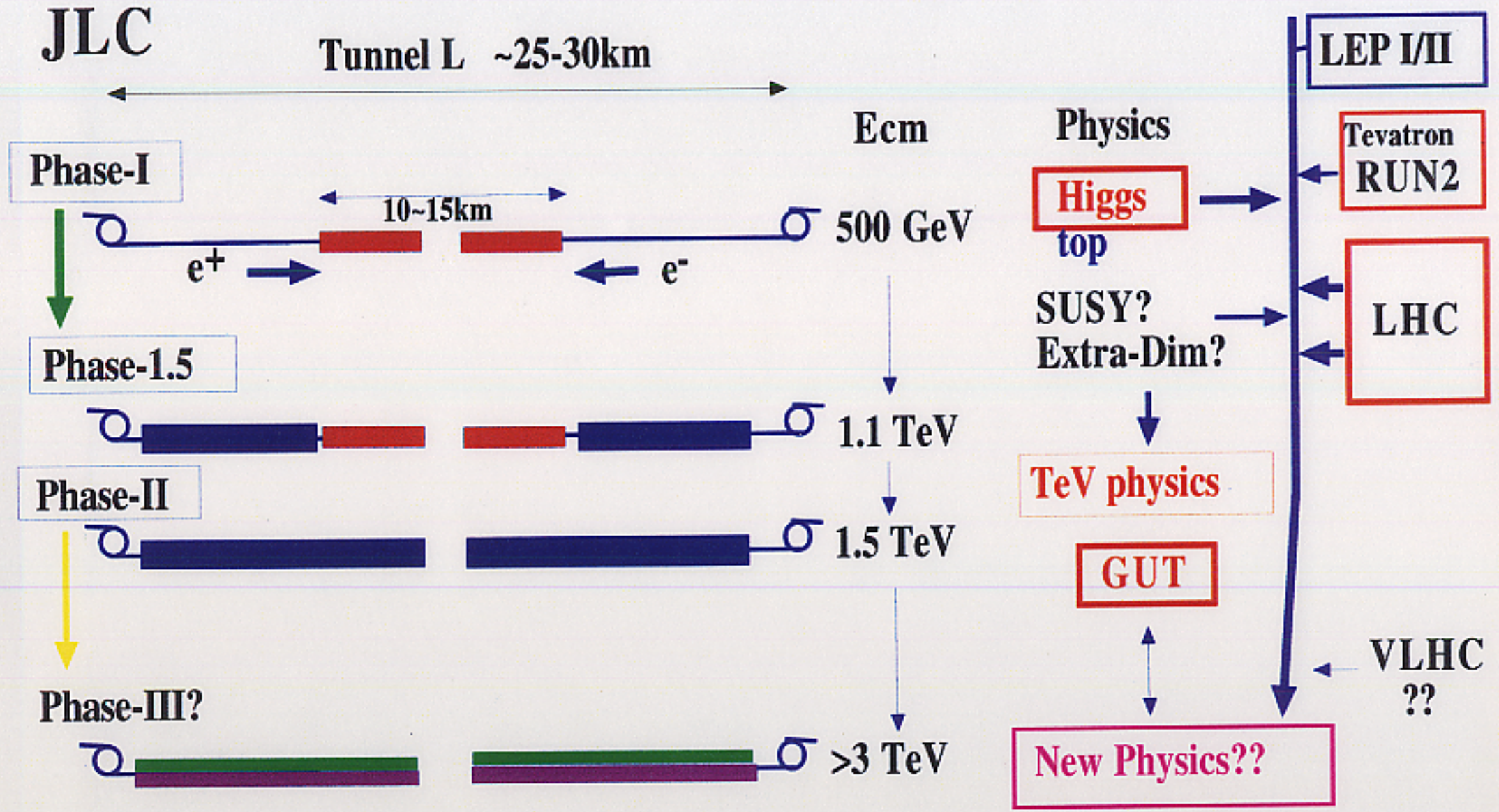
JLC




LHC
LEP
JLC
Big Bang
Brane World
GUT
q̃
g̃
SUSY
H⁰
Z⁰
W±
t

20 years Japan Particle Physics Main stream




JLC
Tunnel L ~25-30km
Ecm
Physics
LEP I/II
Tevatron
RUN2
Phase-I
10~15km
500 GeV
e+
e-
Higgs
top
LHC
SUSY?
Extra-Dim?
Phase-1.5
1.1 TeV
TeV physics
Phase-II
1.5 TeV
GUT
VLHC
??
Phase-III?
>3 TeV
New Physics??

OUR PRINCIPLES OF LINEAR COLLIDER PROJECT

1. EARLY STARTUP of EXPERIMENT

Complementality to LHC (Higgs)

Mentality of Active Young Scientists

2. ENERGY EXTENDABILITY (>1 TeV)

Beyond LHC (Lagrangean)

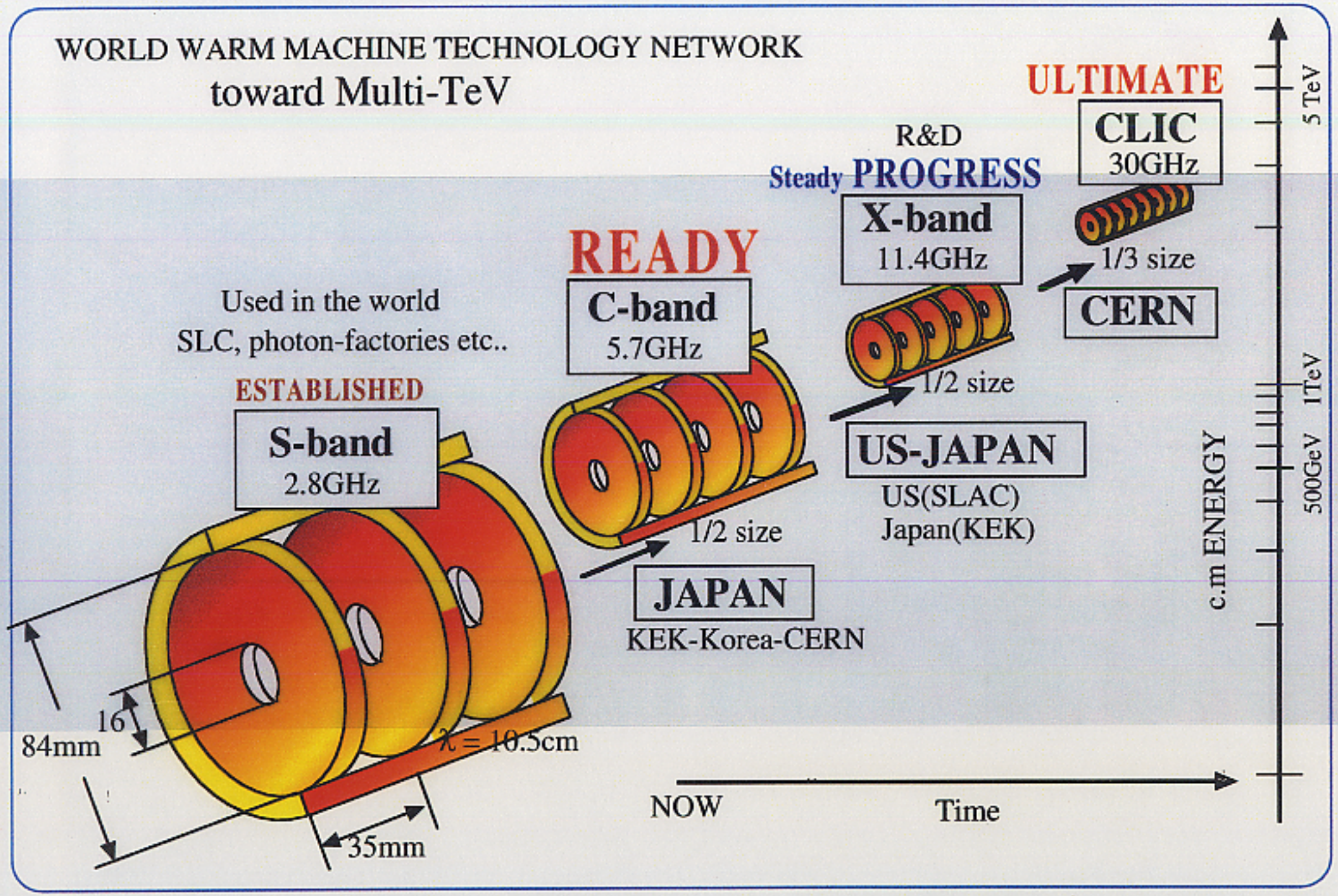
Road to GUT

3. HIGH INTEGRATED LUMINOSITY

500 fb^{-1} / 3 - 5 years

Reliability, Simplicity, Easy Maintenance

4. REASONABLE COST


WORLD WARM MACHINE TECHNOLOGY NETWORK
toward Multi-TeV
ULTIMATE
CLIC
30GHz
R&D
Steady PROGRESS
X-band
11.4GHz
1/3 size
CERN
READY
C-band
5.7GHz
1/2 size
US-JAPAN
US(SLAC)
Japan(KEK)
Used in the world
SLC, photon-factories etc..
ESTABLISHED
S-band
2.8GHz
1/2 size
JAPAN
KEK-Korea-CERN
84mm
16
λ = 10.5cm
35mm
NOW
Time
c.m ENERGY
5 TeV
1TeV
500GeV

ACFA

Asian Committee for Future Accelerators

ACFA Chairman: Won Namkung (Korea)

Member States	population			
China	1250 M people		Thailand	61 M
India	955 M		Korea	46 M
Indonesia	200 M		Taiwan	22 M
Pakistan	138 M		Malaysia	21 M
Japan	126 M		Australia	19 M
Vietnam	77 M			

contacting: Bangladesh and Singapore

1997 ACFA STATEMENT on e^+e^- Linear Collider

``A frontier facility like the e^+e^- linear collider is important as a spearhead to promote all fields of basic science and technology''

``ACFA would be happy if the Japanese Govenment would take an initiative in creating such an international organization''

The 2nd STATEMENT 2001 September

The Second ACFA Statement on the e^+e^- Linear Collider

issued on Sept. 18, 2001 at the 6th Plenary ACFA

Since the previous statement on the e^+e^- Linear Collider (LC) was issued by ACFA in 1997, the project has been pursued along the line of the statement. ACFA highly regards the progress made in both accelerator R&D and physics studies. A remarkable progress on development of components for main linac and creation of small emittance beams at ATF are the major success on the accelerator R&D. It is a great pleasure to receive the report from the ACFA working group on physics and experimental feasibility studies for the LC.

The principal physics motivation of LC has never changed, and it has become even stronger as the ACFA physics studies conclude. The existence of a light Higgs boson suggested by precise measurements of electroweak physics would lead us to a new paradigm beyond the Standard Model, such as supersymmetry and grand unification. Furthermore, if the unification scenario based on the current knowledge is not realized, a completely new physics must be discovered in the next energy region. Both the physics studies and the past history convince us that concurrent running of hadron and e^+e^- colliders is essential to discover and to understand new physics behind new discoveries.

Turning attention to ongoing activities in Asia on particle physics, tremendous achievements were made by various projects, such as BEPC, KEKB, Superkamiokande and K2K, which have been highly esteemed by the world community. The strength and competence of Asian industries, especially in accelerator technology, has been proven by these successful projects as well as others for material science and nuclear physics.

Now the strategy on the LC project becomes clearer and the community matured, the time is ripe to define new steps towards the realization of the LC. (for the better understanding of this statement, see an attached document);

- The e^+e^- LC must start operation when the high luminosity run of LHC starts around 2009-2010. The center of mass energy of the LC should be 250-500 GeV where urgent and critical physics is expected. Including its energy upgrade to higher than 1 TeV, the project as a whole is foreseen to evolve for a quarter of a century.

- ACFA strongly endorses the plan to construct such a collider in the Asian-Pacific region with Japan as the host, and urges KEK to take initiative to investigate possible and practical form of globalization for the construction, commissioning and operation of the collider.

- ACFA urges the Japanese Government to arrange a preparatory budget for KEK to pursue an engineering design of the collider, to study site and civil engineering, as well as to investigate the process for the globalization.

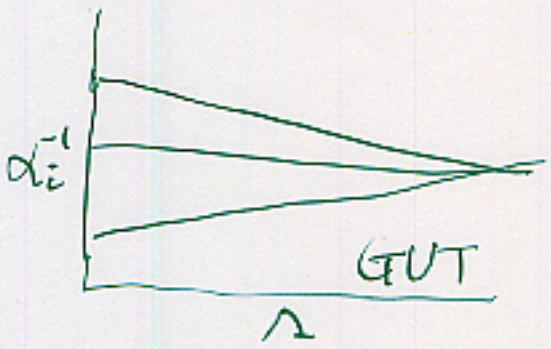
☆ 実験事実に基づいた

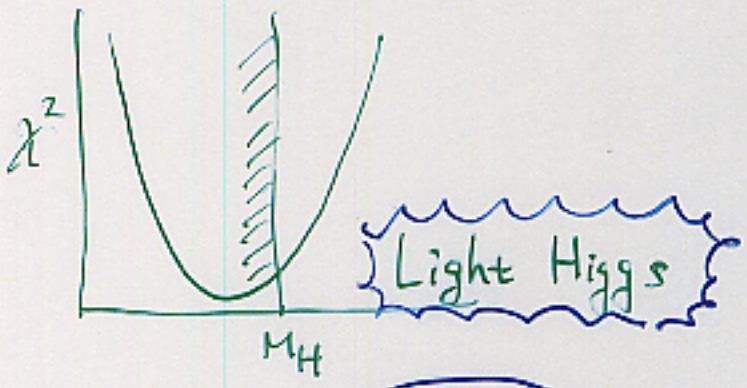
well defined physics target, strategy

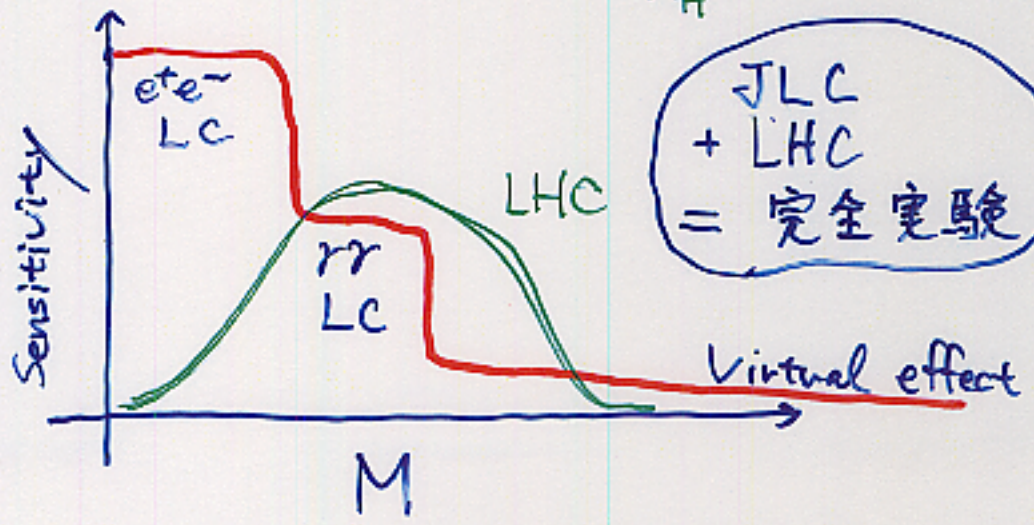
☆ 疑問を残さぬ

完全実験

☆ 更に 先へ 先へ ....







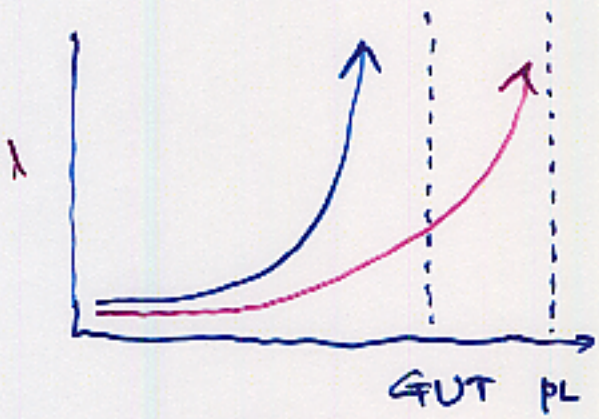
EW scale の物理

"Higgs" 必要 ⇒ 楽しさ & 苦しみの始まり

0^{++}

$m_H = \sqrt{2\lambda}\, v$

v ← 246 GeV



QCD と違.

$$m_W^2 = \frac{g^2 v^2}{4} + \underbrace{\frac{\alpha}{\pi} M^2 - \; + \; - \; \cdots -}_{10^{30}}$$

fine tuning

TeV scale ⇒ 必要.

cut off (cancel)

- 新対称性 — SUSY (cancellation)
- 新相互作用 — technicolor (cut off)
- 新次元 (余) — (Large) Extra-Dimension (Planck scale → TeV scale)

Higgs → TeV physics → 更に先へ

更に…

単純に SUSY SU(5) ✗

SUSY + 更に上の次元　SUSY + 'Brane'
SUSY + 更に上の Λ scale　'Messanger' etc.
SUSY + ……　……

"colored Higgs" 問題 ??

25年の物理

Higgs の徹底研究　わかっているようで 何もわかってない

完全な理解 ⟹ coupling, mass, mixing, CP

- いくつ？
- Type-I？II？
- 中？…

TeV scale の Lagrangean　SUSY / Extra-D ….

$\mathcal{L}$(TeV) = ….

精密実験 + wide scan

e^+e^-　pp

更に 0.1 – 数% のずれを見る??

10 – 100 TeV　GUT 10^{16}　10^{18} – 10^{19} GeV

JLC Phase-I

target: construction start ~2005
experiment start ~2009/2010

Ecm 250 - 500 GeV

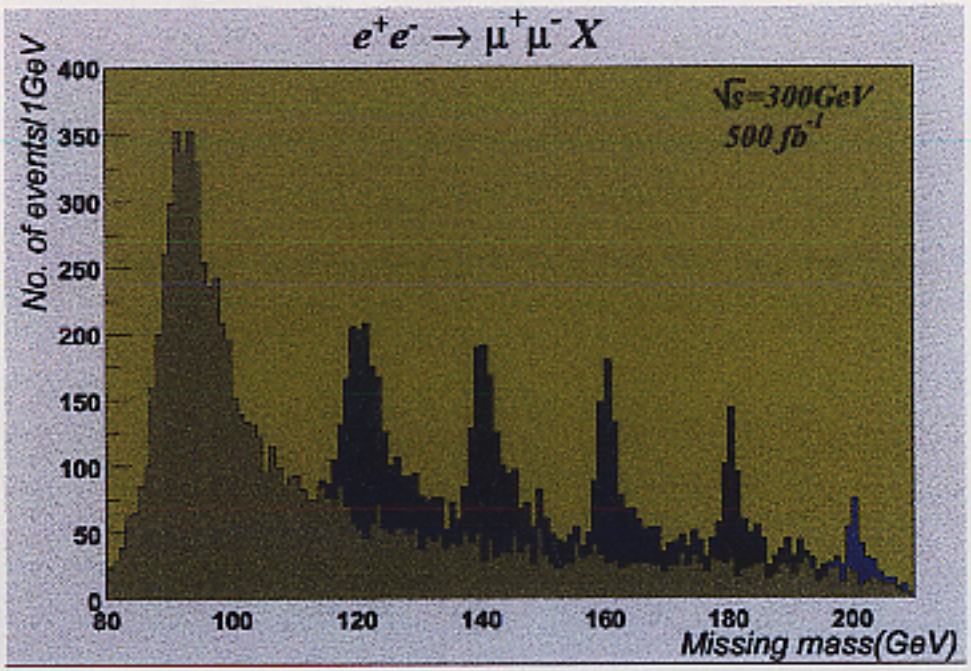
Luminosity 100 - 300 fb^{-1} / year

HIGGS FACTORY

10^4 - 10^5 Higgs / year

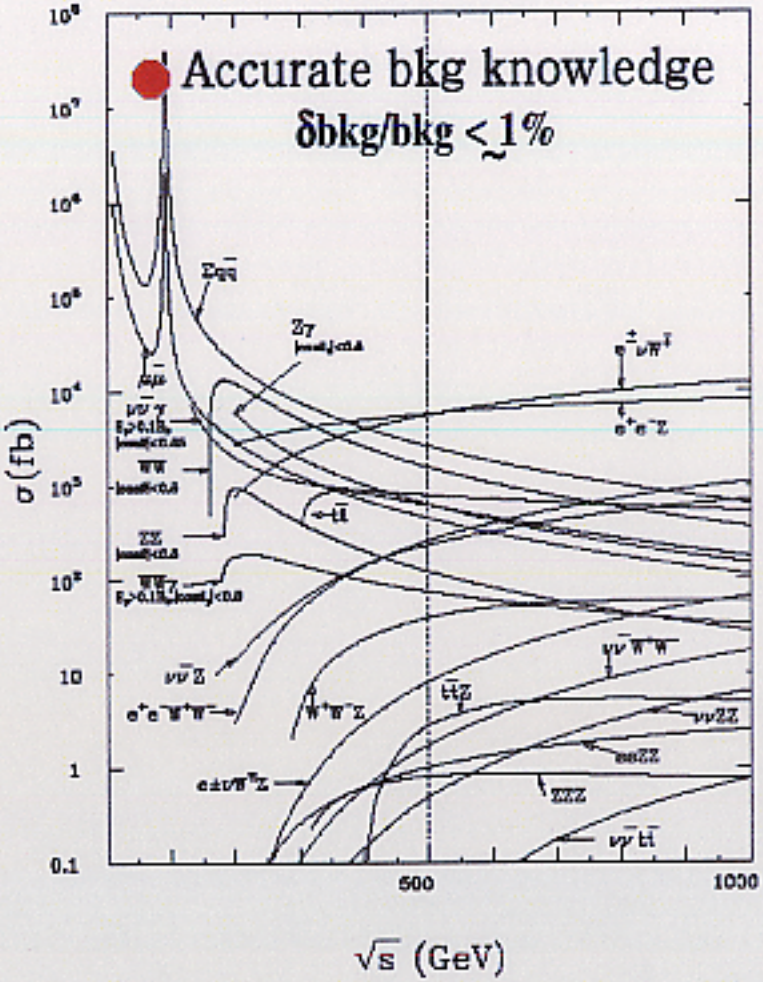
for M_H=100 - 350 GeV

- complete kinematics
- energy scan
- polarized beam
- clean signal S/N ~ 1



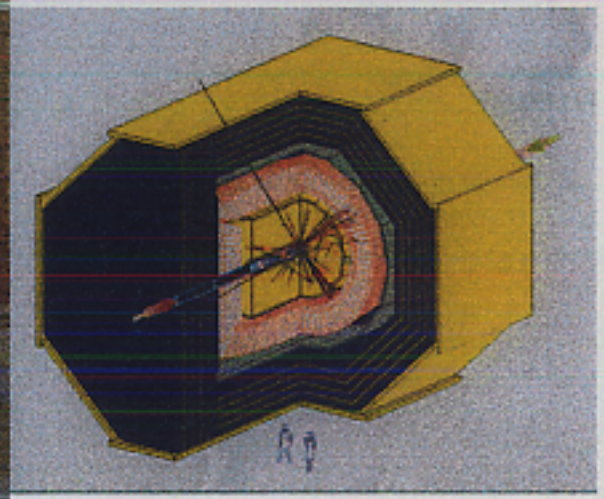
Cross sections

- Accurate bkg knowledge
  δbkg/bkg $\lesssim$ 1%



ACFA Joint Linear Collider Physics and Detector Working Group

1998 Beijing, China
1999 Seoul, Korea
2000 Taipei, Taiwan
2001 Summar
1st ACFA Report on Physics and Detector
2001 Beijing, China (November)

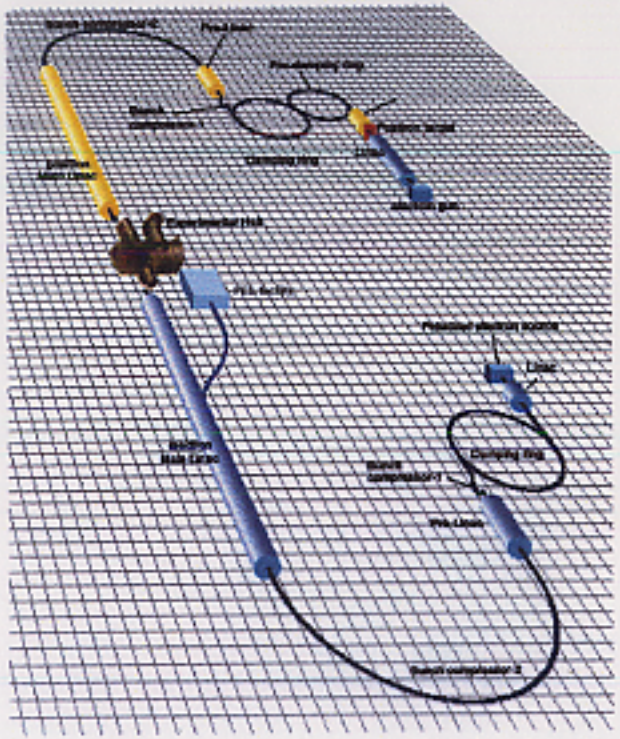


International Linear Collider Workshops (LCWS)

1991 Saariselka, Finland
1993 Hawaii, USA
1995 Morioka, Japan
1999 Sitges, Spain
2000 Fermilab, USA
2002 Che-Ju Island, Korea

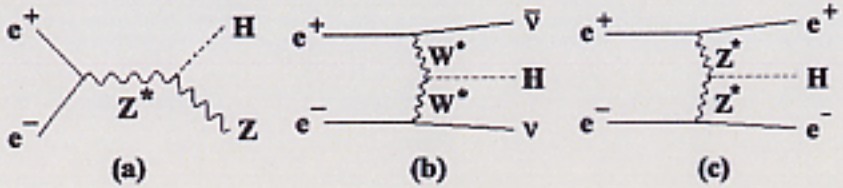
JLC physics

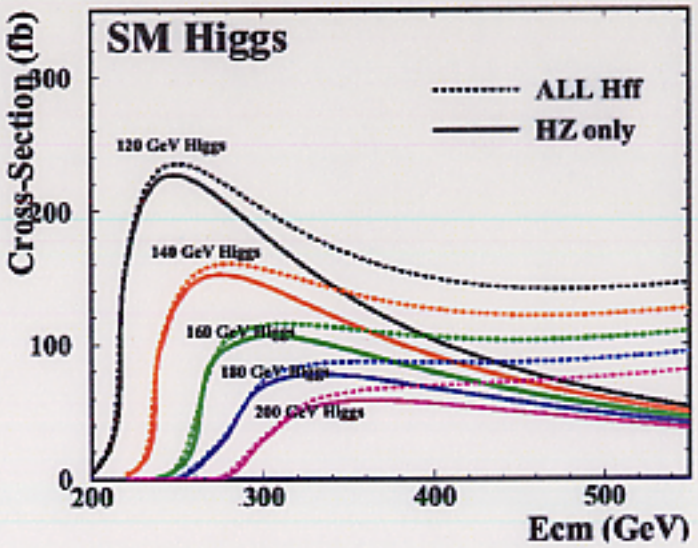
Particle Physics Experiments at JLC

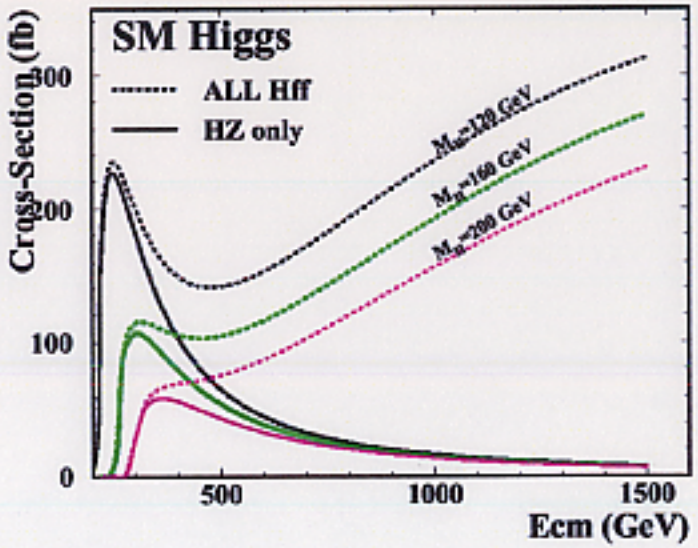


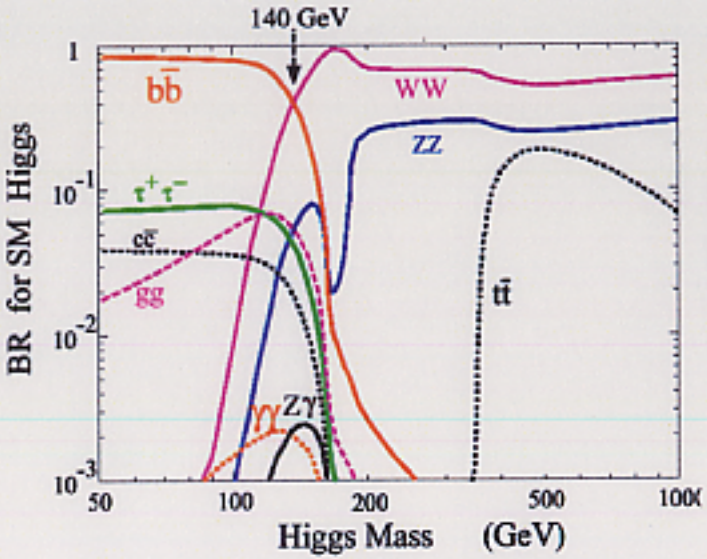
ACFA Linear Collider Working Group Report

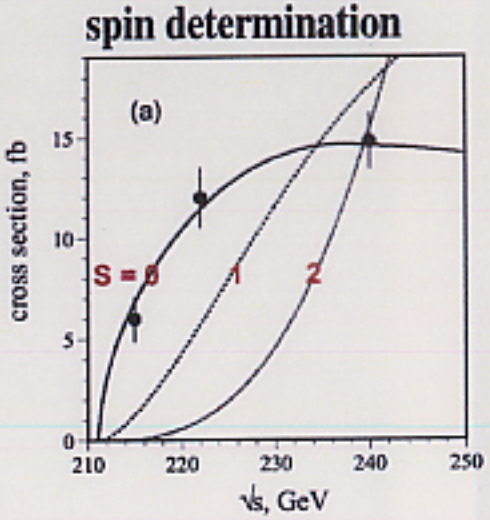
(ACFA Linear Collider Working Group)*

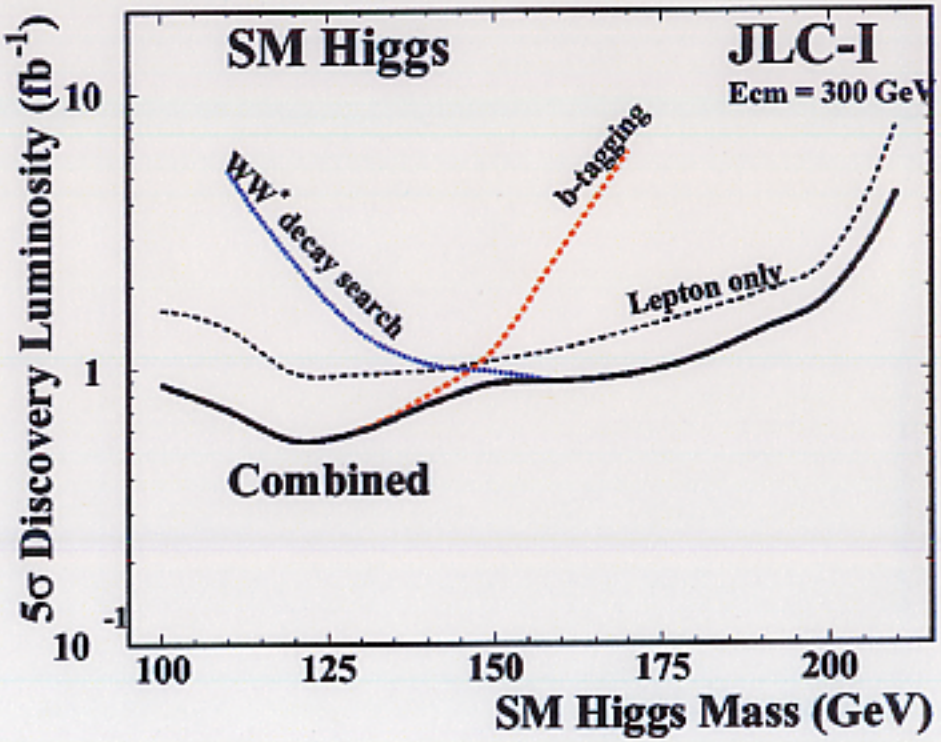

e+
e−
H
Z*
Z
(a)
W*
W*
ν̄
ν
(b)
Z*
Z*
(c)


SM Higgs
ALL Hff
HZ only
120 GeV Higgs
140 GeV Higgs
160 GeV Higgs
180 GeV Higgs
200 GeV Higgs
Cross-Section (fb)
Ecm (GeV)

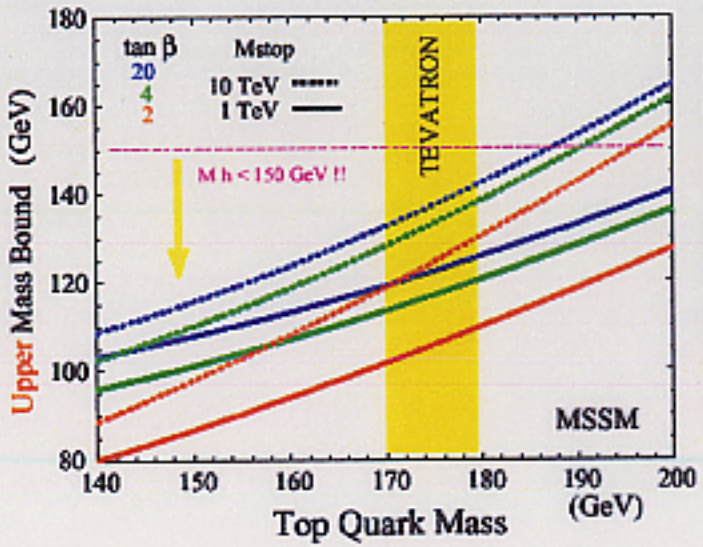

SM Higgs
ALL Hff
HZ only
Cross-Section (fb)
Ecm (GeV)

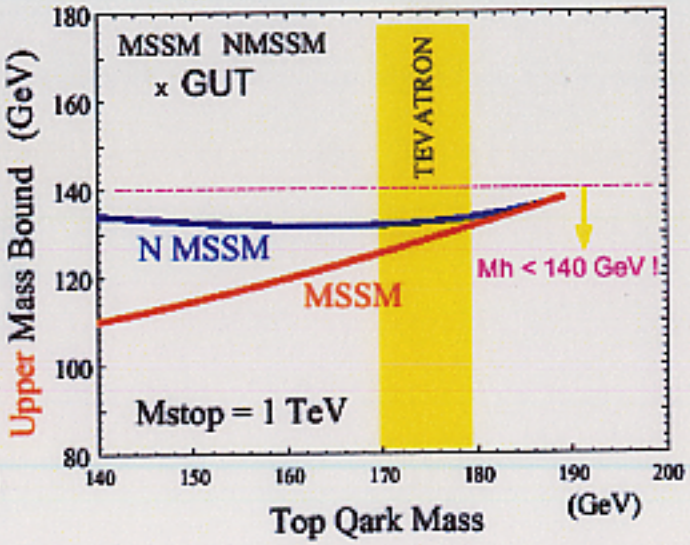

140 GeV
bb̄
WW
ZZ
τ+τ−
cc̄
gg
tt̄
γγ
Zγ
BR for SM Higgs
Higgs Mass (GeV)


spin determination
(a)
S = 0
1
2
cross section, fb
√s, GeV


SM Higgs
JLC-I
Ecm = 300 GeV
WW* decay search
b-tagging
Lepton only
Combined
5σ Discovery Luminosity (fb-1)
SM Higgs Mass (GeV)

SUSY



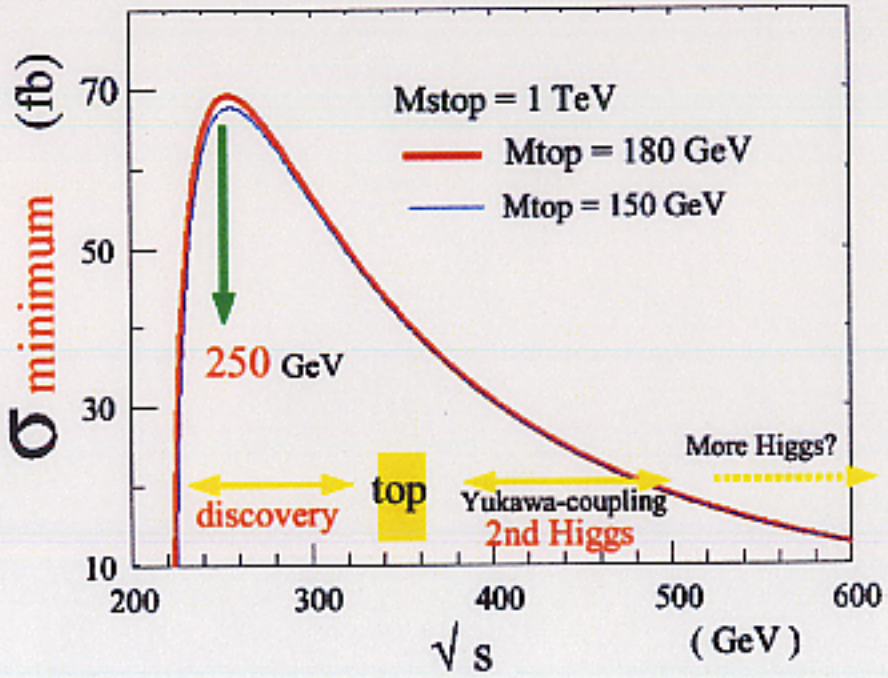


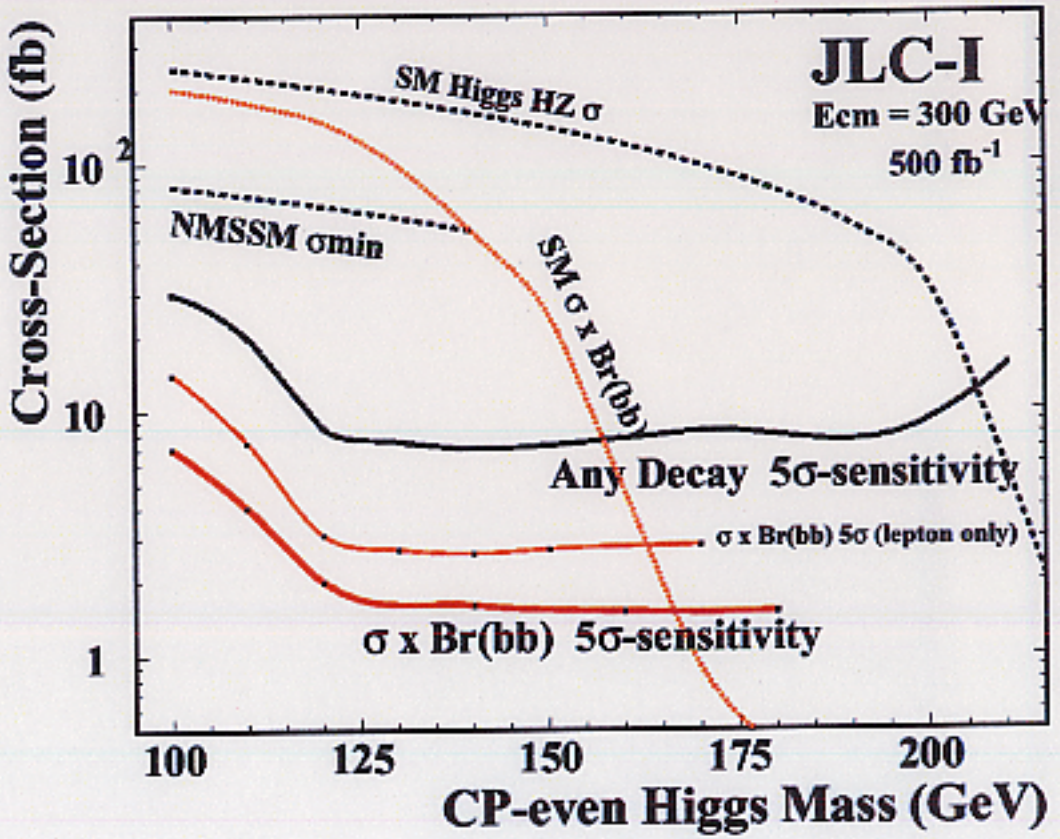
MSSM m_H<140GeV

NMSSM

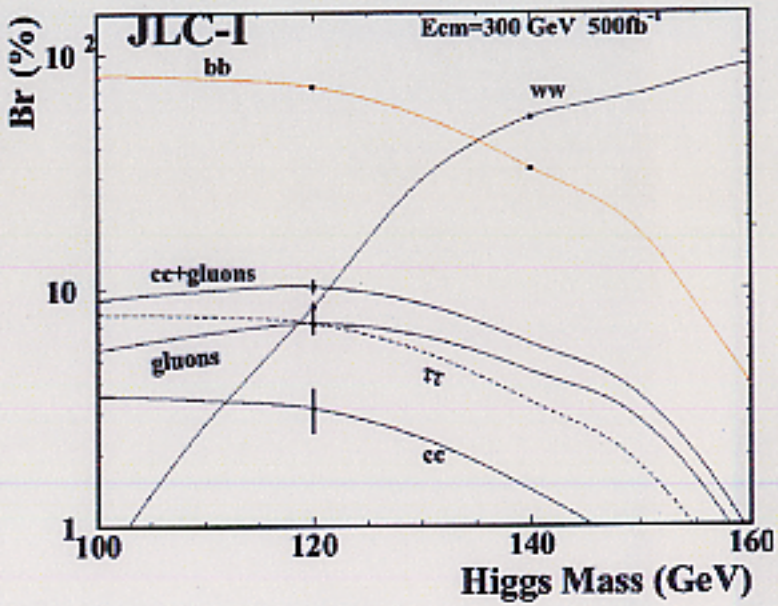
general SUSY + GUT

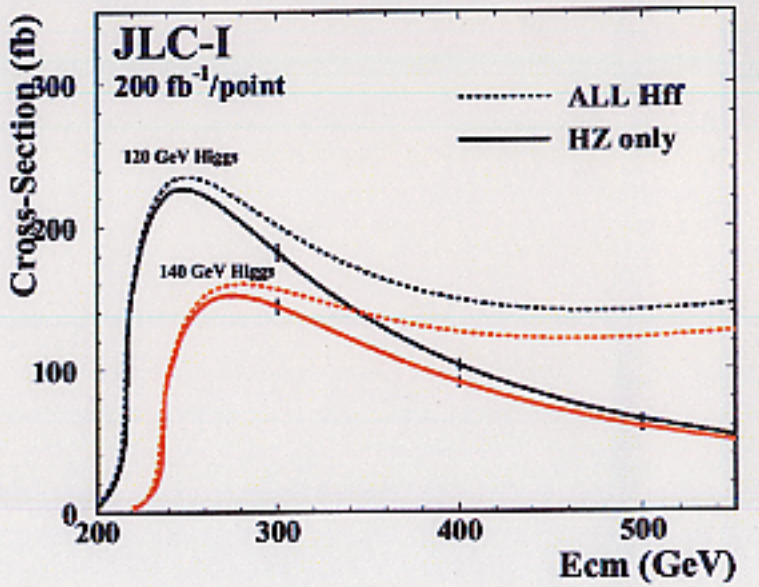
m_H<210 GeV

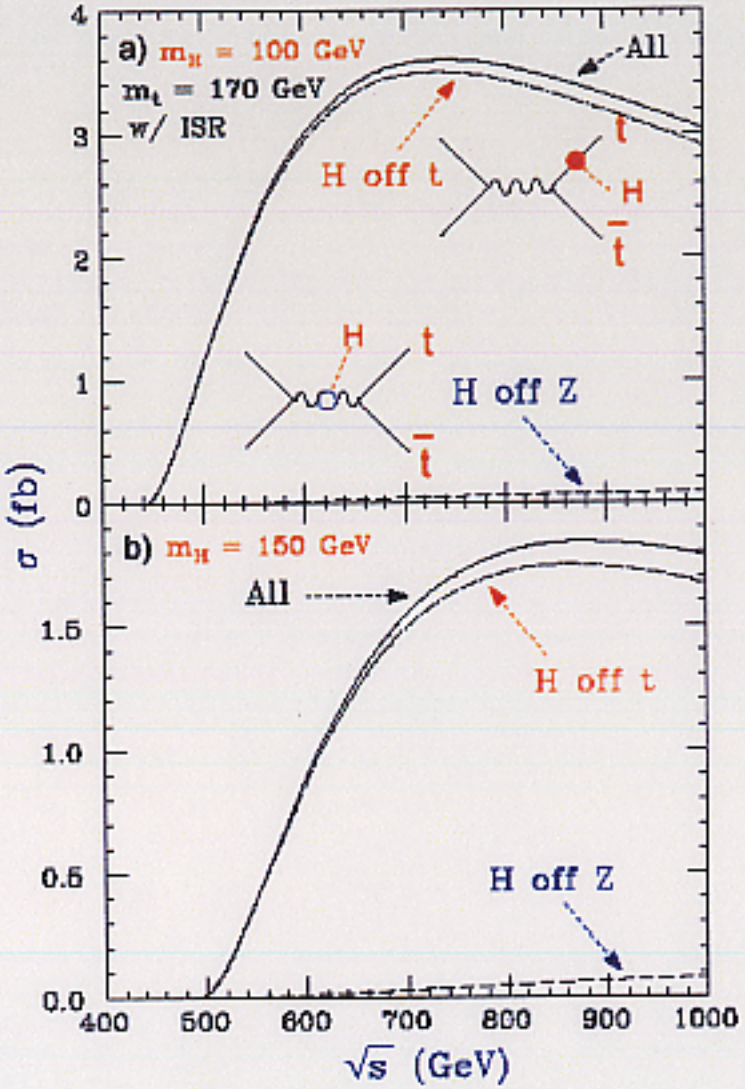




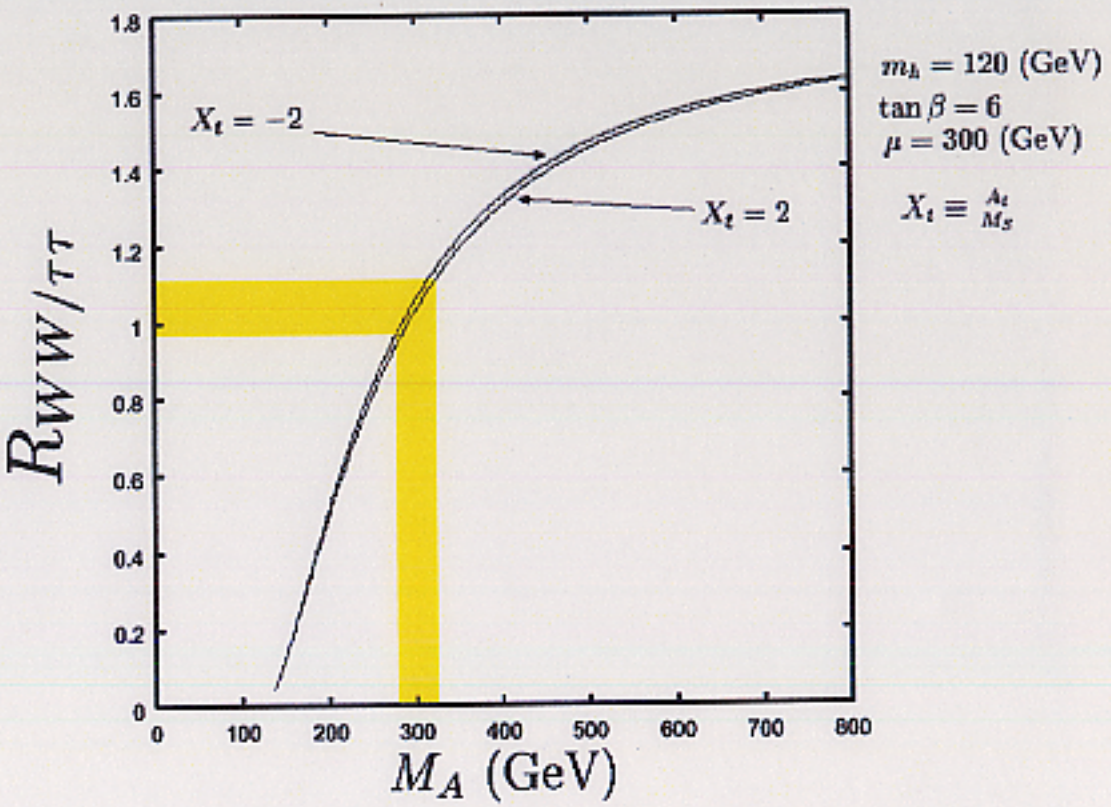
$\sqrt{s}$	300 GeV	400 GeV	500 GeV
$\Delta m_{\rm h}$ (lepton-only)	80 MeV	—	—
$\Delta m_{\rm h}$	40 MeV	—	—
$\Delta\sigma/\sigma$ (lepton-only)	2.1%	2.5%	2.9%
$\Delta\sigma/\sigma$	1.3%	—	—
$\Delta(\sigma_{h\nu\bar{\nu}}\cdot \mathrm{Br}(b\bar{b})$	2.0%	—	—
ZZH-coupling ΔZZH/ZZH	1.1%	1.3%	1.5%
WWH-coupling ΔWWH/WWH	1.6%	—	—
$\Delta\Gamma_{\rm h^0}/\Gamma_{\rm h^0}$	5.5%	12%	16%
Yukawa coupling $\Delta\lambda/\lambda$			
λ_b	2.8%	6.1%	8.1%
λ_τ	3.5%	—	—
λ_c	11.3%	13%	15%
λ_b/λ_τ	2.3%	—	—
λ_b/λ_c	11%	12%	14%
$\lambda_{up-type}$	4.1%	—	—
$\lambda_{down-type}/\lambda_{up-type}$	3.2%	—	—







$$R_{WW/\tau\tau} \equiv \frac{B(h \to W^{+(*)} W^{-(*)})}{B(h \to \tau^+ \tau^-)}$$

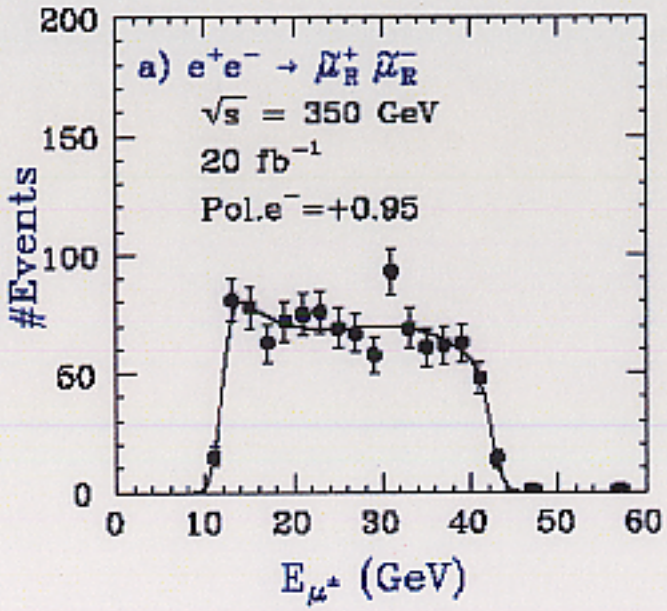


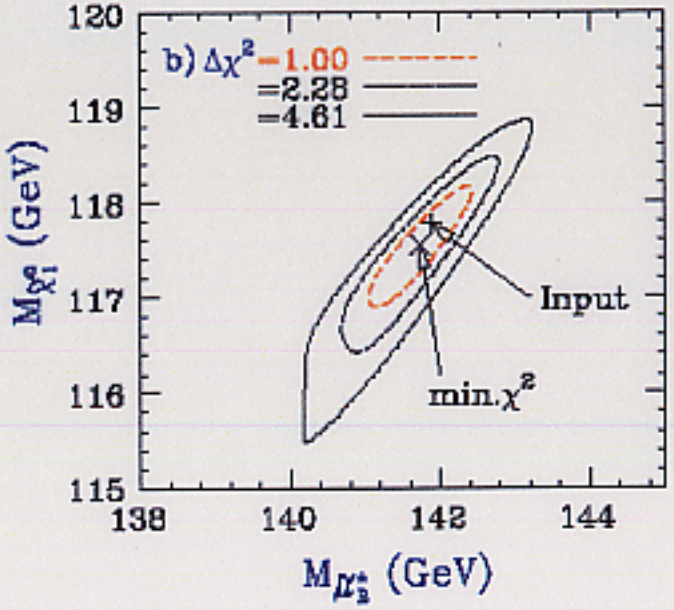
MSSM consistency
CP-odd Higgs A^0

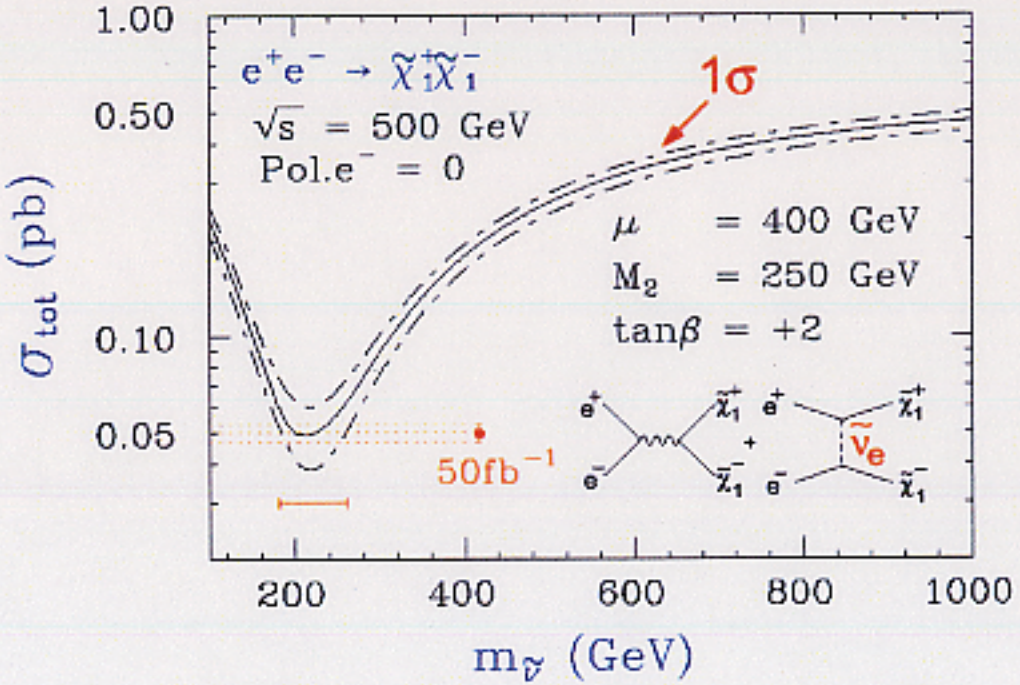
A^0h^0-pair production

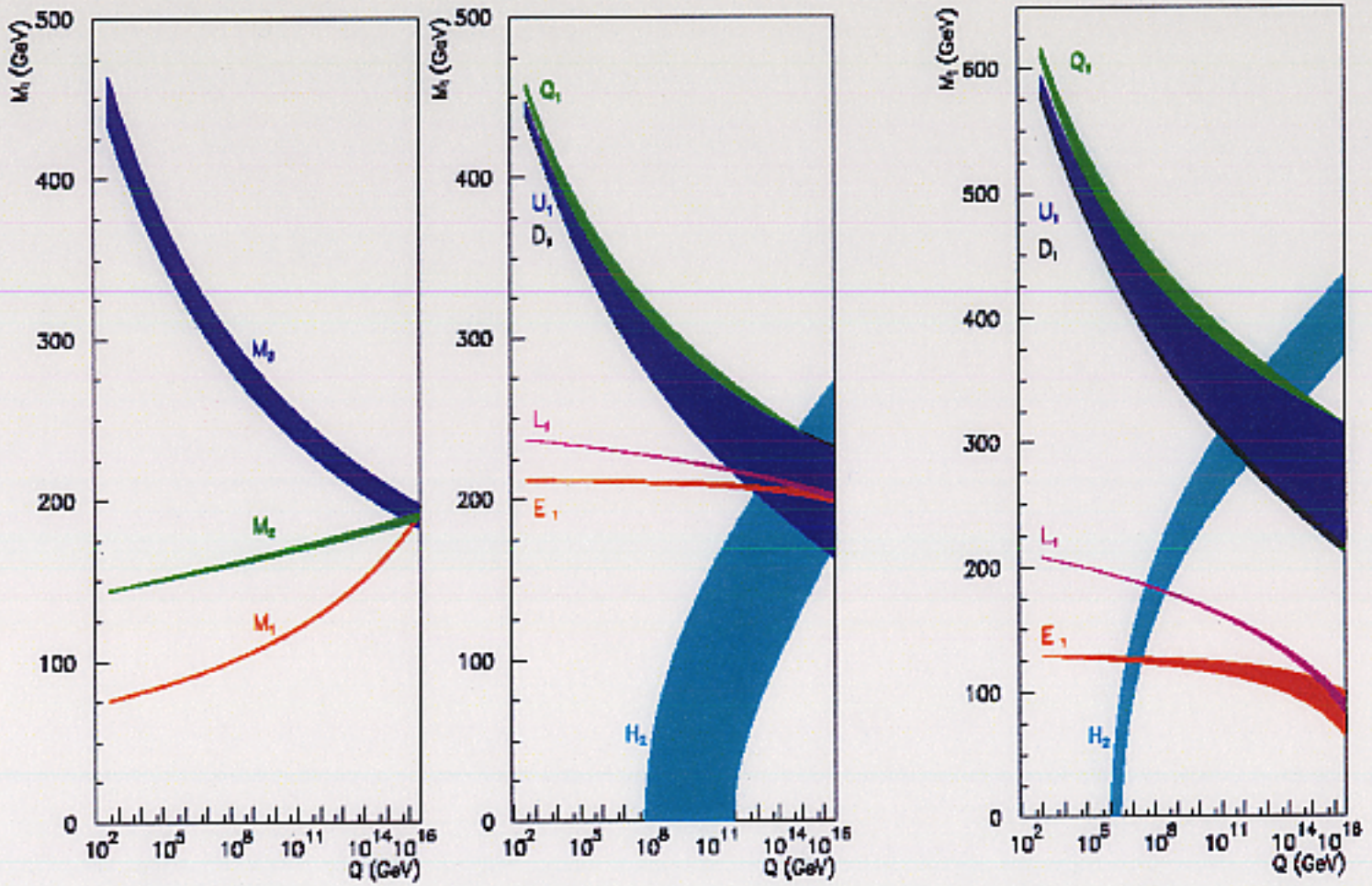
$\gamma\gamma$ collider option (s-channel)

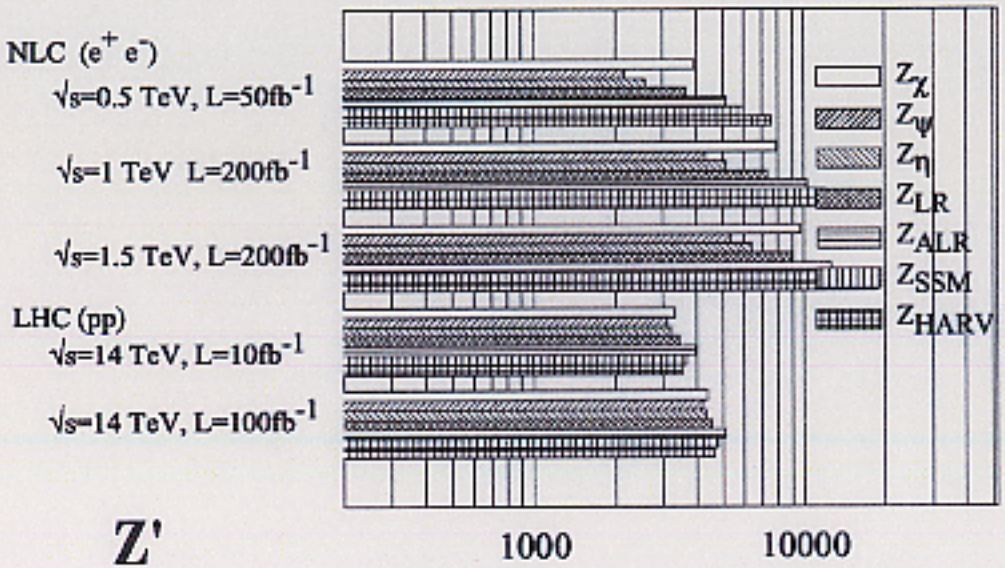
LHC results


a) $e^+e^- \to \tilde{\mu}_R^+ \tilde{\mu}_R^-$
$\sqrt{s}$ = 350 GeV
20 fb^{-1}
Pol.e^-=+0.95
#Events
E_{μ^+} (GeV)

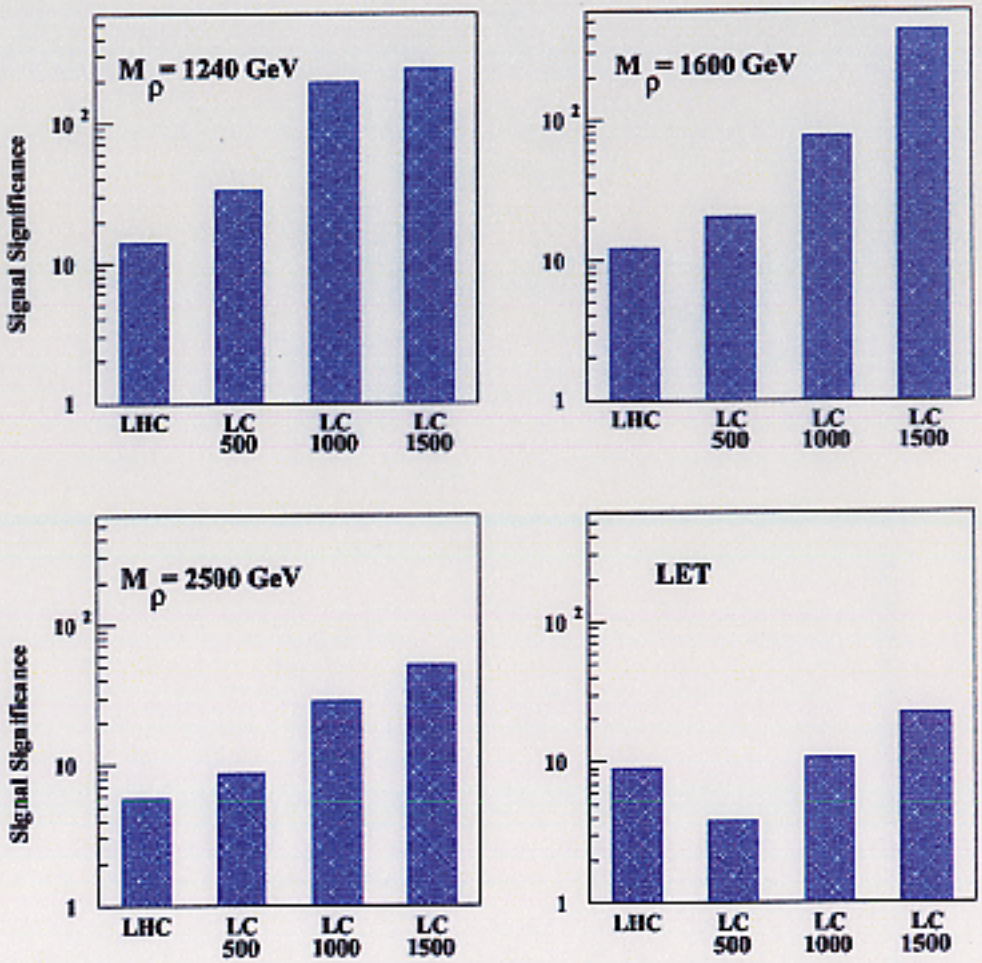

b) $\Delta\chi^2$=1.00
=2.28
=4.61
Input
min.χ^2
$M_{\tilde{\chi}_1^0}$ (GeV)
$M_{\tilde{\chi}_2^+}$ (GeV)


$e^+e^- \to \tilde{\chi}_1^+\tilde{\chi}_1^-$
$\sqrt{s}$ = 500 GeV
Pol.e^- = 0
1σ
μ = 400 GeV
M_2 = 250 GeV
tanβ = +2
50fb^{-1}
$\tilde{\nu}_e$
σ_{tot} (pb)
$m_{\tilde{\chi}}$ (GeV)

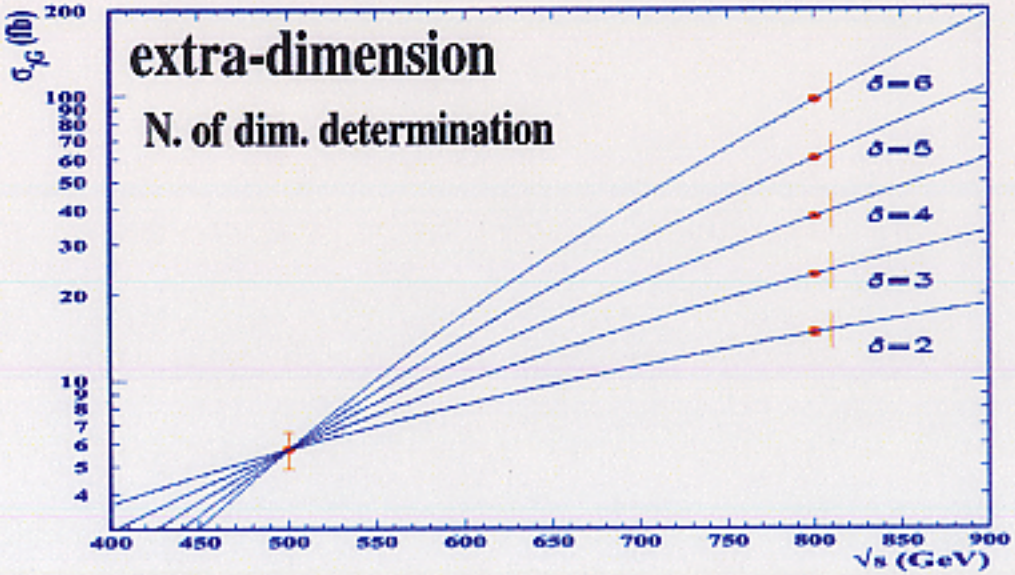

M_i (GeV)
500
400
300
200
100
0
M_3
M_2
M_1
10^2
10^5
10^8
10^11
10^14
10^16
Q (GeV)
M_i (GeV)
500
400
300
200
100
0
Q_1
U_1
D_1
L_1
E_1
H_1
10^2
10^5
10^8
10^11
10^14
10^16
Q (GeV)
M_i (GeV)
600
500
400
300
200
100
0
Q_1
U_1
D_1
L_1
E_1
H_2
10^2
10^5
10^8
10^11
10^14
10^18
Q (GeV)



Z'



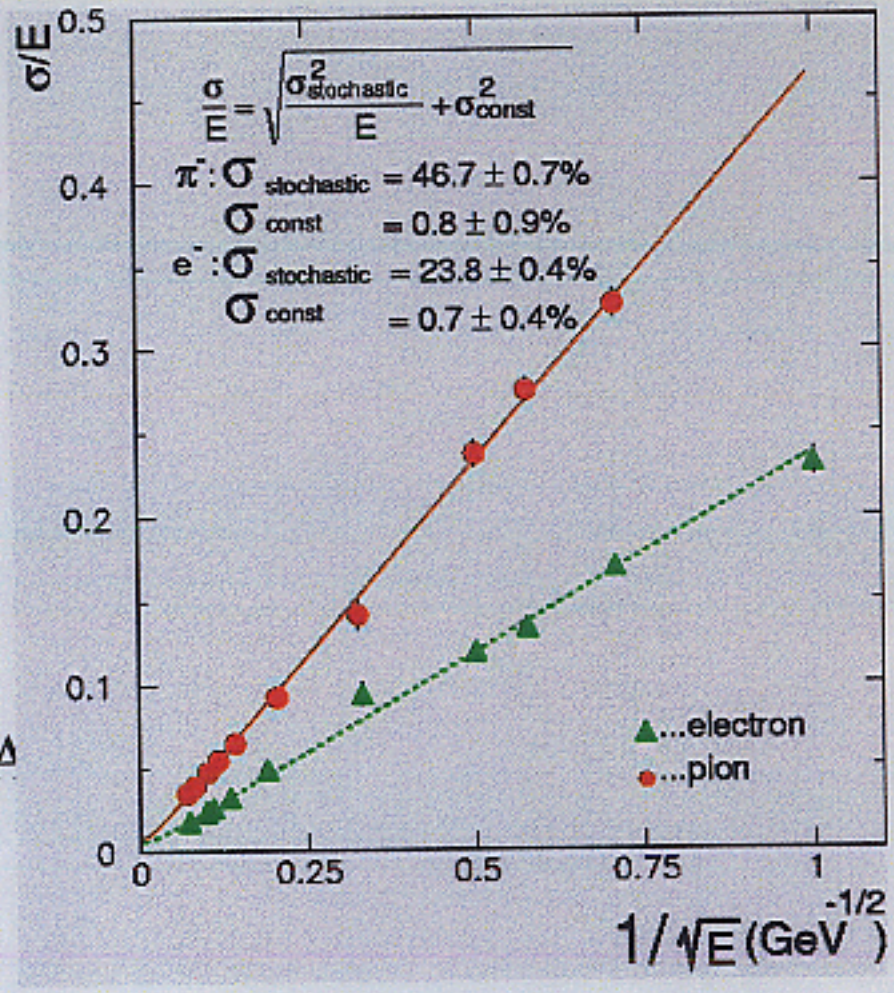
technicolor



ACFA JLC-I Detector R&D

CAL

2000 FNAL Beam Test (FNAL-MT6)



ACFA JLC-I Detector R&D

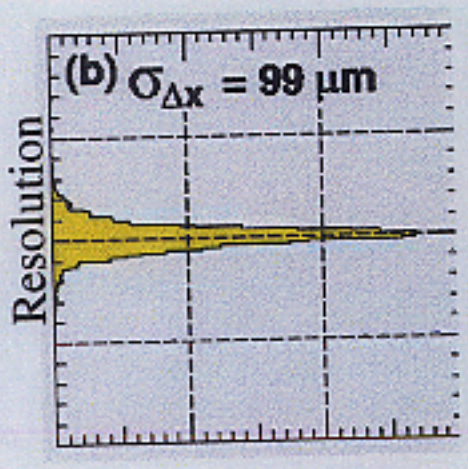
CDC

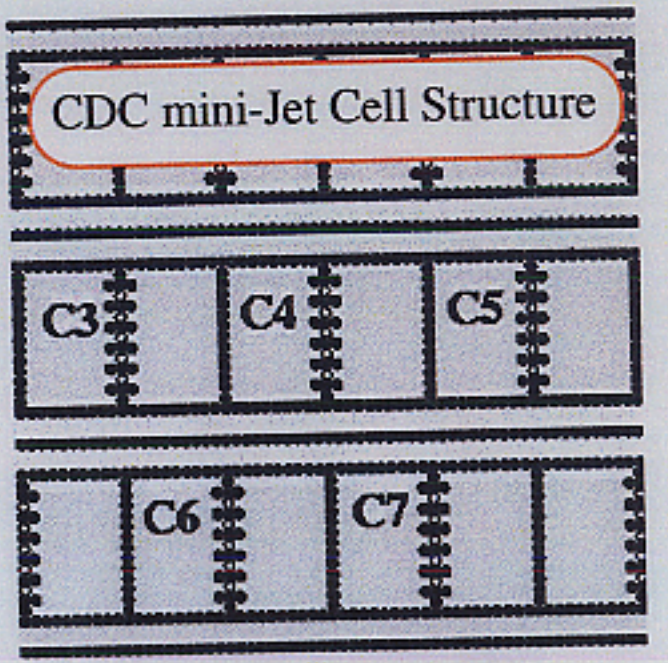
Achieved

Resolution < 100 μm

Two hit separation < 2mm

Time0 (Bunch Separation) resolution
~ 1nsec

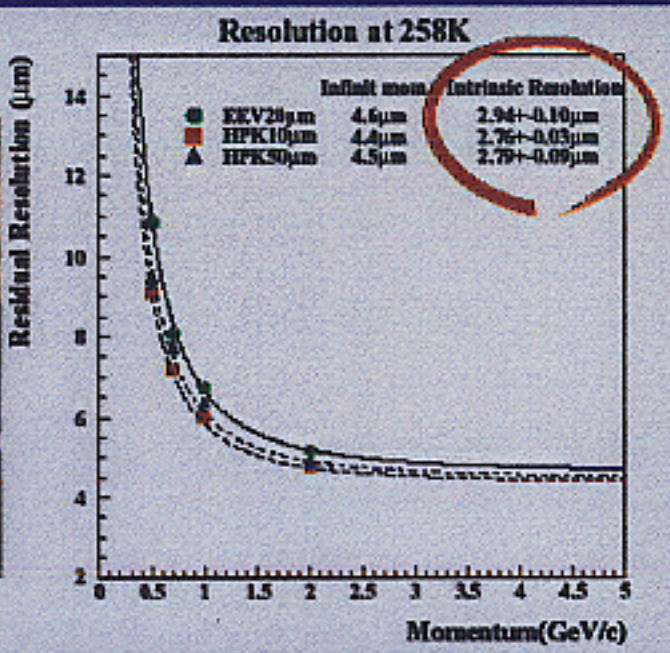




Bunch ID = OK

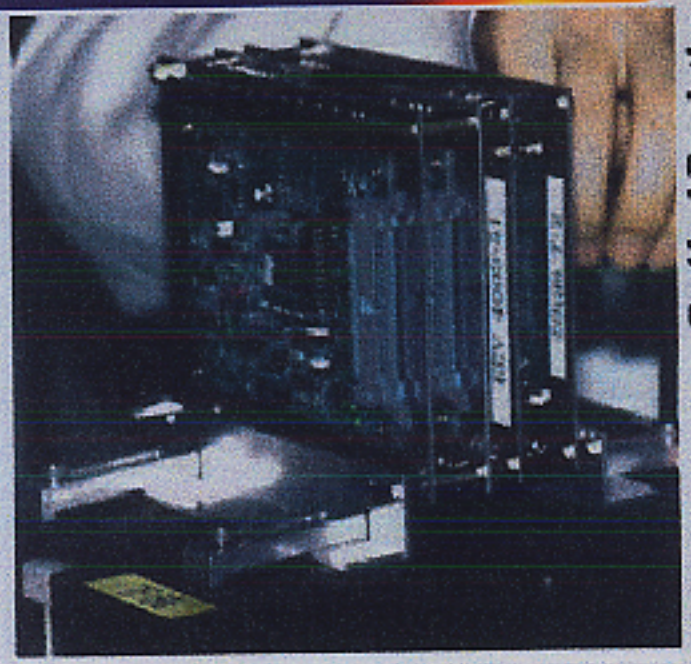
ACFA Joint Linear Collider
Detector R&D

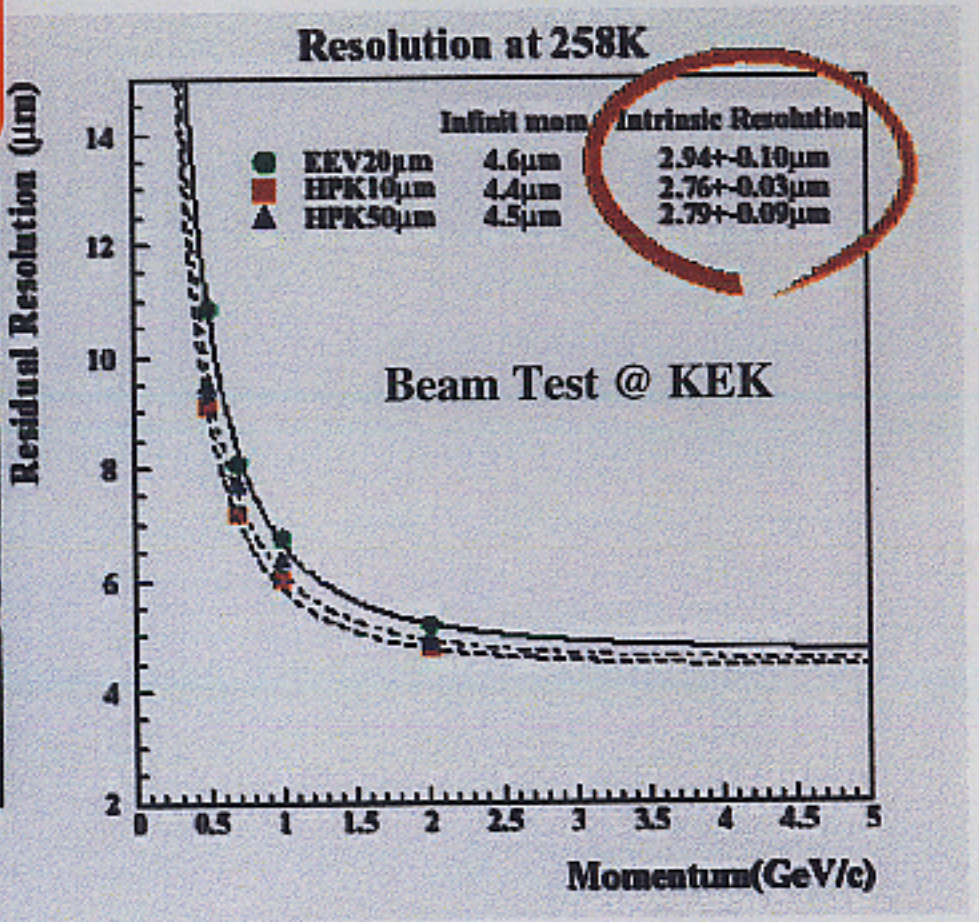
To Be Integrated into World-Wide LC Collab.



ACFA JLC-I Detector R&D

CCD-Vertex





Radiation Hardness TESTED

Electron and Neutron ^{90}Sr ^{252}Cf

Achieved

CCD will **survive > 3 years @ JLC-I**

(@Room Temperature, R=24mm, B=2T)

Spacial Resolution < 3 μm

JLC R&D

1. Polarized beam GUN

THE KEY for BEST PHYSICS

2. Damping Ring

ATF Accelerator Test Facility @ **KEK**

BIG International R&D (~50M$)

THE KEY for High Luminosity

3. Main LINAC

THE KEY for High ENERGY

i) C-band Conservative Approach (KEK-Spring8)

ii) X-band Ambitious Approach (SLAC-KEK)

4. Final Focus / BPM

BPM Beam Profile Monitor

= THE KEY for Small tolerance of High Frequency machines

TEST @ FFTB (SLAC)

5. Detector

THE KEY for PHYSICS

ACFA JLC Collaboration

World-Wide LC Collaboration

JLC R&D Damping Ring THE KEY for High Luminosity

ATF

Accelerator Test Facility @ KEK

Construction Start in 1993

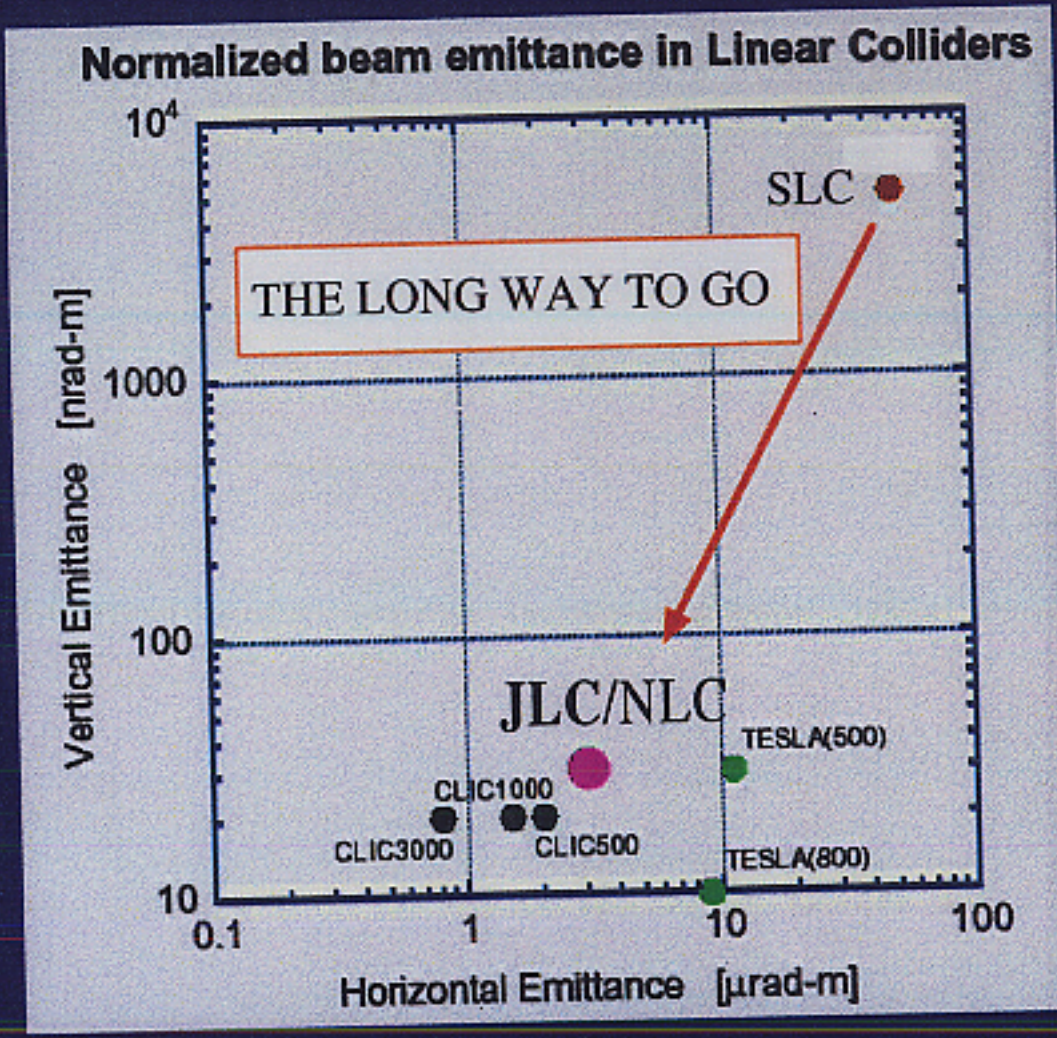
1997 Damping Ring Operation

Single Bunch

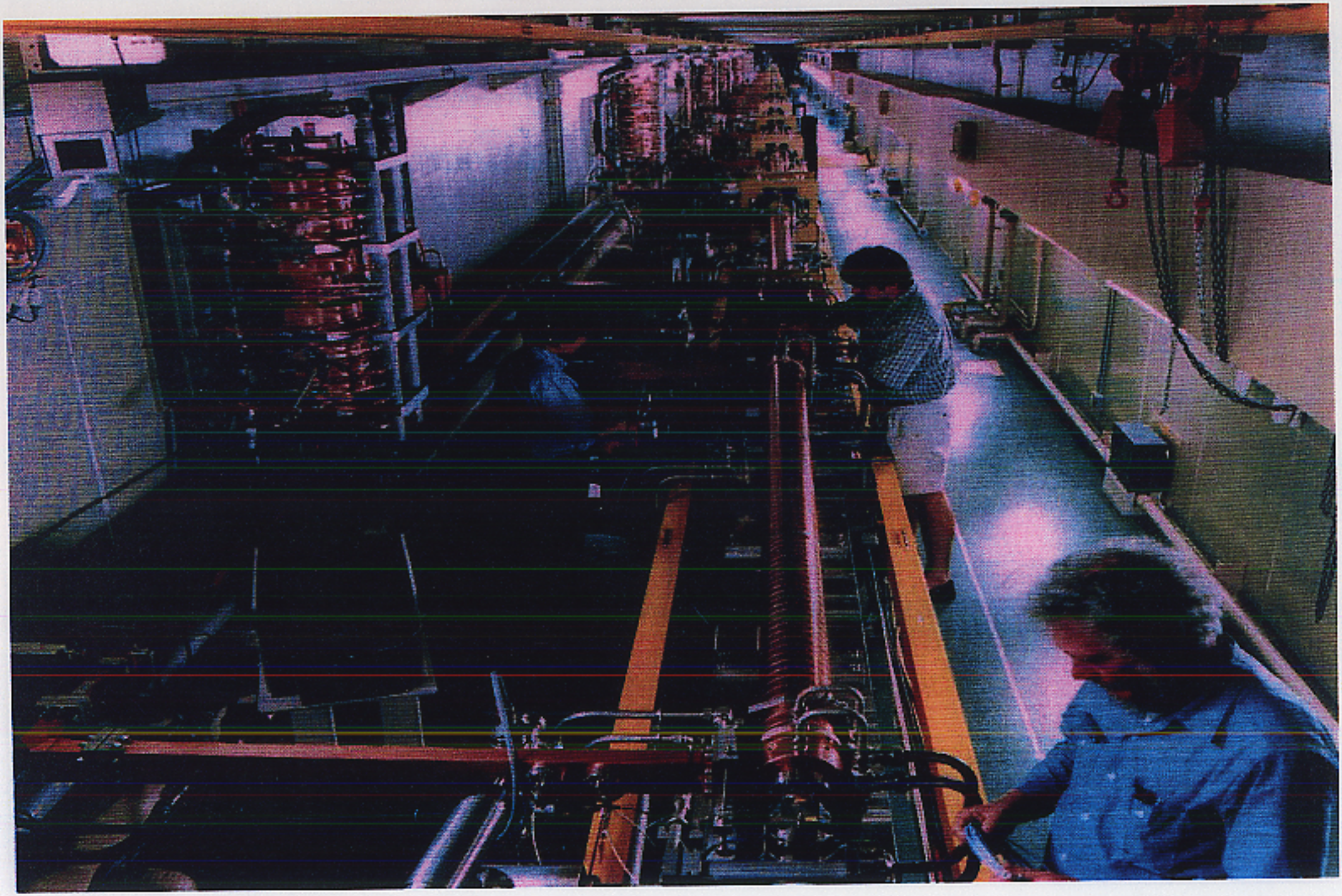
Now Operated with **Multi-Bunch**

BIG INTERNATIONAL EXPERIMENT

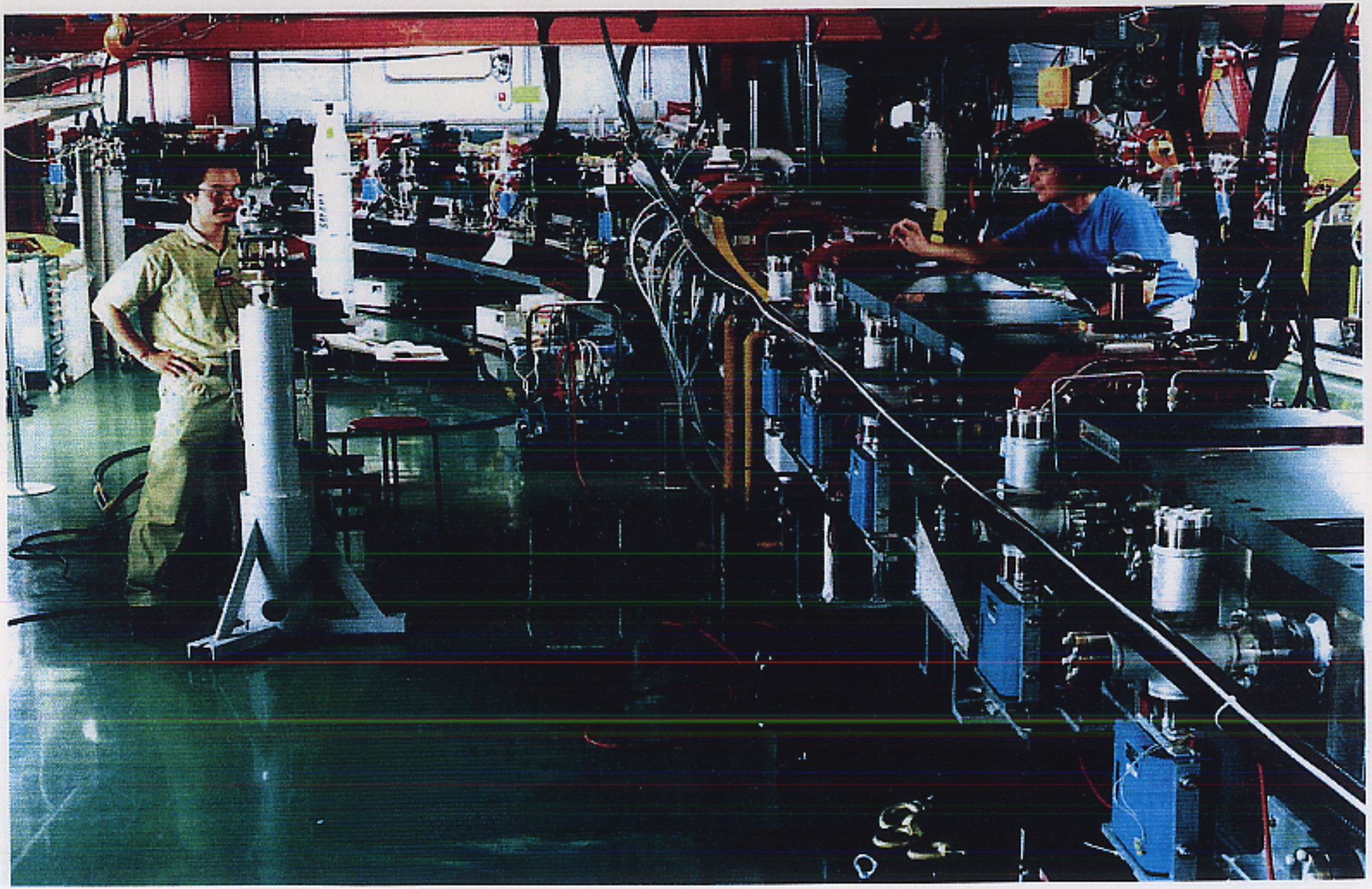
A lot of Universities, Students

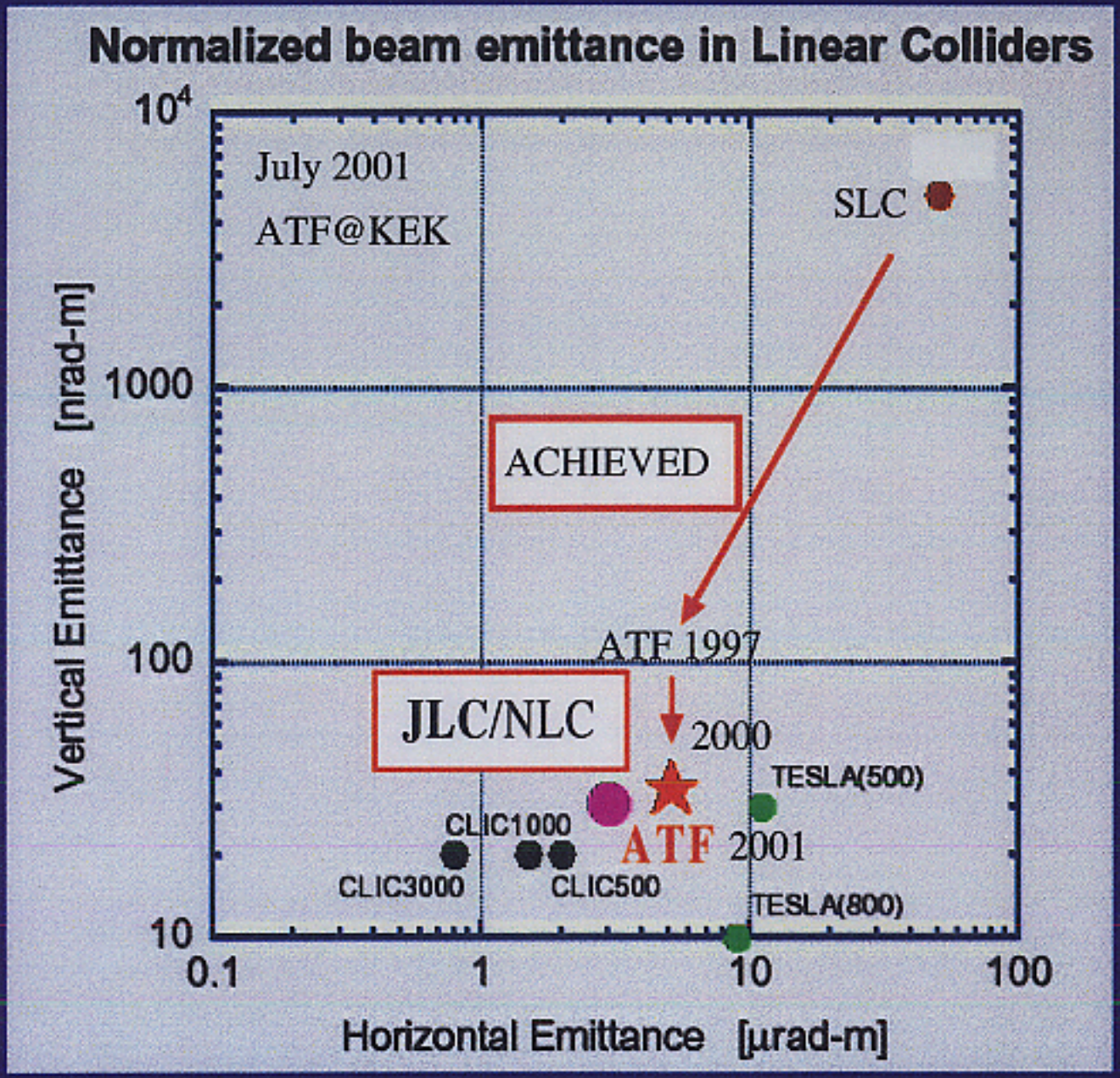


ATF Linac for JLC

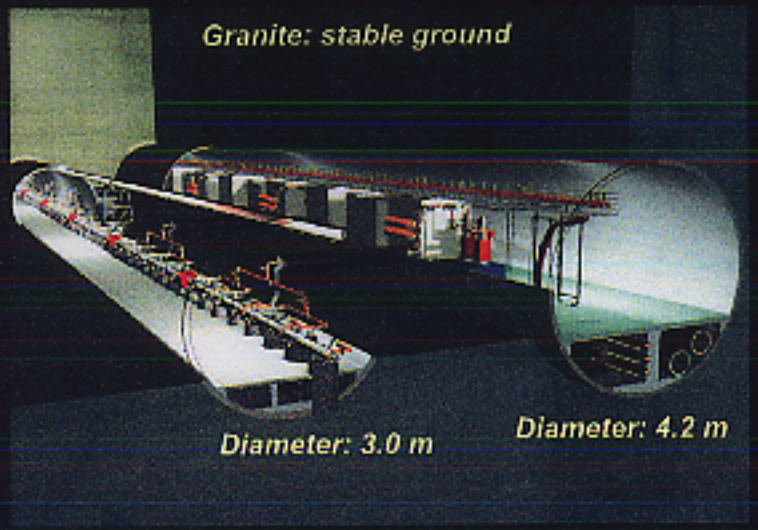


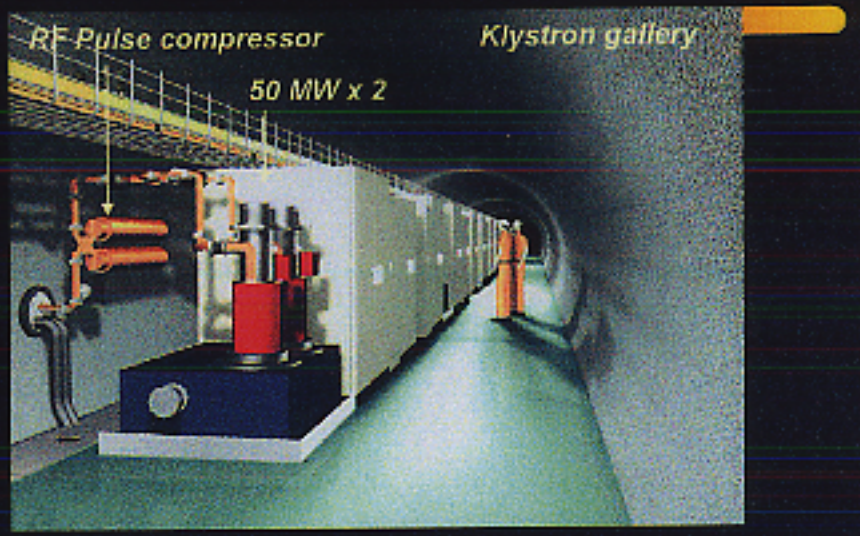
ATF Damping Ring for JLC

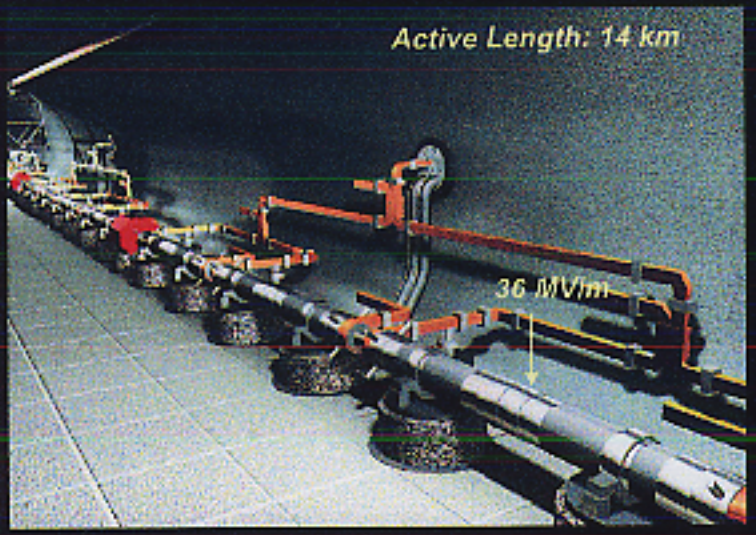


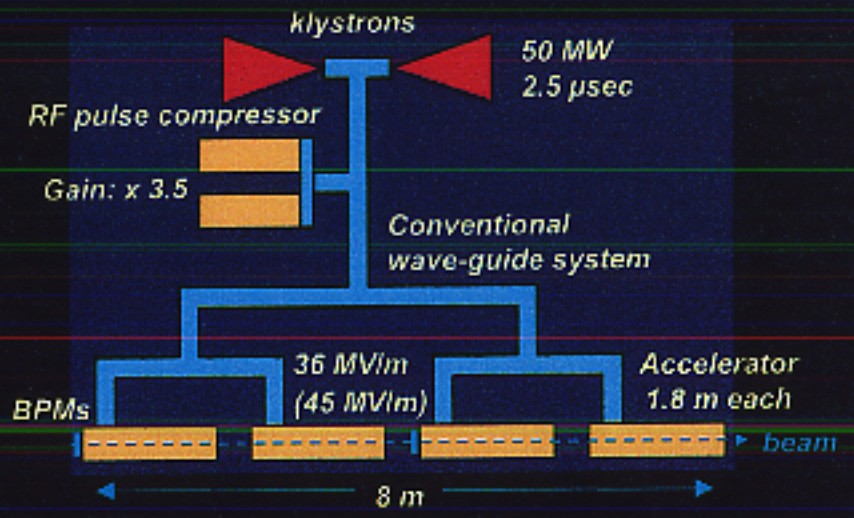

Normalized beam emittance in Linear Colliders
July 2001
ATF@KEK
SLC
ACHIEVED
ATF 1997
JLC/NLC
2000
TESLA(500)
CLIC1000
ATF 2001
CLIC3000
CLIC500
TESLA(800)
Vertical Emittance [nrad-m]
Horizontal Emittance [μrad-m]
10^4
1000
100
10
0.1
1
10
100

JLC C-band (5712 MHz) Main Linac Tunnel



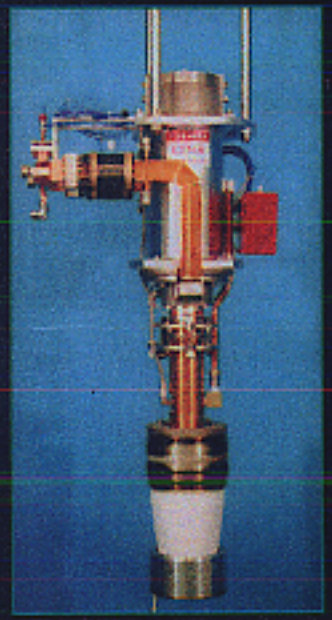


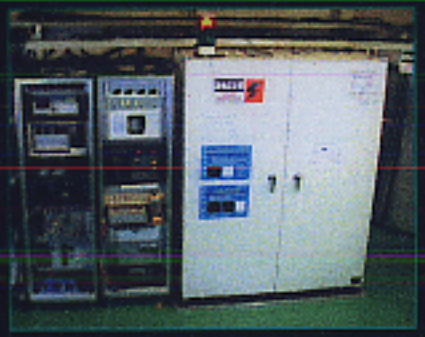




Phase-I R&D Summary

C-band Klystron	Klystron Modulator	RF Pulse Compressor	Accelerating Structure
50 MW, OK	110 MW OK	Flat Pulse	1.8 m OK
2.5 μsec, 47 %	100 pps	Gain 3.3	Choke-Mode
Life test >5000 hour, OK.	Smart modulator using inverter HV charger. Running for klystron life test	Three-cell cavity 1 m long cold model	Beam acceleration at 50 MV/m was done at ATF-KEK, with S-band model. HOM damping performance was proved by ASSET-SLAC test, 1998

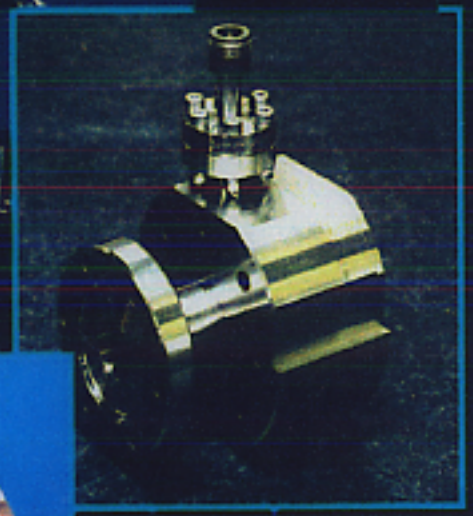


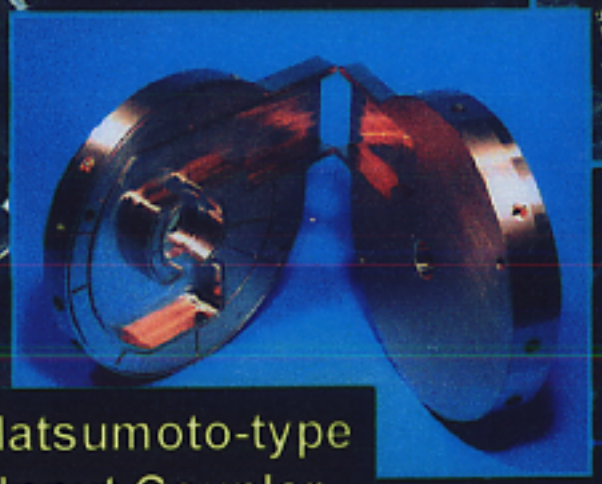


Need High Power Test

C-band Accelerating Structure

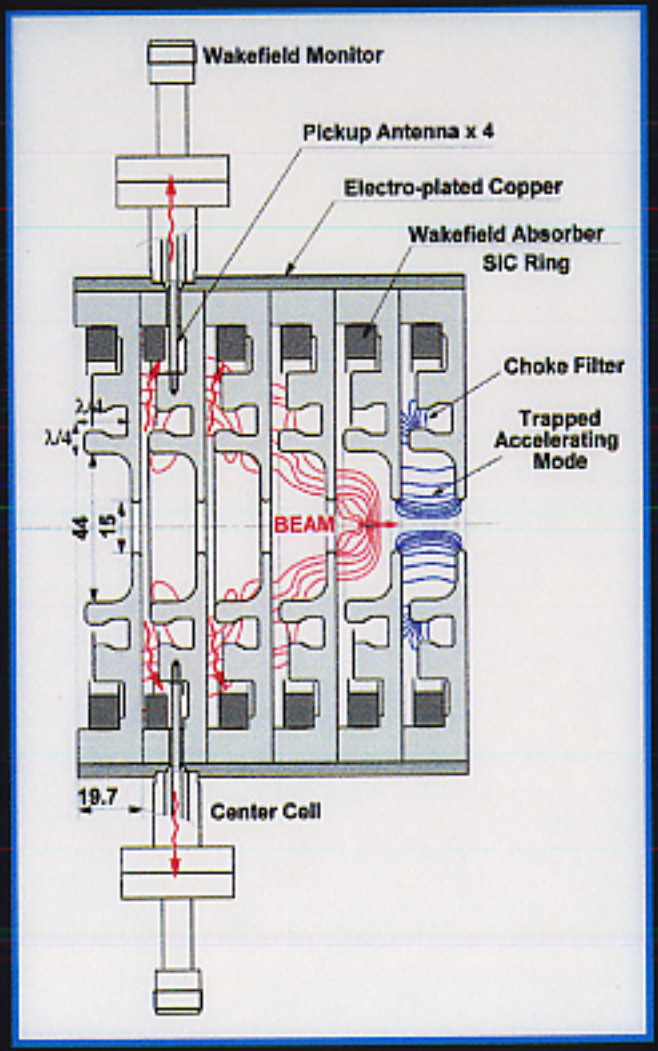
Full Scale Structure
1.8 m long



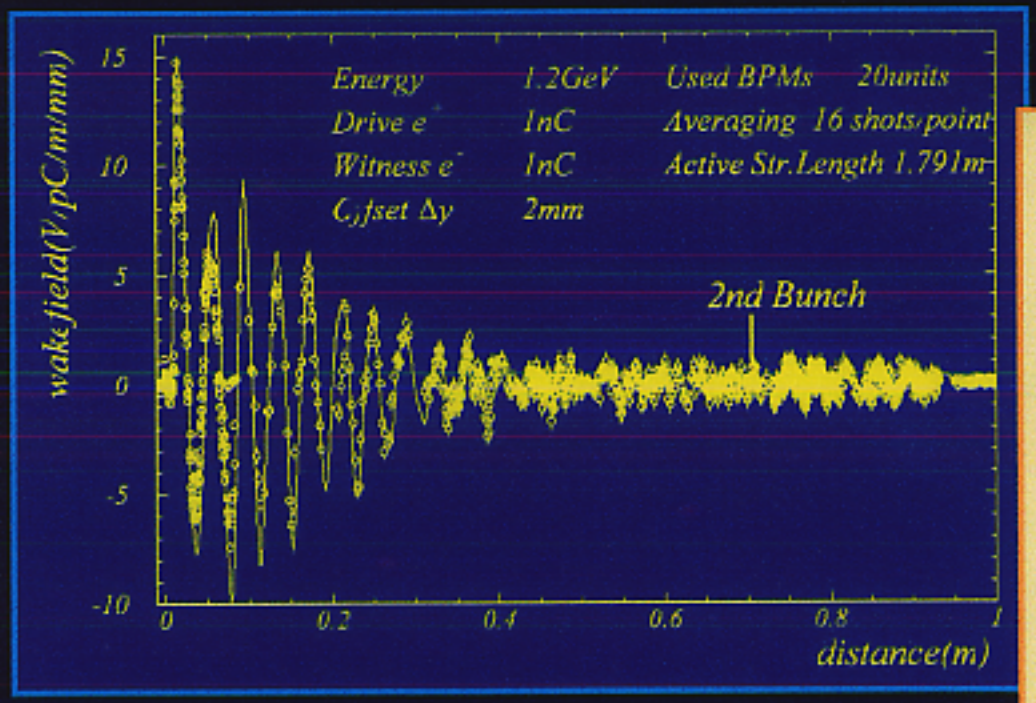


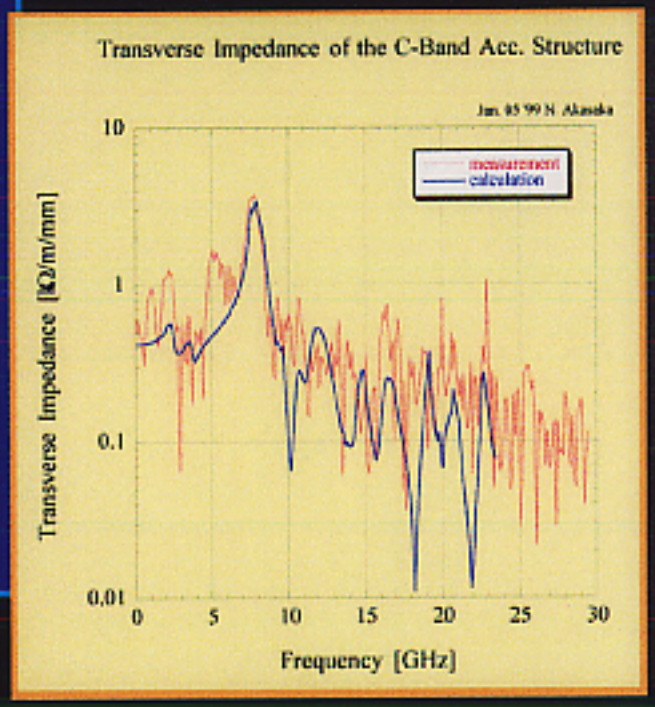
Matsumoto-type
Input Coupler

Choke-Mode Cavity



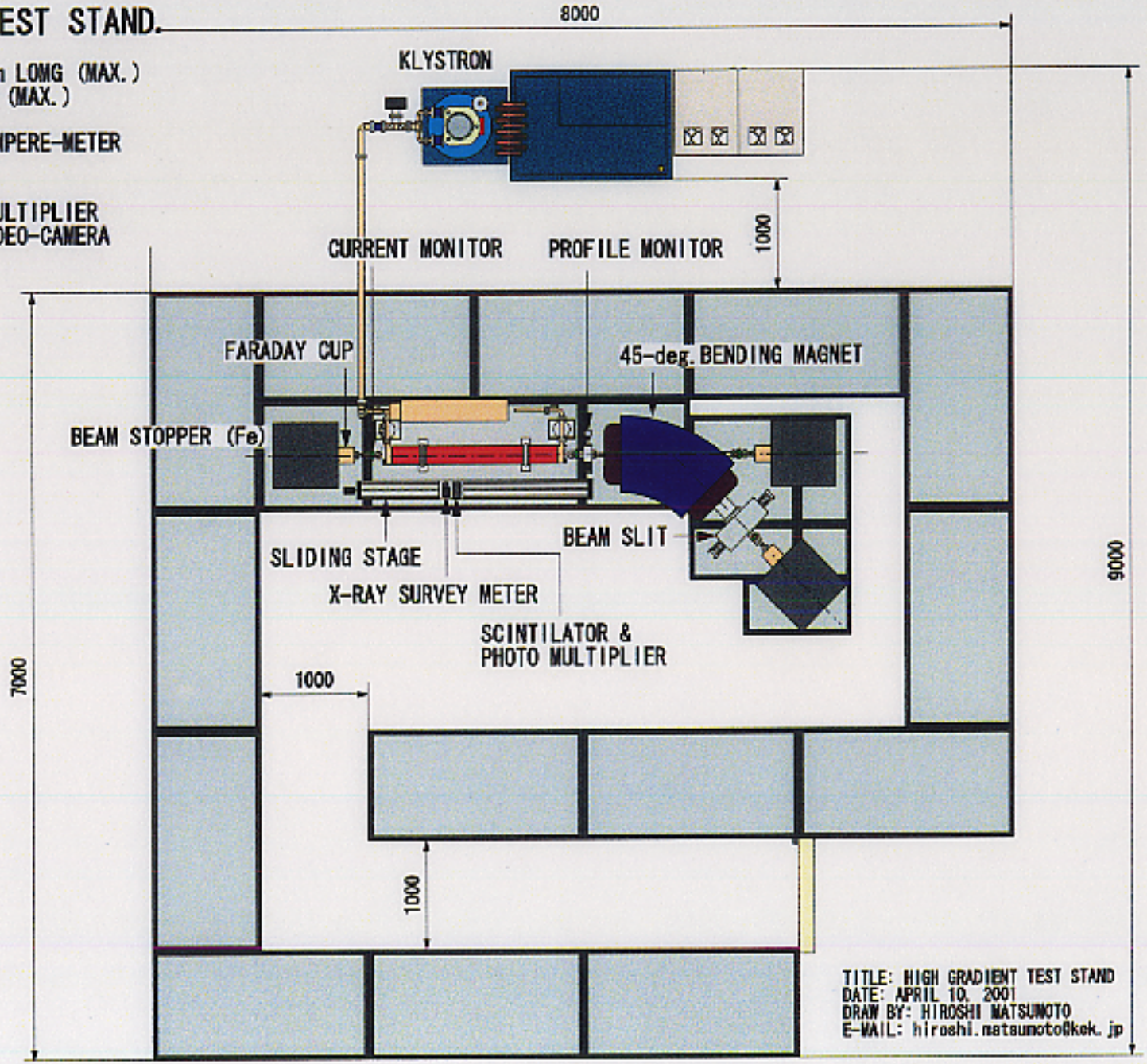
Measured Wakefield





HIGH GRADIENT TEST STAND.

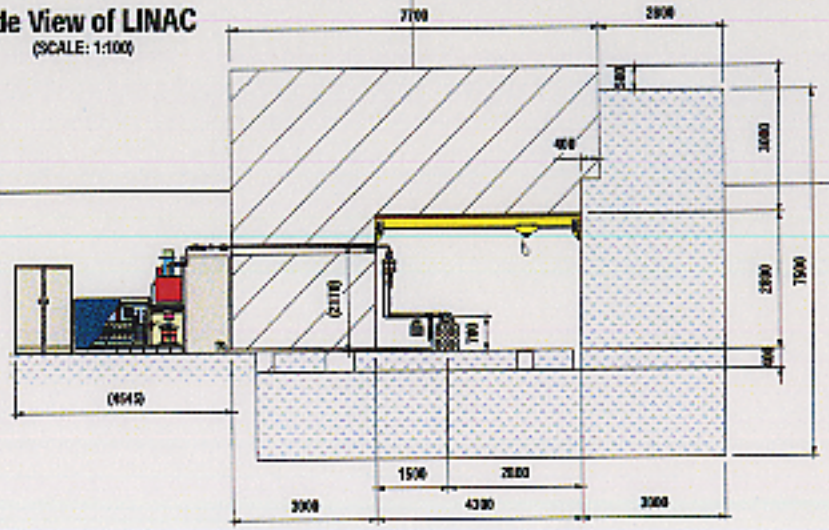
- STRUCTURE LENGTH: 3 m LONG (MAX.)
- BEAM ENERGY: 100 MeV (MAX.)
- MONITORS:
  FARADAY CUP & PICO-AMPERE-METER
  CURRENT MONITOR
  X-RAY SURVEY METER
  SCINTILATORPHOTO & MULTIPLIER
  PROFILE MONITOR & VIDEO-CAMERA



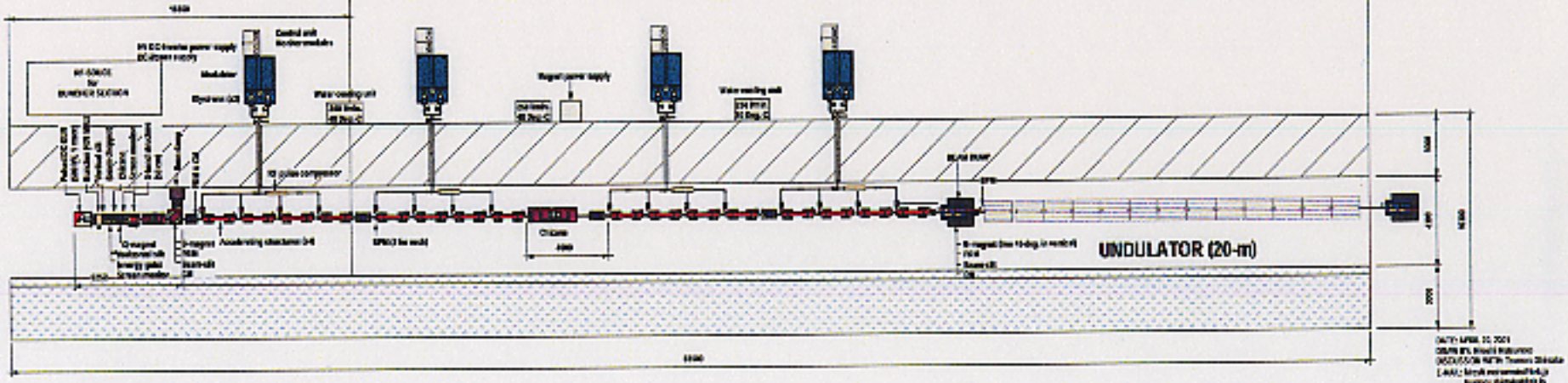
SPring-8 Compact SASE Source
SCSS Project

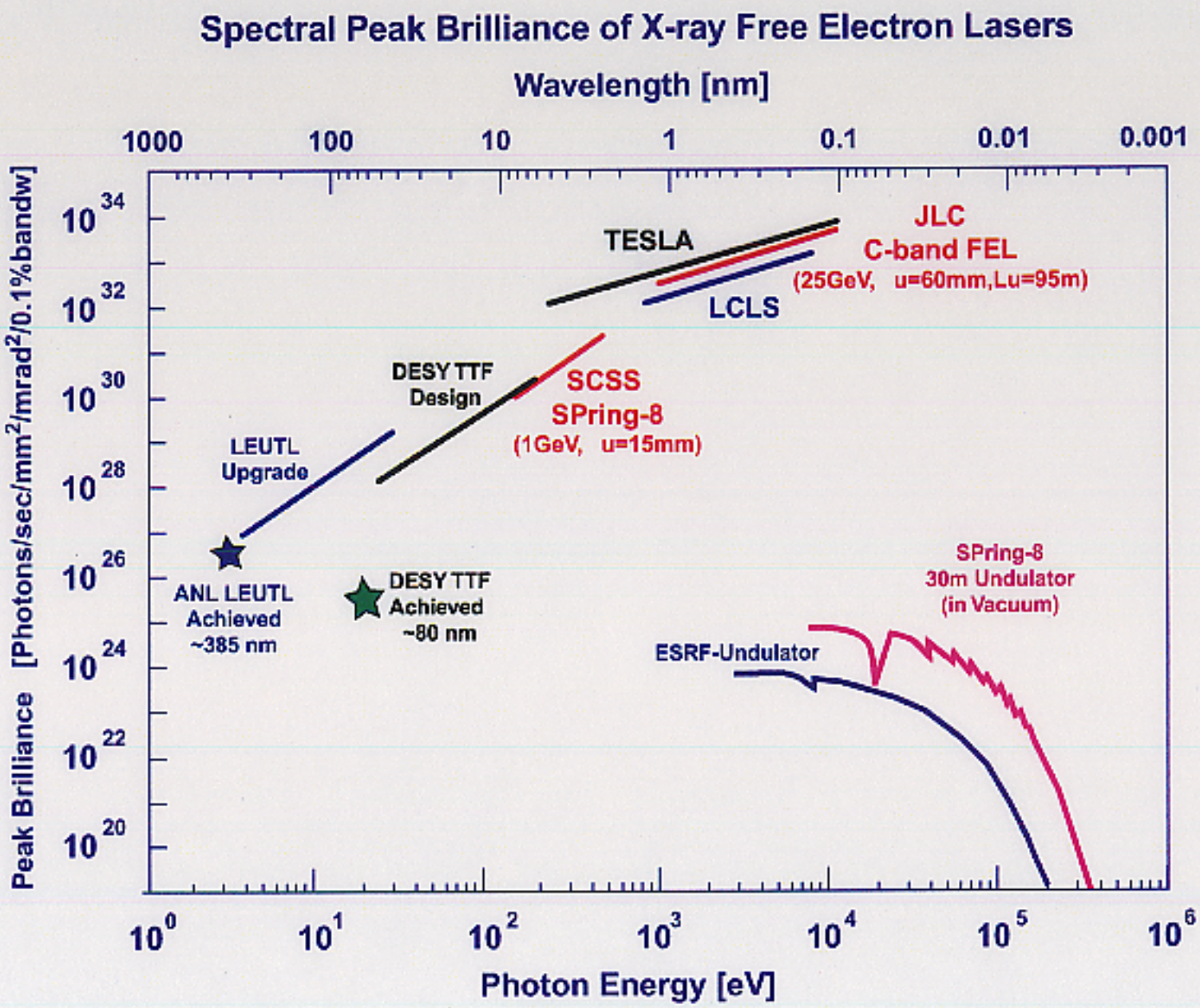
- Wave length: 10 nm
- Buncher section
  Thermionic electron gun: 500 KeV, 1 msec
  Normalized emittance: 0.5 pmm.mrad
  Peak current: 4 kA
- Main LINAC
  Frequency: 5712 MHz
  Accelerating gradient: 35-40 MeV/m
- UNDULATOR
  Vacuum type
  Length: 20 m (in total)
  Periodicity: 1-1.5 mm
  Gap distance: 2 mm (for minimum)

Side View of LINAC
(SCALE: 1:100)



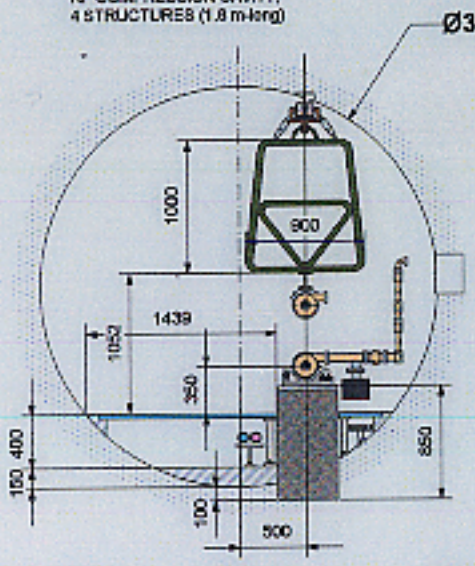
Top View of LINAC
(SCALE: 1/200)

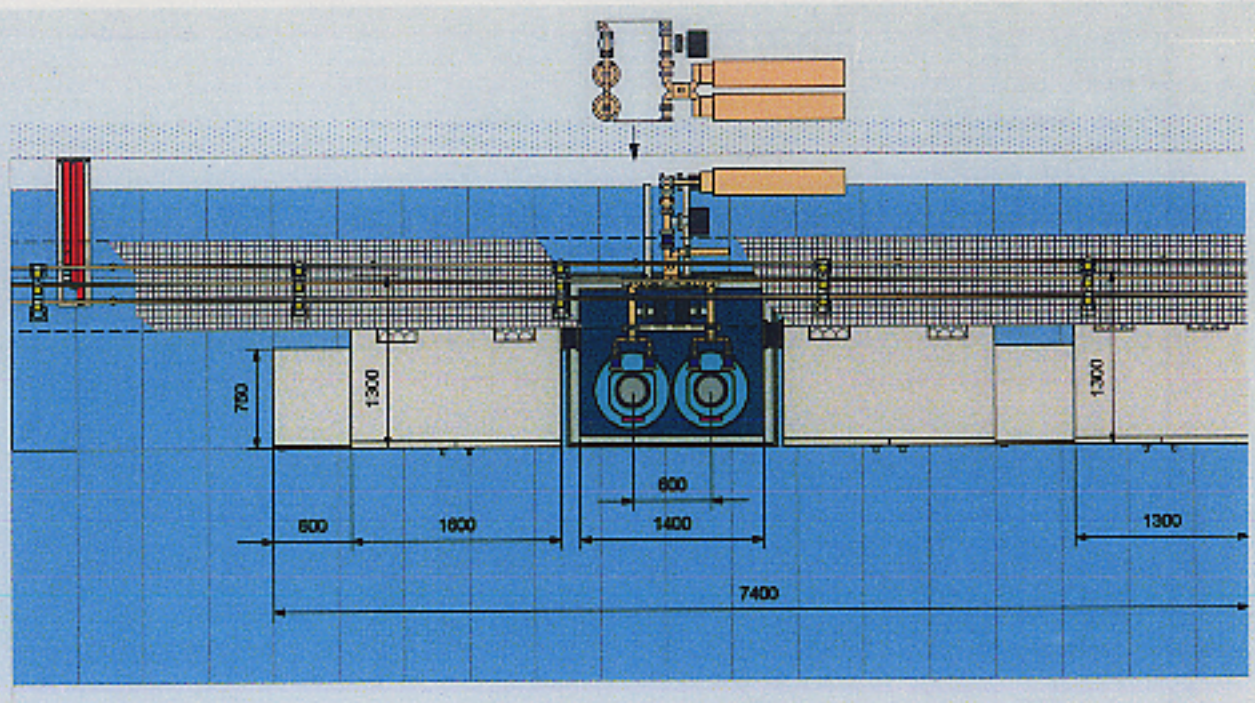


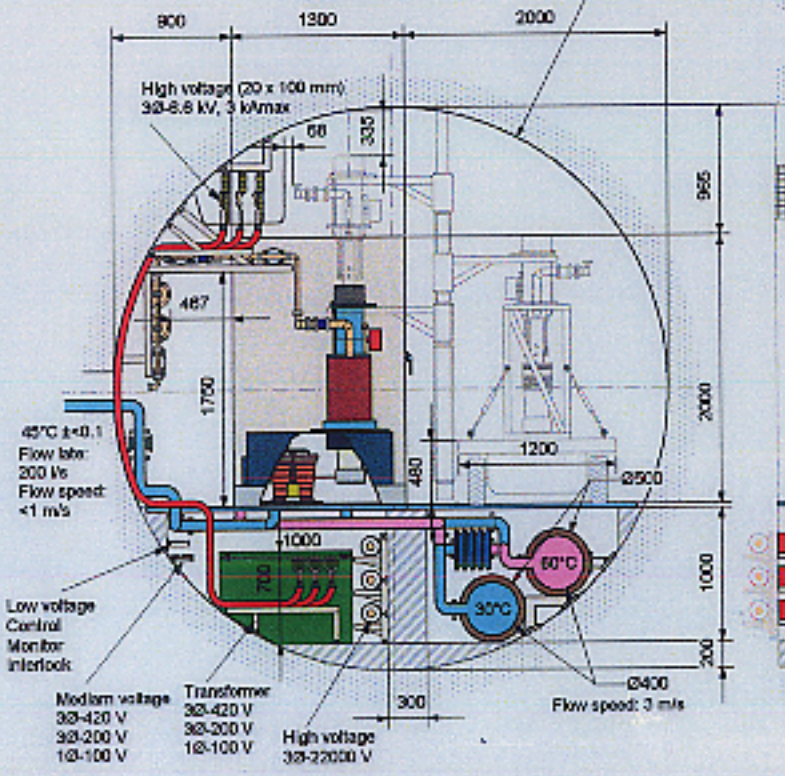

Spectral Peak Brilliance of X-ray Free Electron Lasers
Wavelength [nm]
1000
100
10
1
0.1
0.01
0.001
Peak Brilliance [Photons/sec/mm²/mrad²/0.1%bandw]
10 34
10 32
10 30
10 28
10 26
10 24
10 22
10 20
TESLA
JLC
C-band FEL
(25GeV, u=60mm,Lu=95m)
LCLS
DESY TTF
Design
SCSS
SPring-8
(1GeV, u=15mm)
LEUTL
Upgrade
ANL LEUTL
Achieved
~385 nm
DESY TTF
Achieved
~80 nm
SPring-8
30m Undulator
(in Vacuum)
ESRF-Undulator
10 0
10 1
10 2
10 3
10 4
10 5
10 6
Photon Energy [eV]

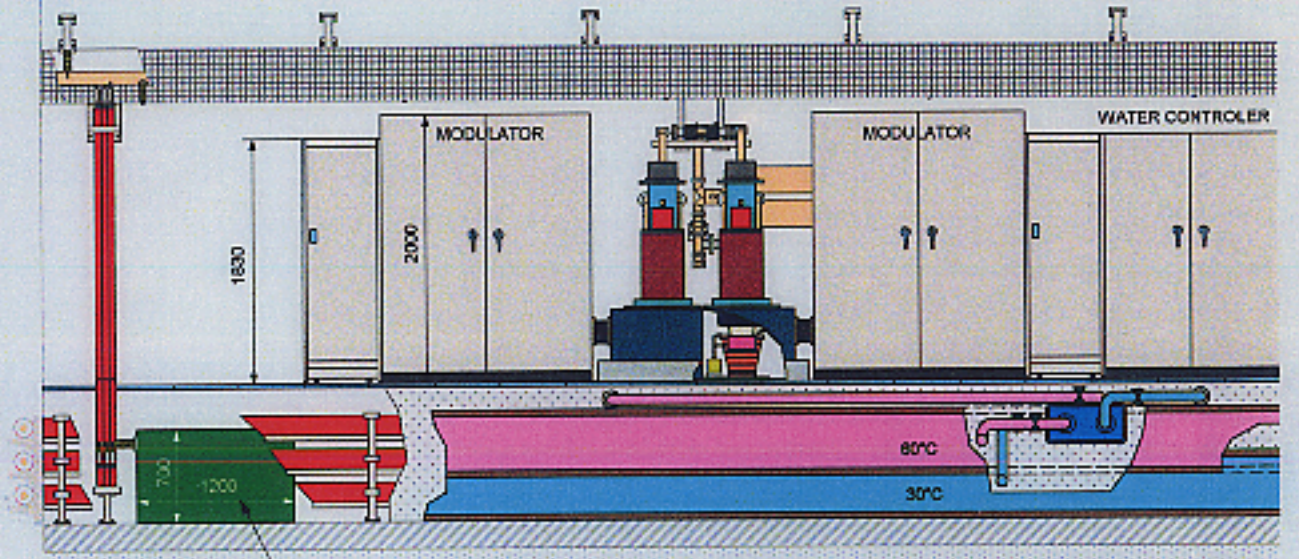
C-BAND MAIN LINAC TUNNEL

TARGET ENERGY: 500 GeV C.M.
LENGTH: ~22 km (220 SECTORS)
1 SECTOR: 100 UNITS (1 km)
1 UNIT: 2 KLYSTRONS,
2 MODULATORS,
RF COMPRESSION CAVITY,
4 STRUCTURES (1.8 m-long)







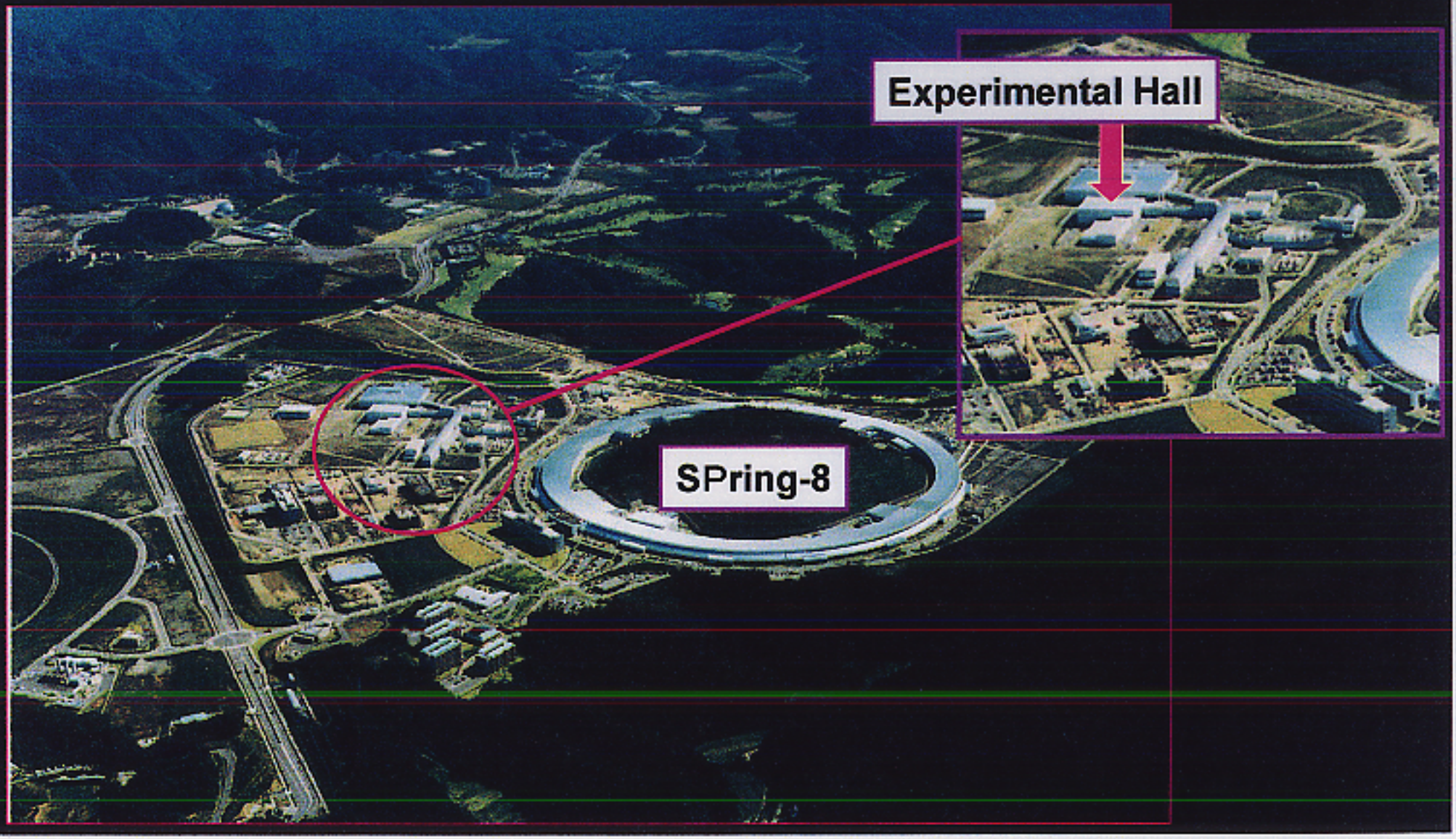


Transformer
3Ø-420 V, 3Ø-200 V, 1Ø-100 V

DRAW BY: H. Matsumoto
0298-64-5200 (PHS: 4317)
hiroshi.matsumoto@kek.jp

Where to build FEL?

X-ray FEL



X-band THE KEY for > TeV

VERY STRONG COLLABORATION **SLAC - KEK**

Current JLC X-band Parameters (K.Yokoya)

c.m. Energy	500 GeV		1 TeV
	option-A	option-Y	
Luminosity (10^{34} cm^{-2} s^{-1})	0.88	**2.49**	1.25
Bunch Spacing	2.8ns	1.4ns	2.8ns
Rep. Rate (Hz)	150	150	100
N. of Bunch	95	190	95
Two-LINAC Total Length	**9.5 km**	**11.0 km**	**21.8 km**

Achieved

KEK PPM-2 **Klystron**

73MW 1.5μsec 54% Eff. ACHIEVED (2001 May)

DLDS Delay Line Pulse Compressor

Developping 2x2 Multi-mode DLDS

Modulator

Developping **Solid State Devices**

Accelerator Structure Problem Surface Field

Several Different Shapes have been made at KEK

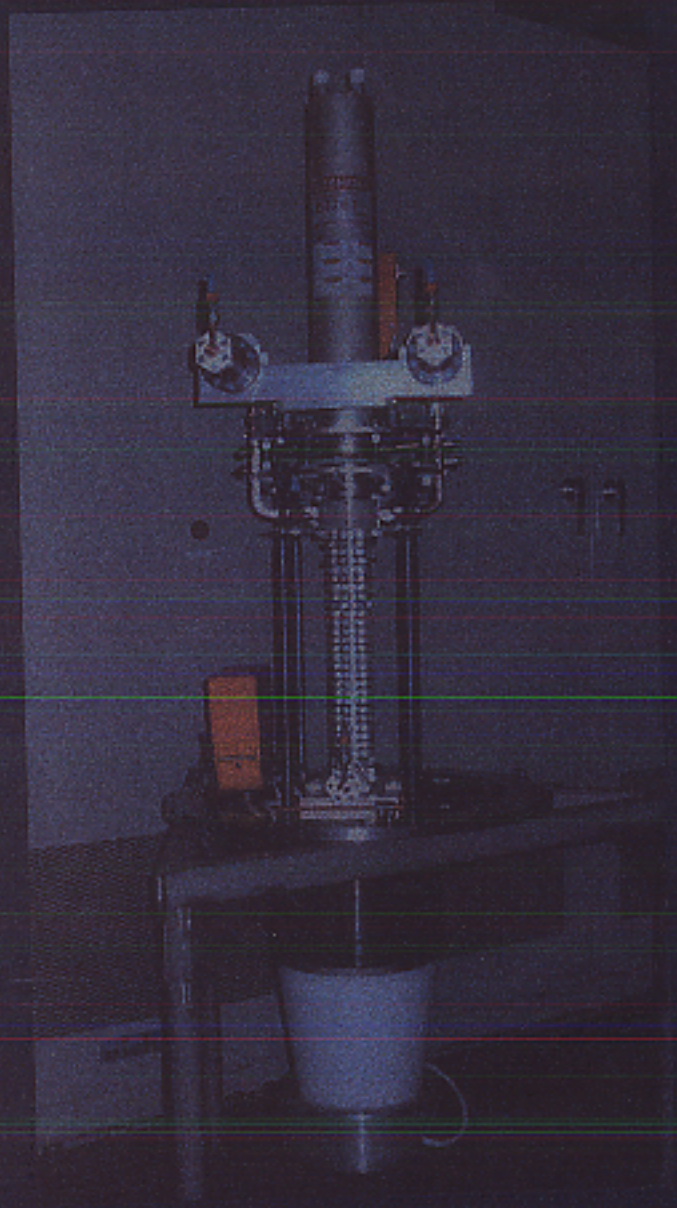
→ Tested at SLAC **Very Encouraging Results**

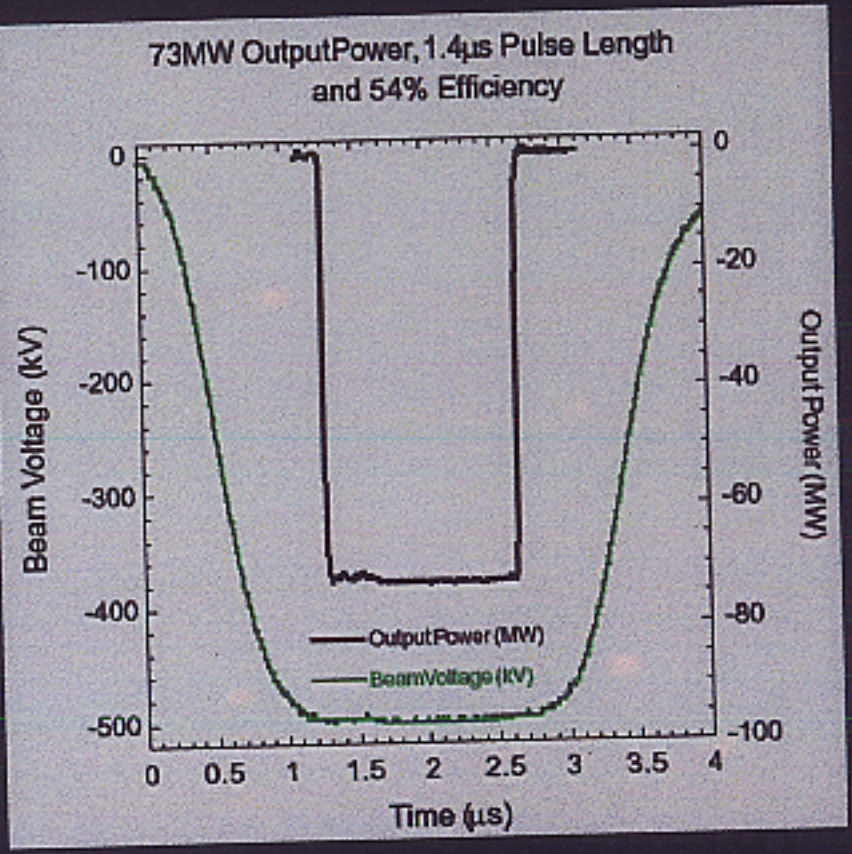
The other way = Different **Material** (e.g. W) **coating**

Getting Hints to Solve the Problem

JLC X-band R&D KEK PPM-2 Klystron

2001 May

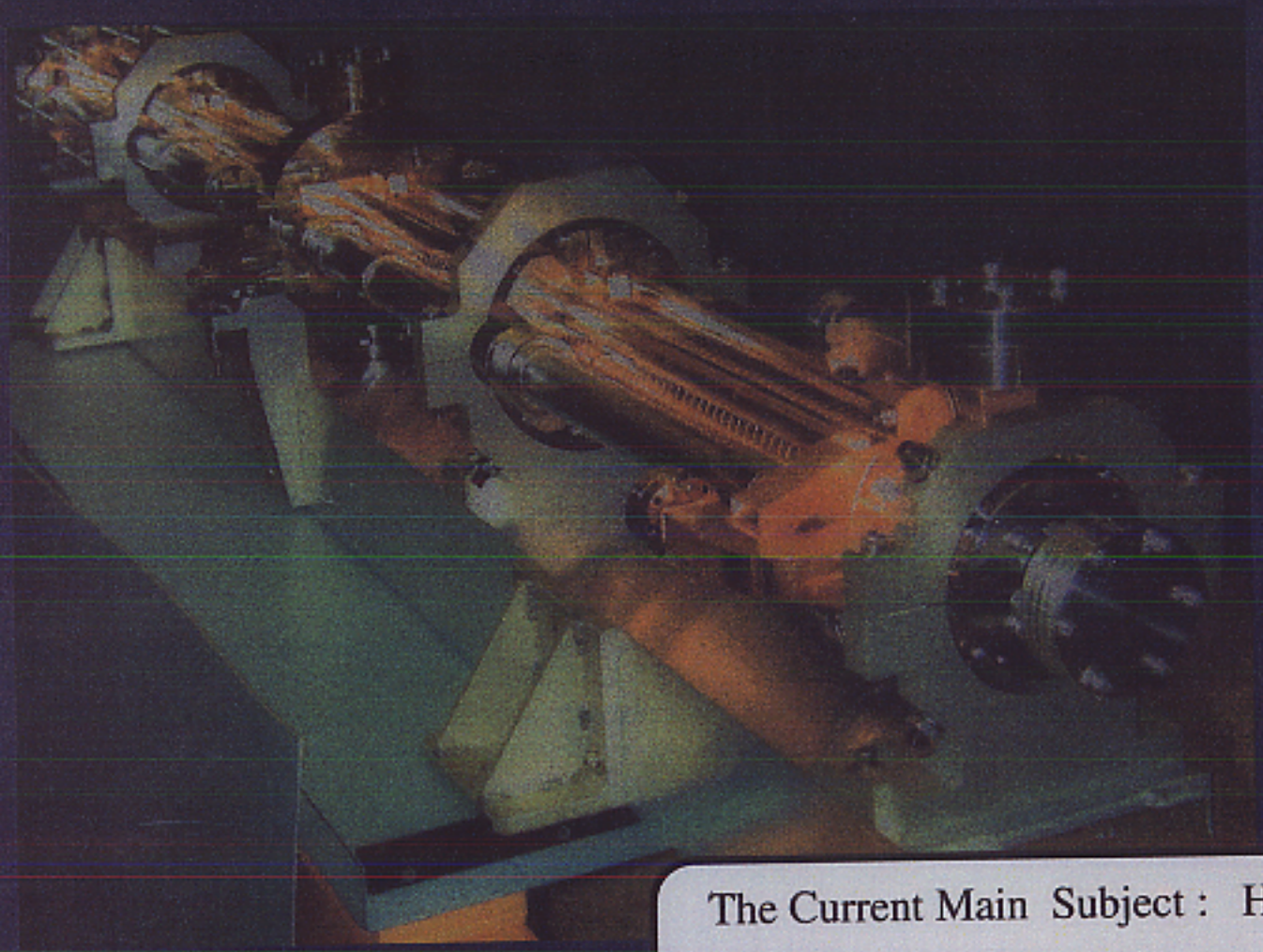




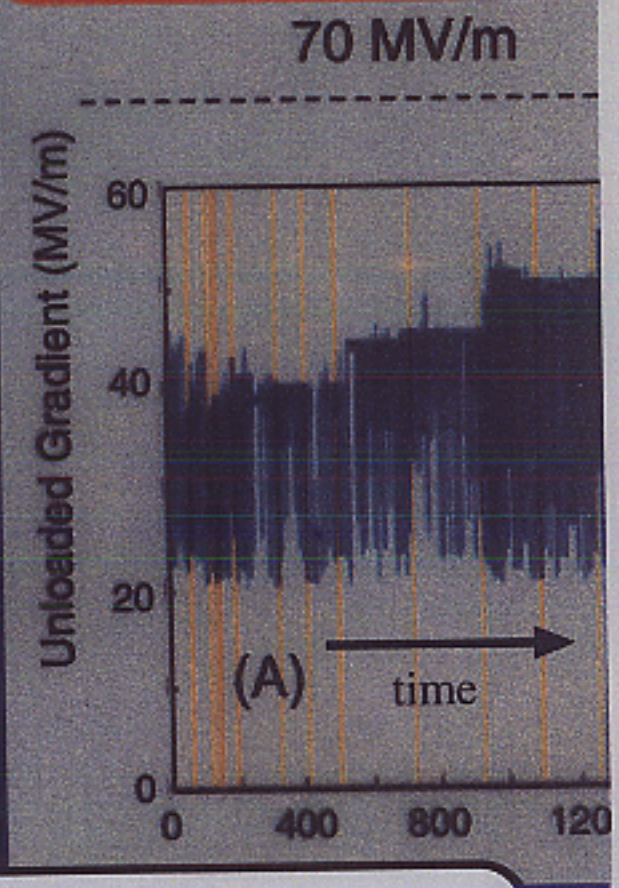
	JLC spec	Achieved
Power	75 MW	73 MW
Efficiency	55%	54 %
Rf-width	1.5 μs	1.4 μs

SLAC - KEK

X-band R&D Accelerating Structure



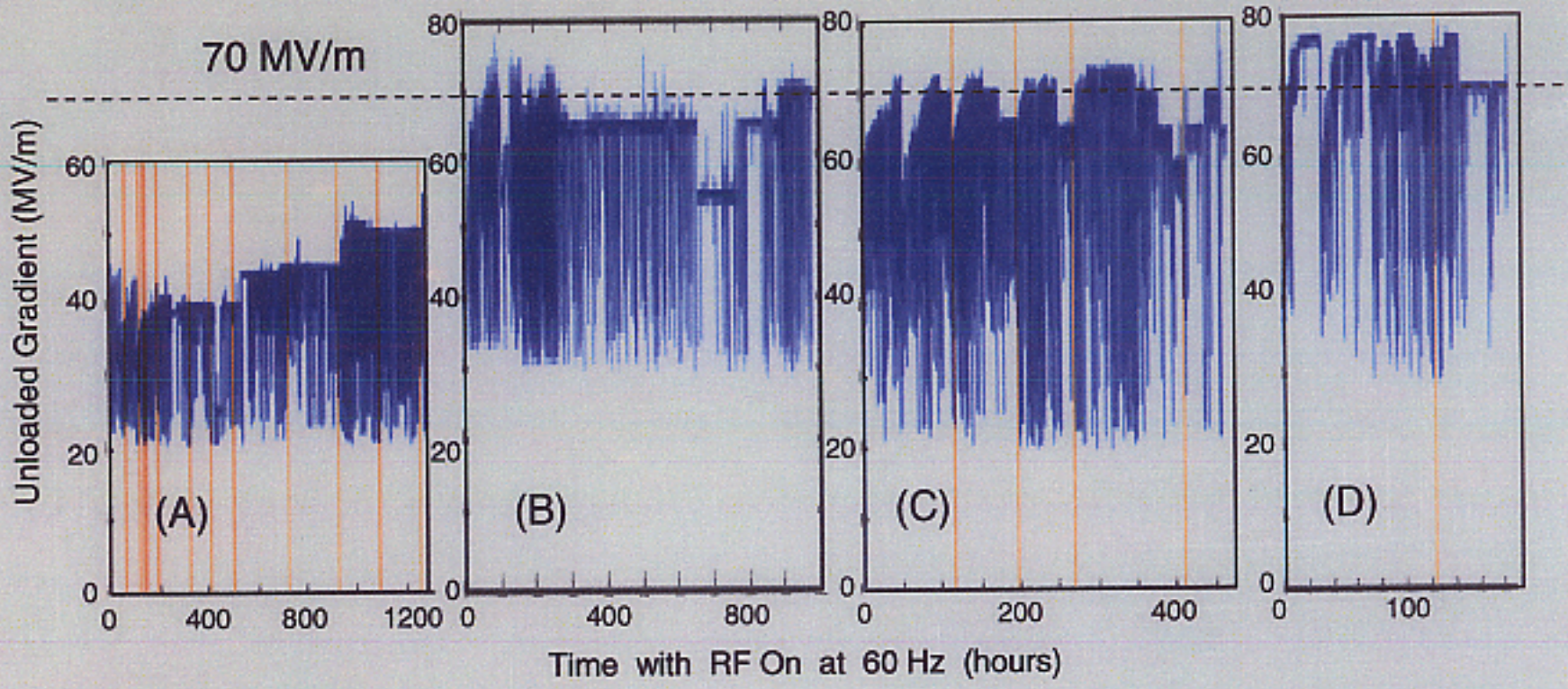
Surface Field Problem



The Current Main Subject : How to Solve?

1. Different Structure 2. Material Coating

Processing History of Several Accelerator Structure (X-band)

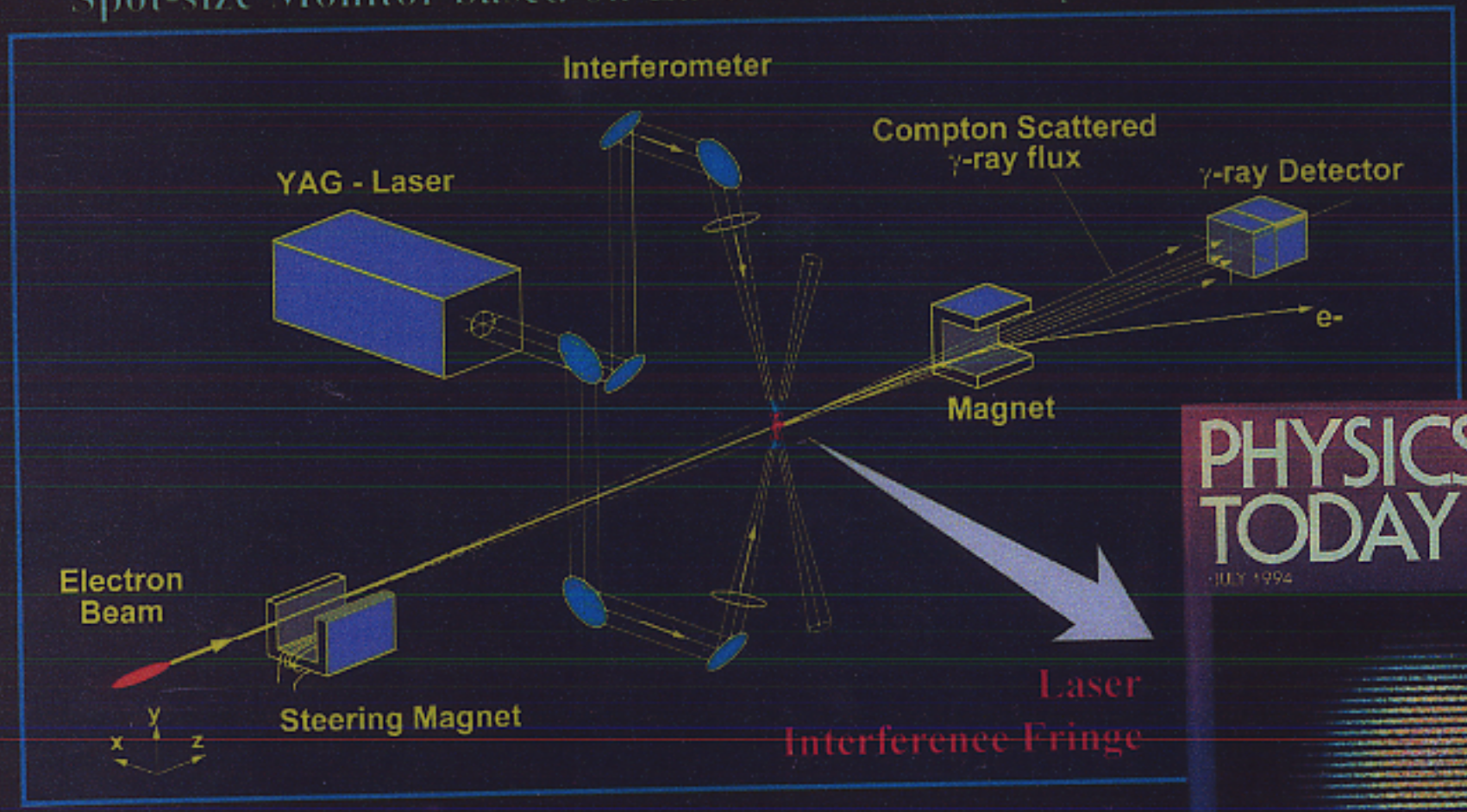


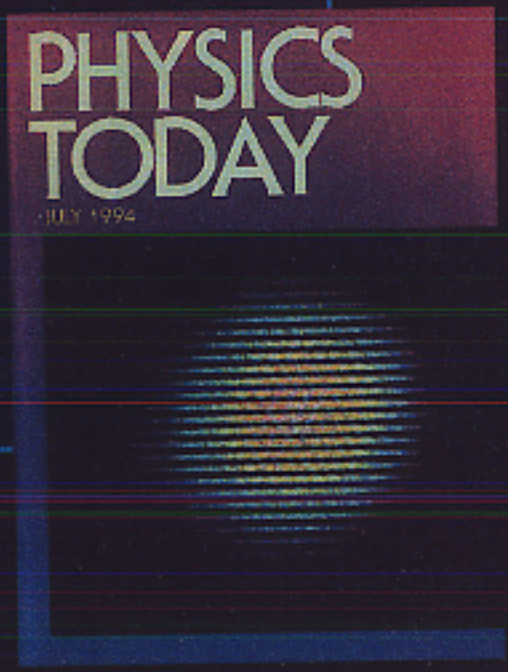
1.8 m long with 12% v_g | 0.5 m long with 5% v_g | 1.0 m long with 5% v_g | 0.5 m long with 3% v_g

Nanometer Beam Size Measurement

e+e- Linear Collider R&D

Spot-size Monitor based on Laser Interferometry





T. Shintake 1990

JLC R&D SUMMARY

READY 1. Polarized beam GUN

Achieve **multi-bunch**, 0.6×10^{10} e^- / bunch
> 80% pol. **upgraded to 200KV**

READY 2. Damping Ring

World BEST Emittance (~JLC parameters)
Good performance in **Multi-bunch** opperation
ATF Injector Upgrading now

READY 3. Main LINAC

~ DONE C-band

Conservative Approach
Basic Components are all READY → Cost Reduction
SASE-XFEL in Spring8 (2001-2004) **APPROVED** (a few 10s MS)

Steady PROGRESS X-band

Ambitious Aproach
Big success of PPM Klystron. Strong cooperation with SLAC.
Rf-Structure needs more studies. They have hints to solve the problem

READY 4. Final Focus / BPM

Achieved
Cavity BPM δ=23nm (<<requirement)
Strip Line BPM δ=0.7μn(~requirement)

O.K. 5. Detector

NO PROBLEM

Very Active ACFA JLC Collaboration
→ World-Wide LC Collab

Satoru Yamashita *ICEPP, Univ. of Tokyo,* *19 July 2001 Snowmass*

JLC THE NEXT PRINCIPAL HEP PROJECT

2001 Jan. JHF approved

JLC = THE OFFICIAL PRINCIPAL PROJECT

2001 Apr. JLC Promotion Committee established
Chairman: H.Sugawara (KEK Derector)

NOW

2001 Aug. The 1st ACFA Report on JLC Physics and Detector

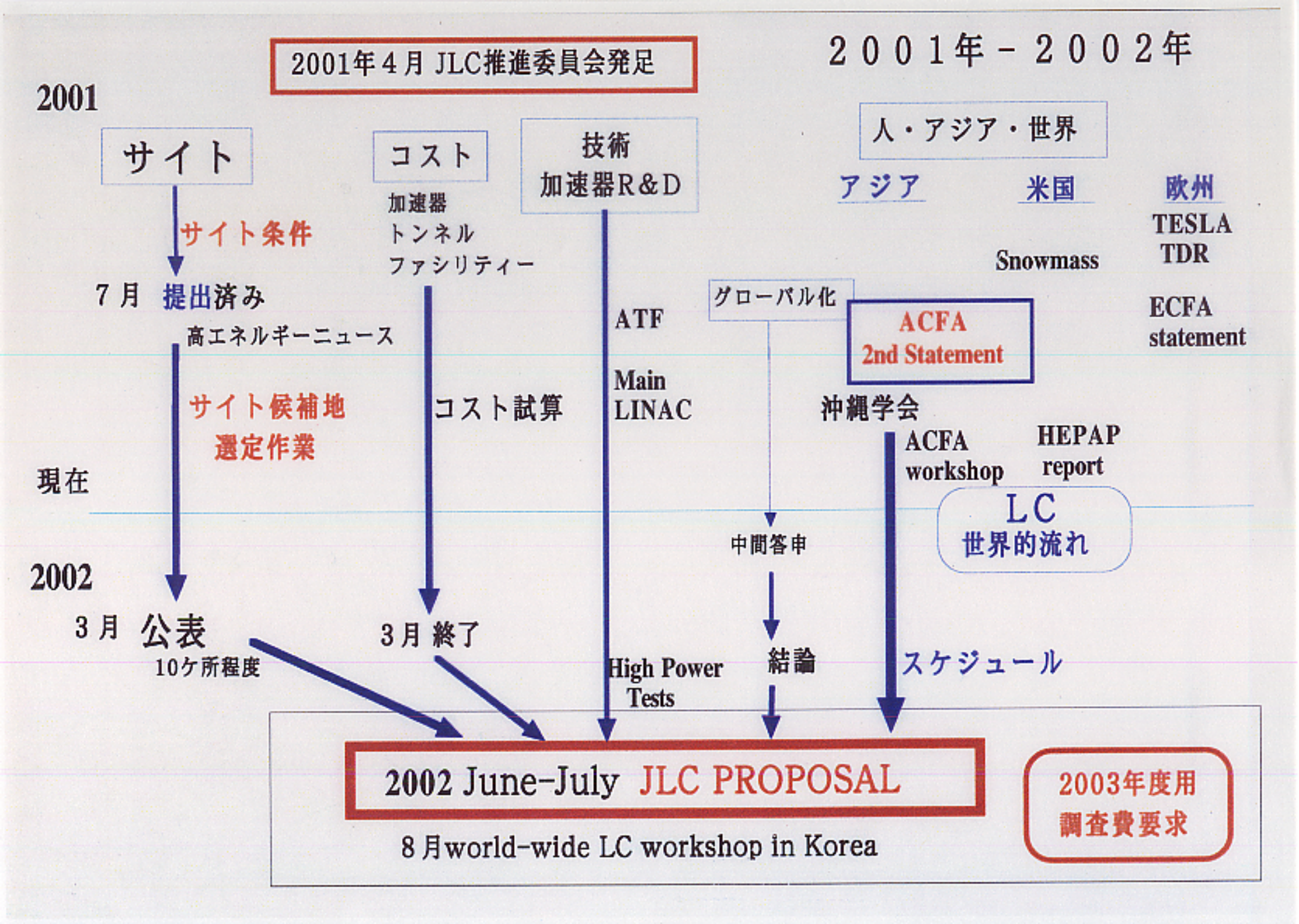
2001 Sep. The 2nd ACFA STATEMENT

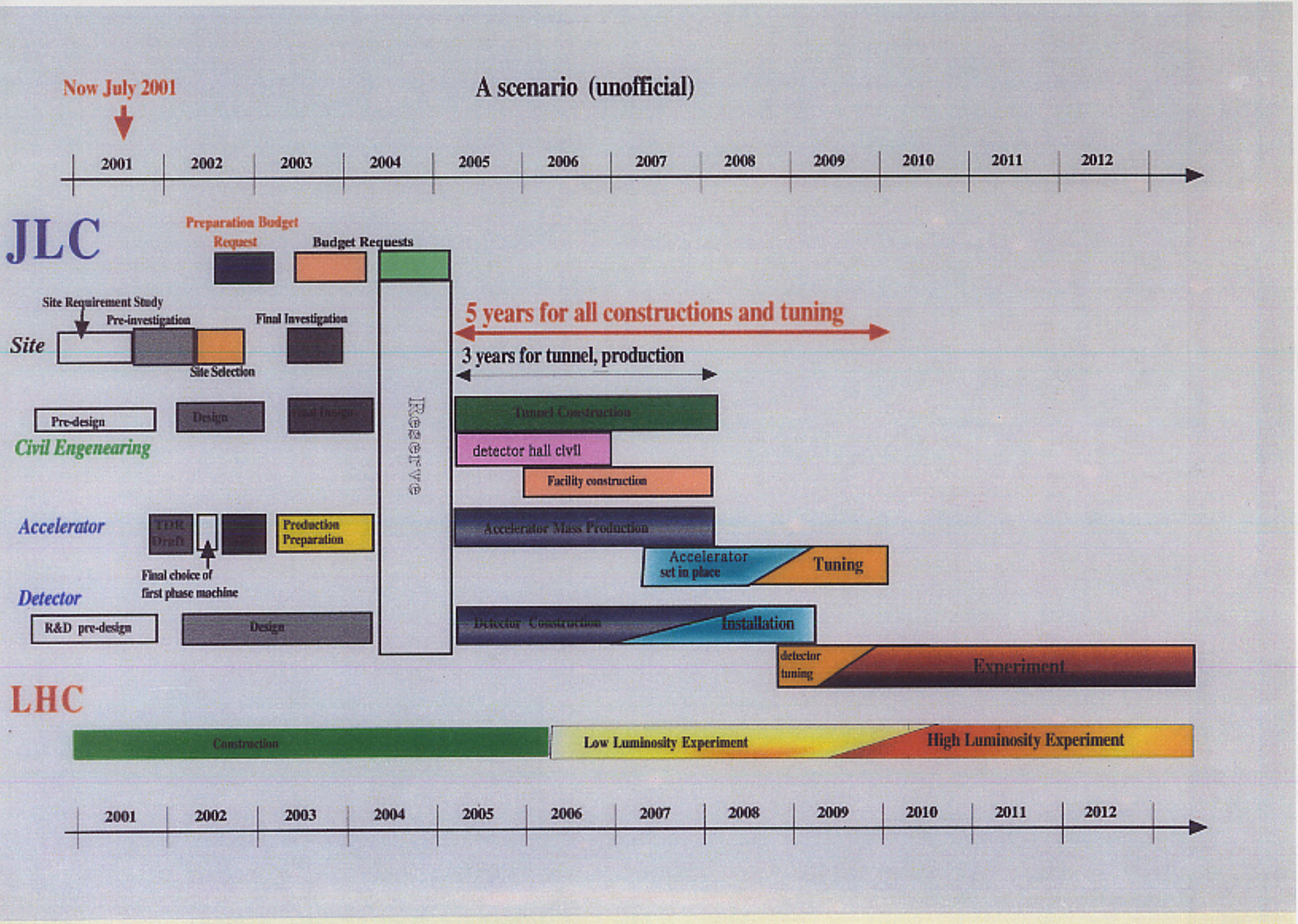
2001 Nov. ACFA Physics and Detector Workshop (Beijing, China)

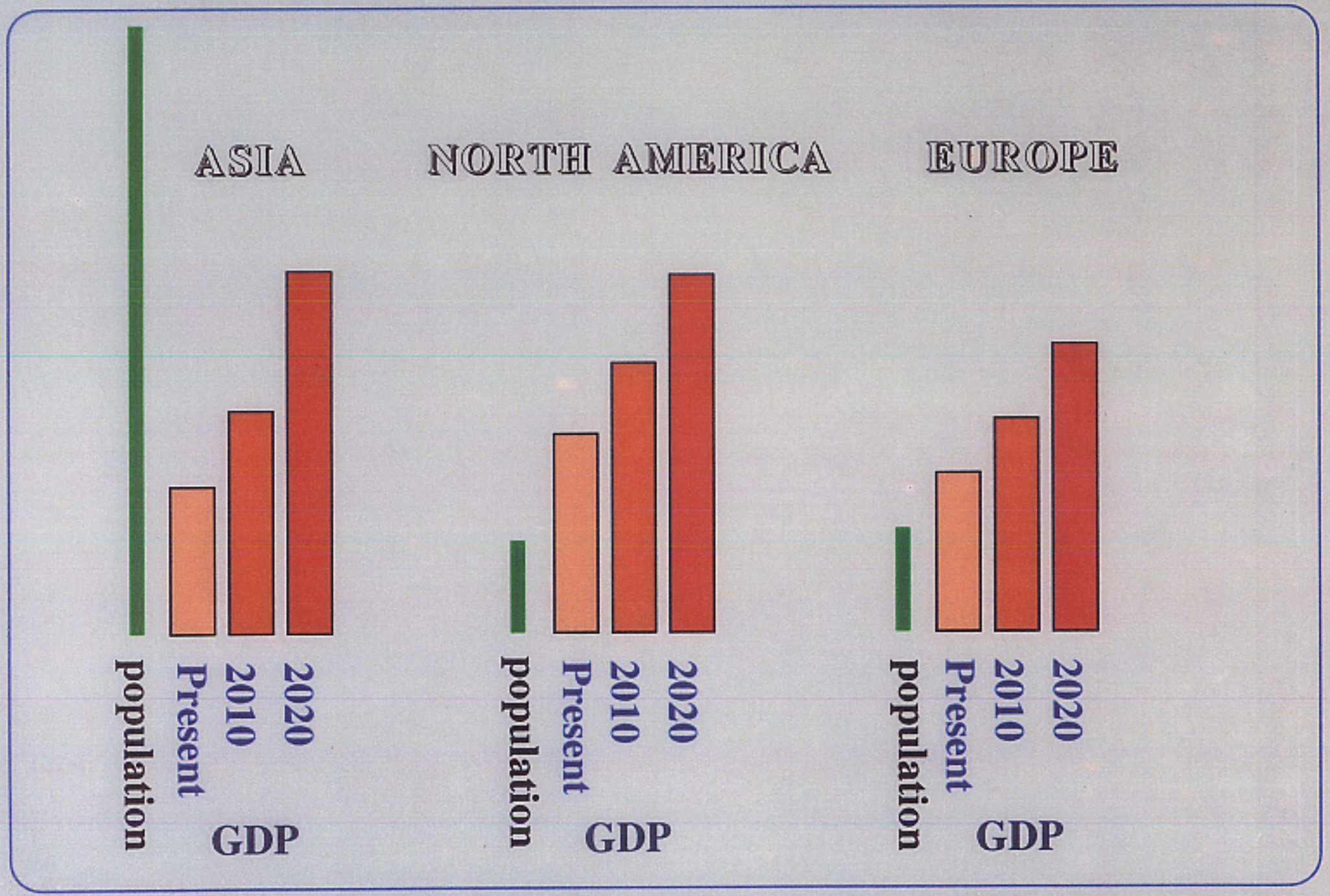
2002 International LC Workshop (Che-Ju Island, Korea)

2002 Autumn
PREPARATORY BUDGET REQUEST

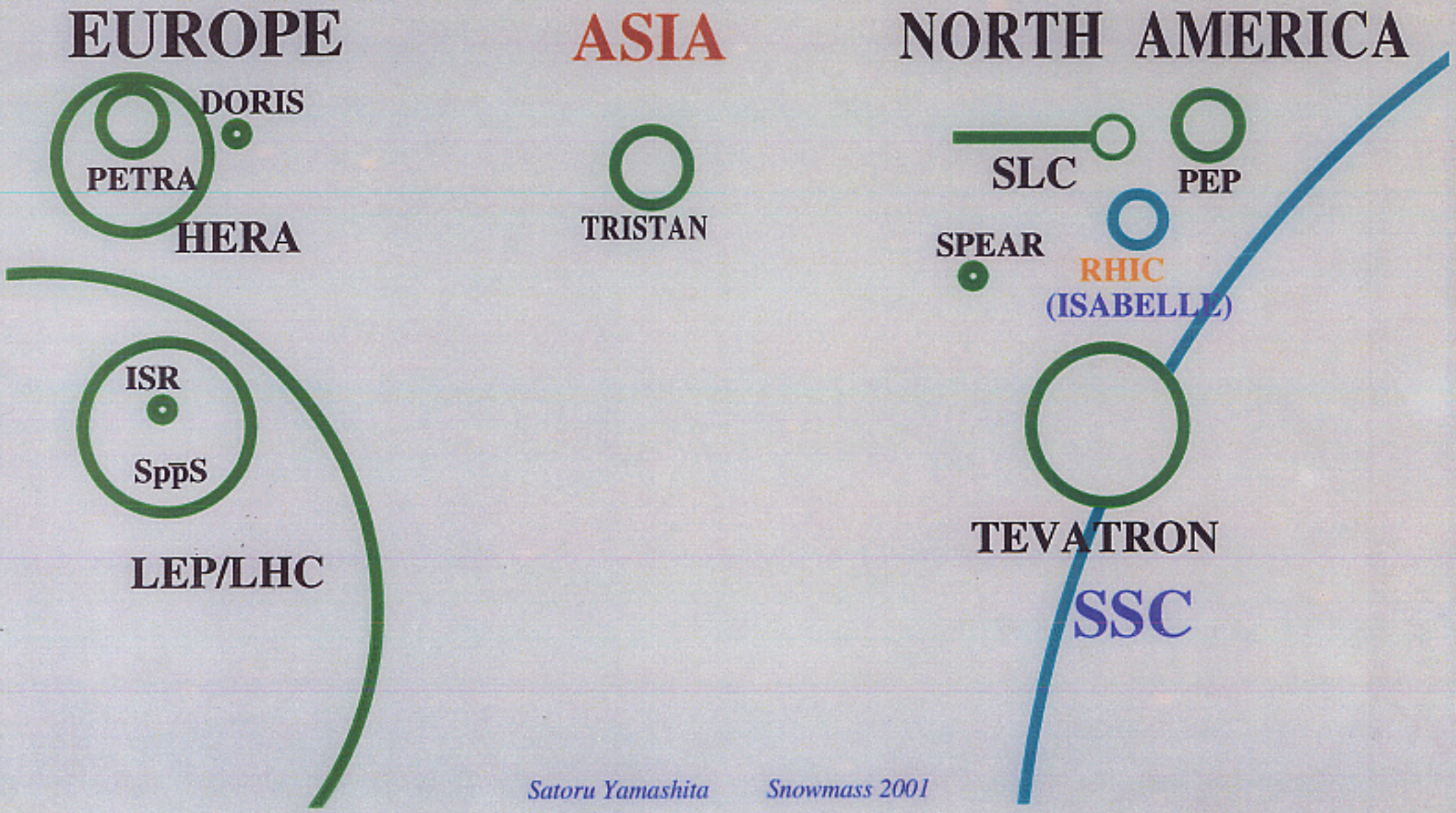
Satoru Yamashita *ICEPP, Univ. of Tokyo,* *19 July 2001 Snowmass*


2001年－2002年
2001年４月 JLC推進委員会発足
2001
サイト
コスト
技術
加速器R&D
人・アジア・世界
アジア
米国
欧州
TESLA
TDR
Snowmass
ECFA
statement
サイト条件
加速器
トンネル
ファシリティー
7月 提出済み
高エネルギーニュース
グローバル化
ACFA
2nd Statement
ATF
Main
LINAC
サイト候補地
選定作業
コスト試算
沖縄学会
ACFA
workshop
HEPAP
report
現在
LC
世界的流れ
中間答申
2002
3月 公表
10ケ所程度
3月 終了
High Power
Tests
結論
スケジュール
2002 June-July JLC PROPOSAL
8月world-wide LC workshop in Korea
2003年度用
調査費要求


Now July 2001
A scenario (unofficial)
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
JLC
Preparation Budget Request
Budget Requests
Site Requirement Study
Pre-investigation
Final Investigation
Site
Site Selection
5 years for all constructions and tuning
3 years for tunnel, production
Pre-design
Design
Civil Engeneering
Tunnel Construction
detector hall civil
Facility construction
Accelerator
Production Preparation
Accelerator Mass Production
Accelerator set in place
Tuning
Final choice of first phase machine
Detector
R&D pre-design
Design
Detector Construction
Installation
detector tuning
Experiment
LHC
Construction
Low Luminosity Experiment
High Luminosity Experiment
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012


ASIA
NORTH AMERICA
EUROPE
population
Present
2010
2020
GDP
population
Present
2010
2020
GDP
population
Present
2010
2020
GDP

ASIANS DESPERATELY NEED
A MAJOR HEP (ENERGY FRONTIER) MACHINE



Satoru Yamashita *Snowmass 2001*

We believe **JLC Take off**

0. **PHYSICS** IS COMPELLING
   WORLD-WIDE Collaboration

1. **CONSENSUS** of Japanese HEP
   ACFA recommendation

2. GOOD **SCENARIO** / Warm Machine
   Early Start Up.
   Energy Extendability.
   High Integrated Lumi.

3. JHF = **Big Milestone Approved Jan 2001**

Focus on JLC
THE OFFICIAL PRINCIPAL PROJECT

4. **Asian Technologies have Matured**
   KEKB, BEPC, etc..

WHY WE ARE OPTIMISTIC??

5. **GREAT PROGRESS in R&D**
   Universities, KEK, Spring-8, Industry,
   and **International Collaborations**

READY (polalized) **electron Gun** (Nagoya U., KEK)

READY Damping Ring **ATF** (KEK)

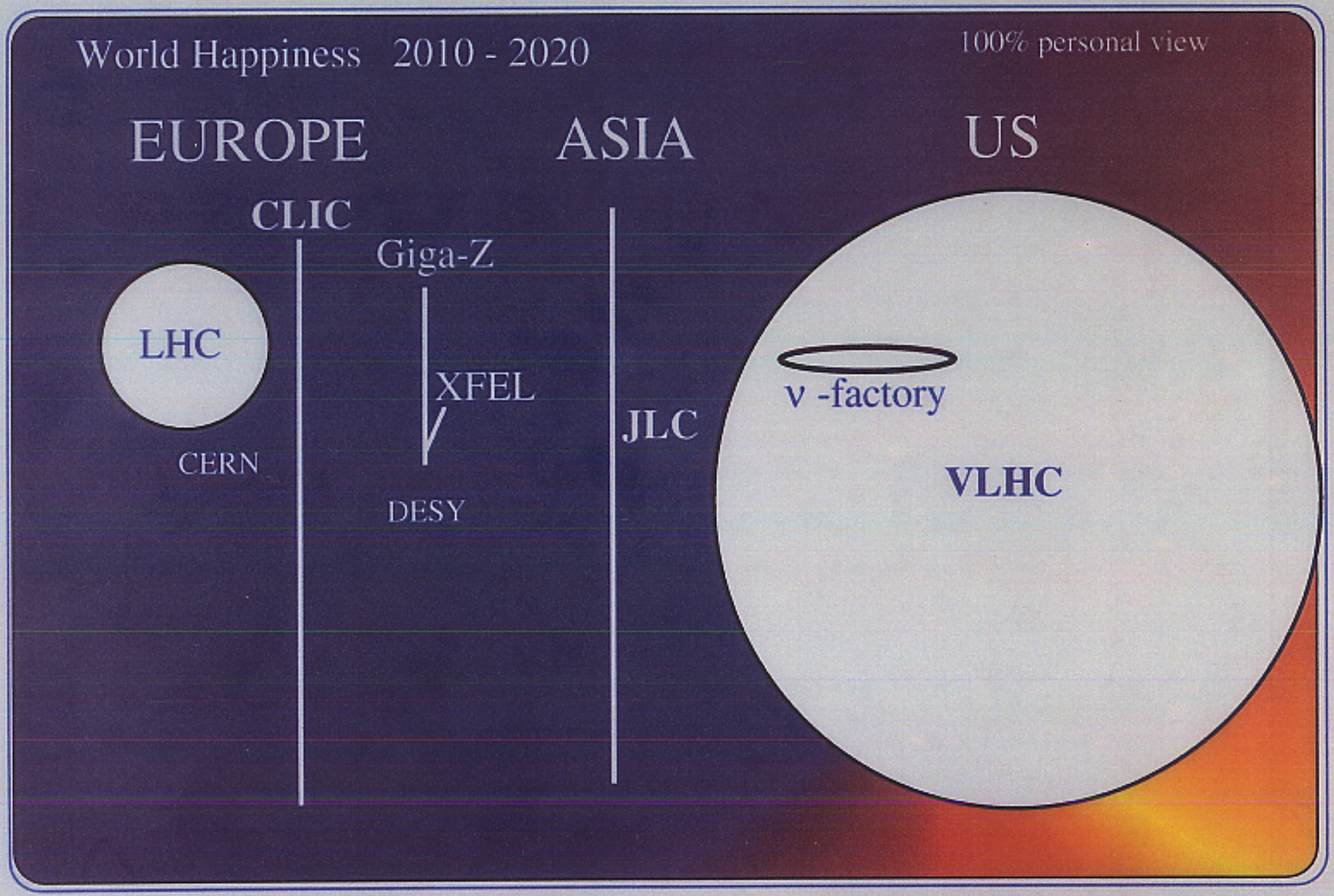
READY Main LINAC **JLC-I 500 GeV**
   i) **C-band** (KEK-Spring8)
   ii) **X-band** (SLAC-KEK)

READY **BPM**/Final Focus FFTB (SLAC)

O.K. Detector
   (ACFA Collab., World-Wide Collab.)

6. **STRONG PUSH** from **Asian Countries**

7. TESLA TDR = Additional PUSH from World



Satoru Yamashita *ICEPP, Univ. of Tokyo,* *19 July 2001 Snowmass*