Status and Prospects of KEKB

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1. Features of KEKB

2. Commissioning history & Present performance

3. Issues
   - finite angle crossing & crab cavities
   - stored current & masks
   - beam blow-up in LER

4. Future prospects

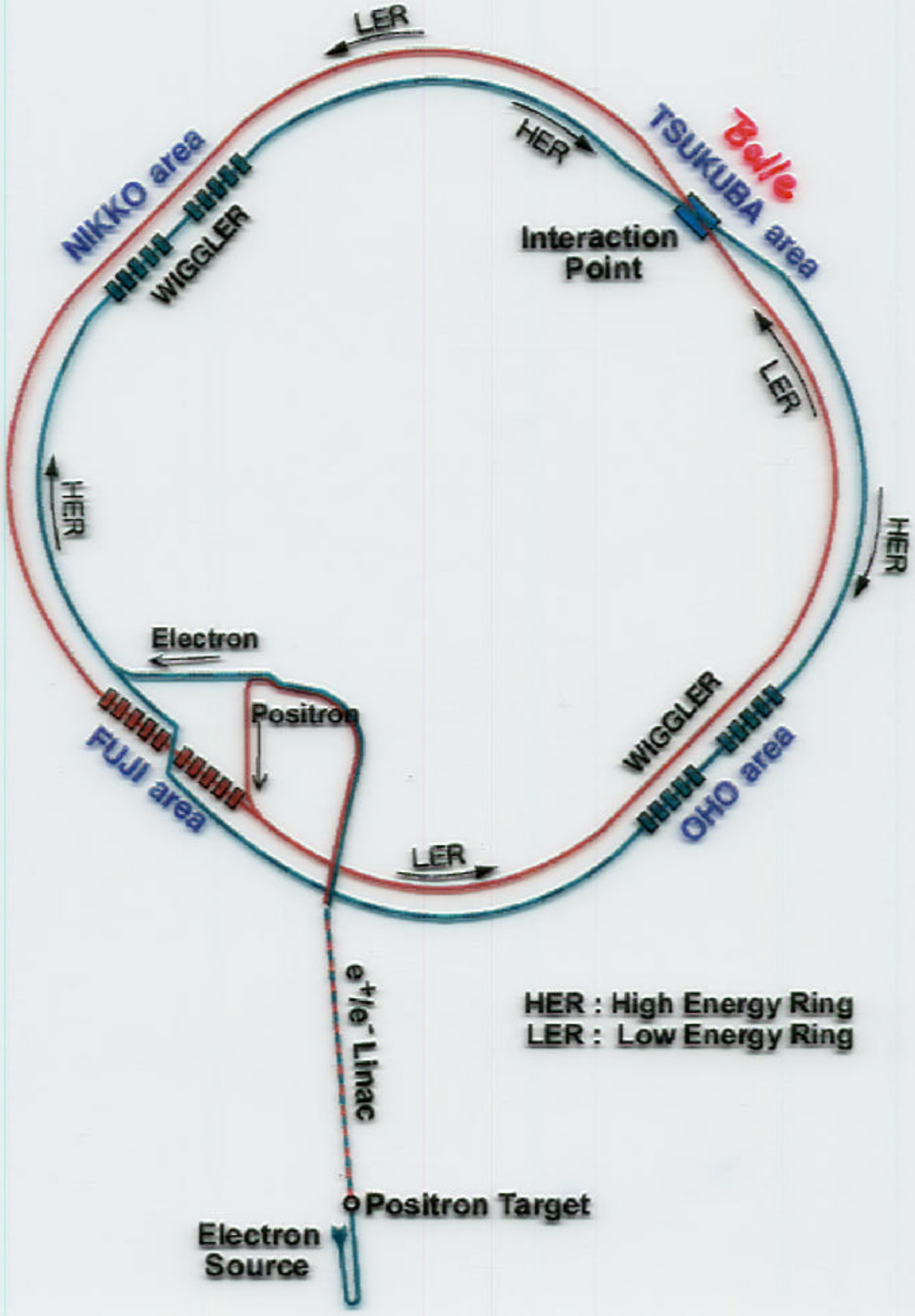
KEK B-Factory(KEKB)

3.5 GeV(e^+) x 8 GeV(e^-)
2-ring, asymmetric collider

design luminosity
$1 \times 10^{34} cm^{-2} s^{-1}$

Features:

- **5-year project (94-98)**
- **budget 380 x 10^8yen**
- **in TRISTAN tunnel**
- **BELLE at IP**
- **finite-angle crossing of 2 x 11 mrad at IP**
- **crab crossing scheme** (future)


LER
HER
Belle
TSUKUBA area
NIKKO area
WIGGLER
Interaction Point
LER
HER
HER
Electron
Positron
WIGGLER
FUJI area
OHO area
LER
e+/e- Linac
HER : High Energy Ring
LER : Low Energy Ring
Positron Target
Electron Source

2.4×10^{33}

0.04 ~ 0.02

0.7 cm

0.65 0.86

1150 2.4

KEKB Parameters

- 3.5 GeV(e^+) x 8 GeV(e^-)
- 3016 m circumference
- Luminoisty $10^{34}cm^{-2}s^{-1}$
- Beam-beam tuneshift $\xi = 0.05$
- $\beta_y^* = 1$ cm
  $\sigma_x \equiv 90$ μm, $\sigma_y \equiv 1.9$ μm
- Currents 1.1 A(e^-), 2.6 A(e^+)
- 5000 bunches with 0.6 m spacing
- Crossing at 2 x 11 mrad at IP

Interaction Region

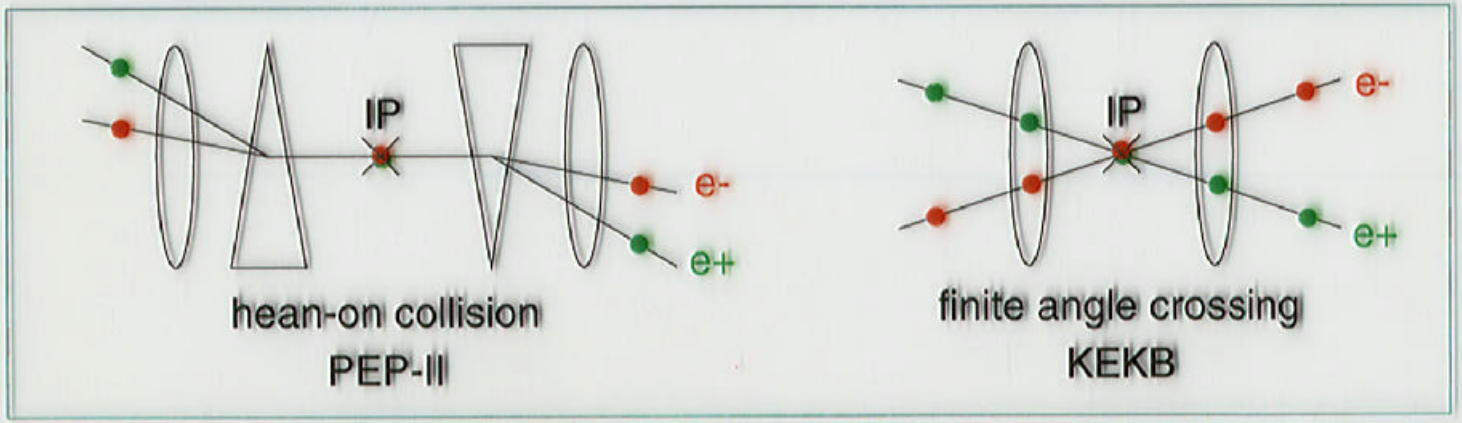
1. 2 x 11 mrad finite-angle crossing at IP to simplify IR and fill every bucket with beam.

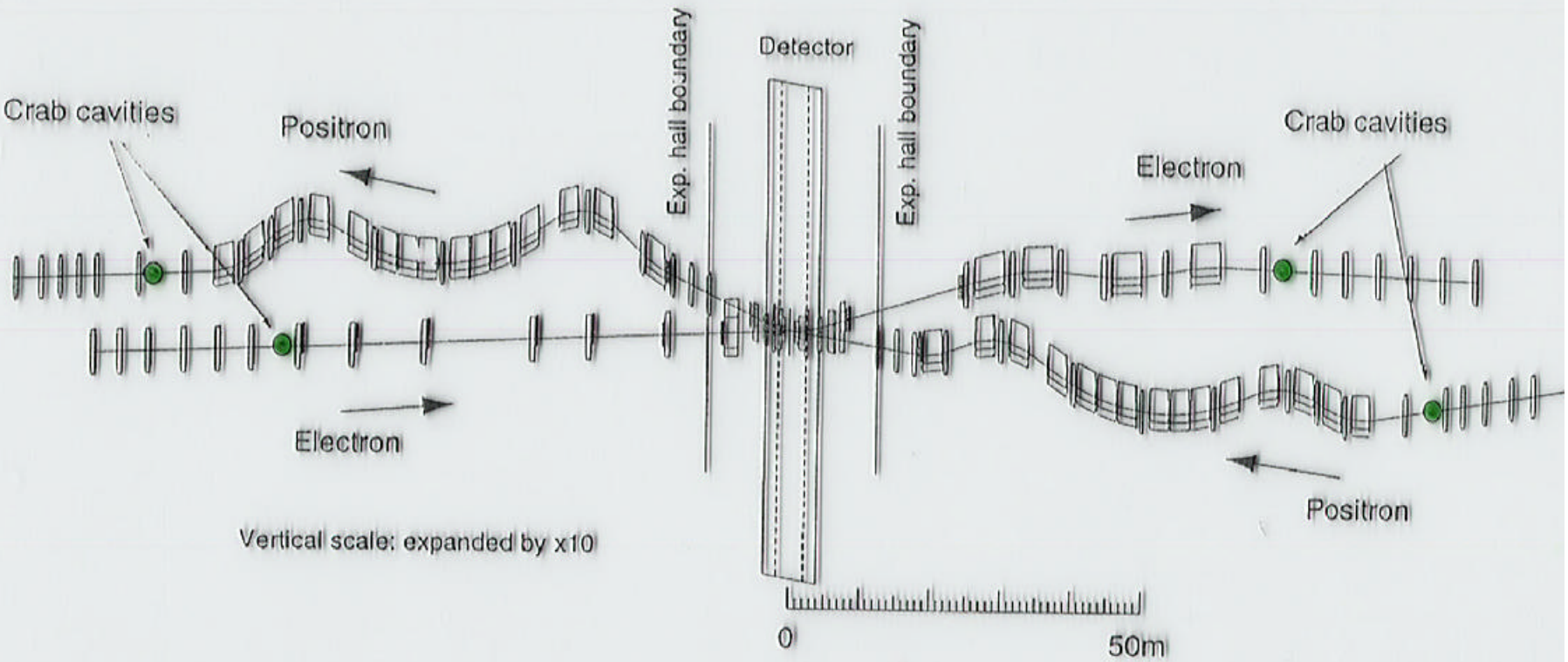
2. Superconducting final-focus quads and anti-solenoids inside 1.5 Tesla BELLE detector solenoid.

3. Crab-crossing scheme as a fall-back option. Superconducting crab cavities are being developed.

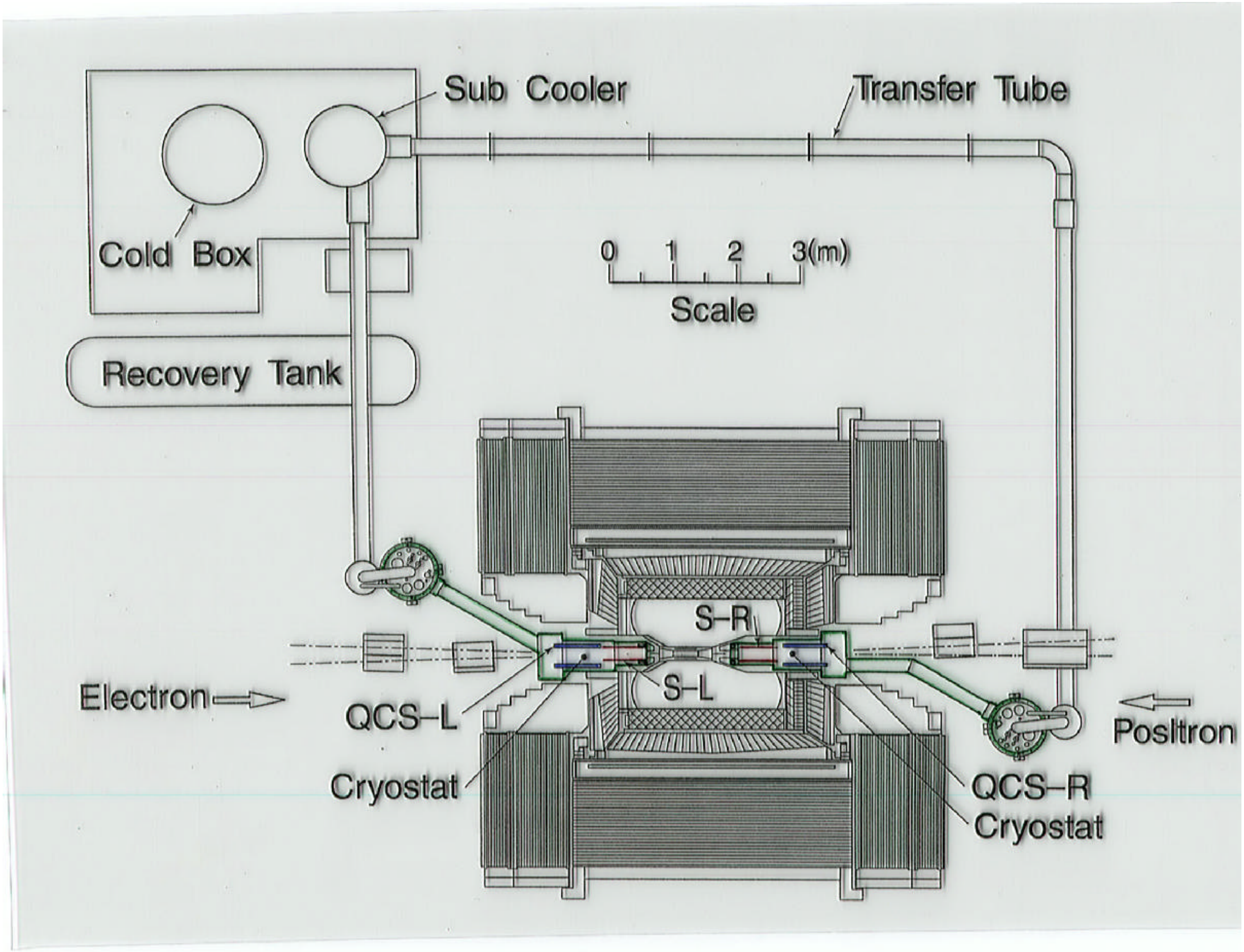
Finite Angle Crossing @ IP

- No strong separation bend at IP
- No synchrotron radiation due to the bend
- No parastic collisions
- **Shorter bunch spacing**




Crab cavities
Positron
Exp. hall boundary
Detector
Exp. hall boundary
Electron
Crab cavities
Electron
Positron
Vertical scale: expanded by x10
0
50m

± 11 mrad


Sub Cooler
Transfer Tube
Cold Box
0 1 2 3(m)
Scale
Recovery Tank
S-R
S-L
Electron
QCS-L
Positron
Cryostat
QCS-R
Cryostat

RF system

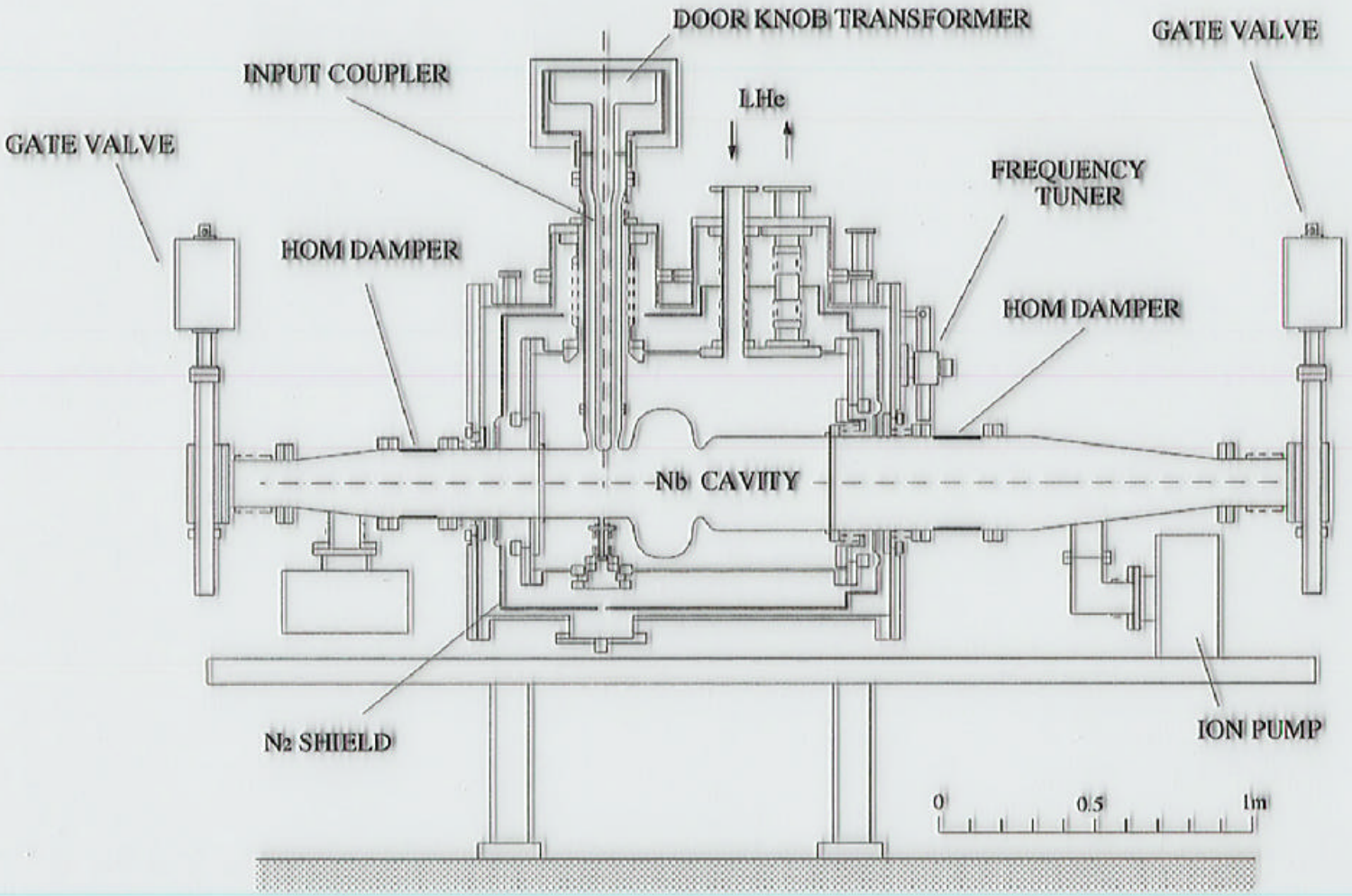
- Number of cavities:

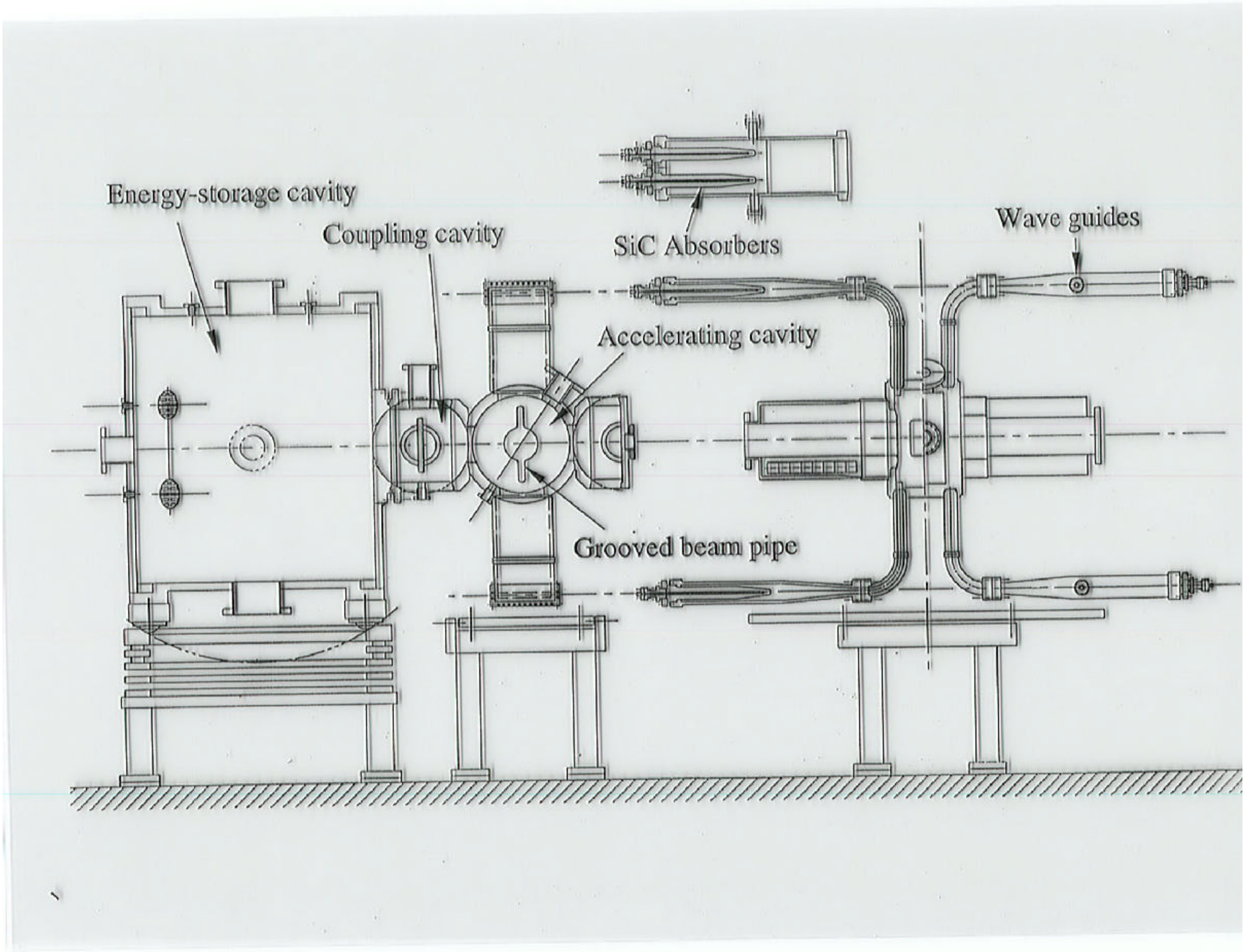
		t=0	Oct. 99	Oct. 00	Oct. 01
LER	ARES	12	16	16	20
HER	ARES	6	10	10	12
	SCC	4	4	8	8

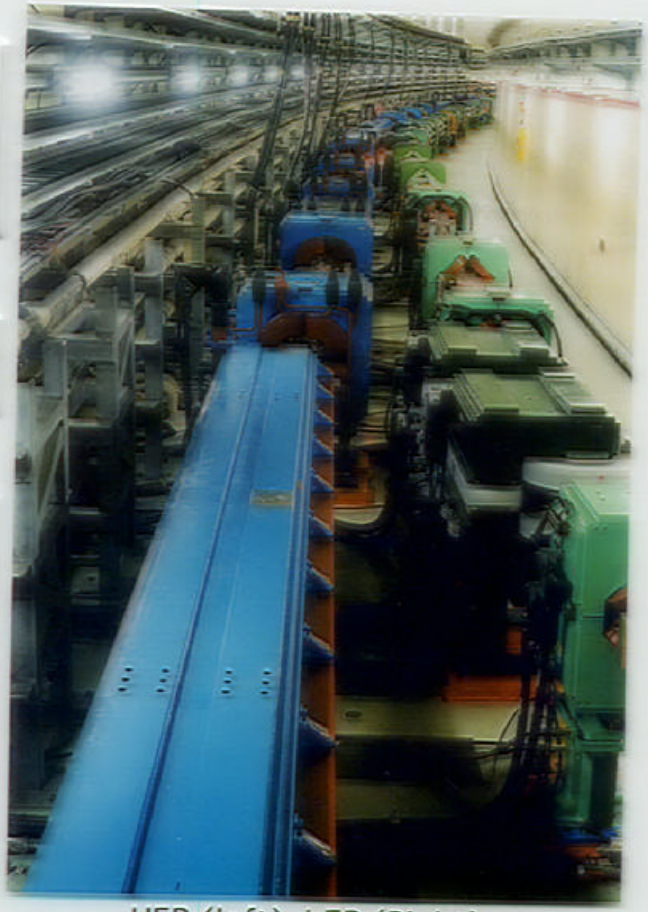
- ARES and SCC are working without any problems

- 380 kW is delivered by a SCC

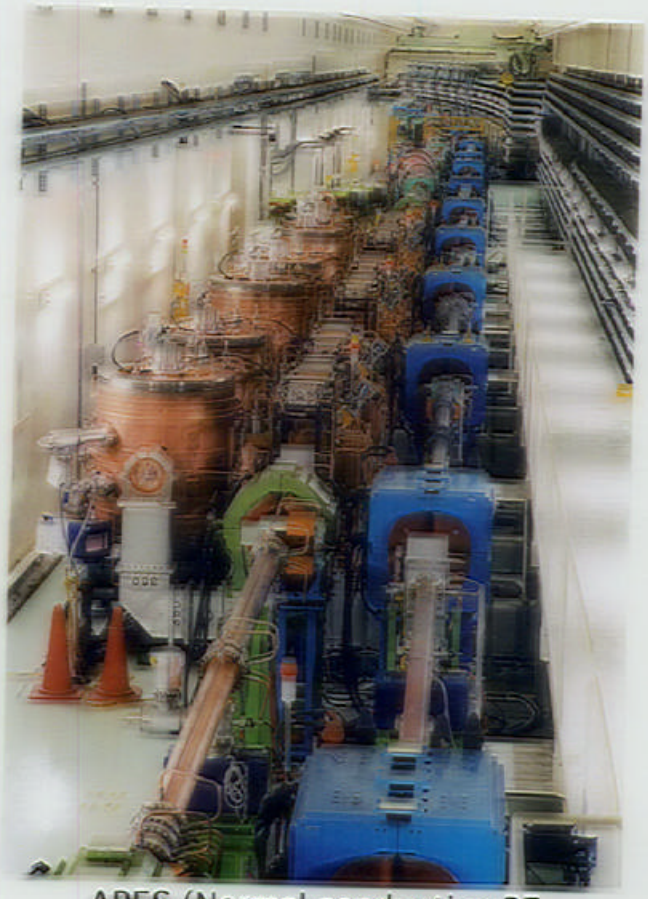
- Breakdowns of SCC is quite rare


DOOR KNOB TRANSFORMER
GATE VALVE
INPUT COUPLER
LHe
GATE VALVE
FREQUENCY TUNER
HOM DAMPER
HOM DAMPER
Nb CAVITY
N2 SHIELD
ION PUMP
0
0.5
1m

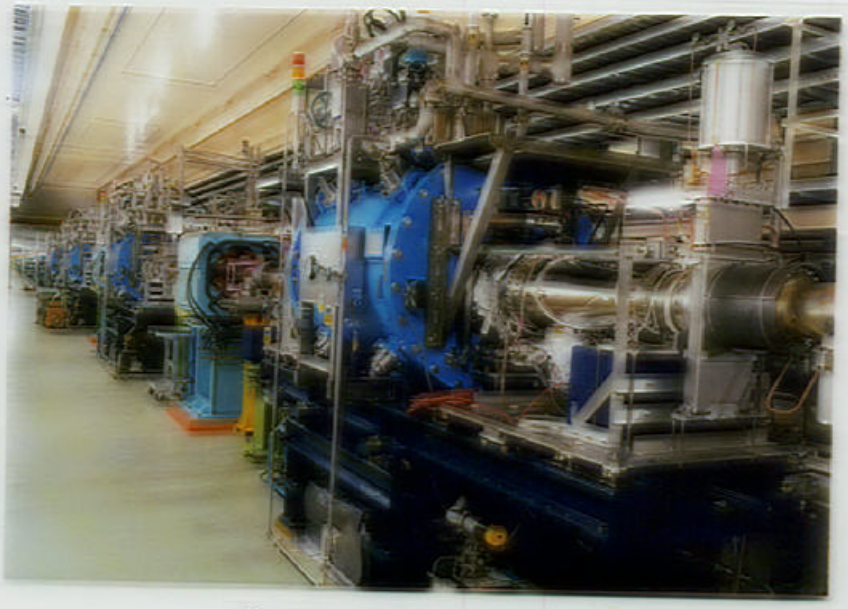

Energy-storage cavity
Coupling cavity
SiC Absorbers
Wave guides
Accelerating cavity
Grooved beam pipe



HER (left), LER (Right)



ARES (Normal conducting RF for LER,left), HER(Right)



Superconducting RF

Trips of D10 cavities