



4/24/2007 TTC-WG3 Test Facility

Beam plan at STF

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Beam plan of STF is changed;

STF phase1 beam (Feb. 2008)

DC-gun + photo-cathode + single bunch Laser

quick beam source(DC gun exist),
no pre-acceleration, no capture cavity,
single bunch, 1%~10% of ILC charge in a bunch.

For demonstration of beam acceleration by ILC-like cavities.

STF phase2 beam (Feb. 2011)

RF-gun + photo-cathode + SC capture cavities + ILC bunch Laser

RF-gun cavity: collaboration with FNAL.

Cs-Te Photo-cathode: extension of S-band RF-gun of ATF

SC capture cavities: use STF phase 1 cavity?,

(or collaboration with KEK-ERL group?)

Laser: collaboration with KEK-JAEA-ERL group and LAAA group.

(or collaboration with Russian lab.?)

For demonstration of ILC beam loaded cavity control.

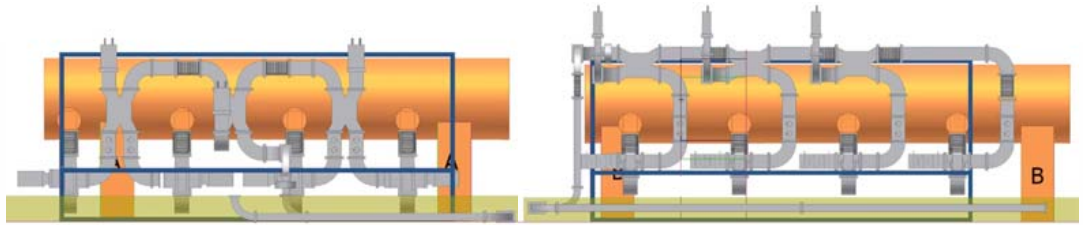
Reason of Beam at STF (phase 2)

To develop following performance & technologies;

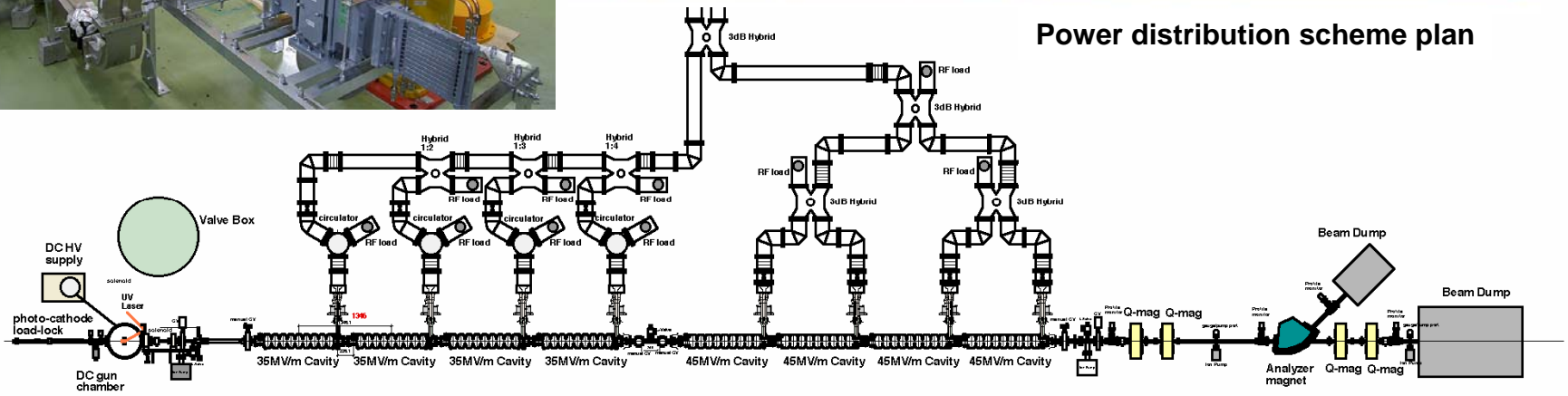
- 1. Cavity gradient,**
- 2. LLRF control for beam loaded cavities,**
- 3. HOM studies,**
- 4. Instrumentation (BPM, BSM) development,**
- 5. Laser development for ILC beam generation,**



STF Phase 1 beam-line Plan



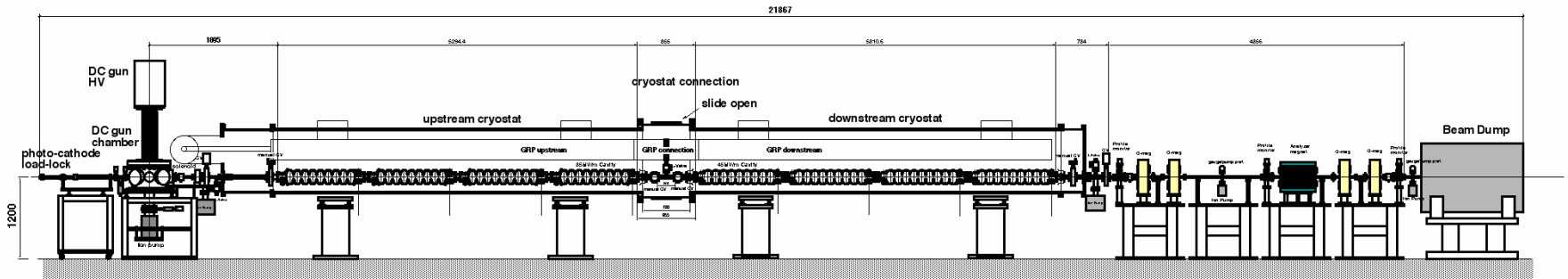
Power distribution scheme plan



Plain view

Tree distribution without circulator

Photo-cathode DC-gun



Side view

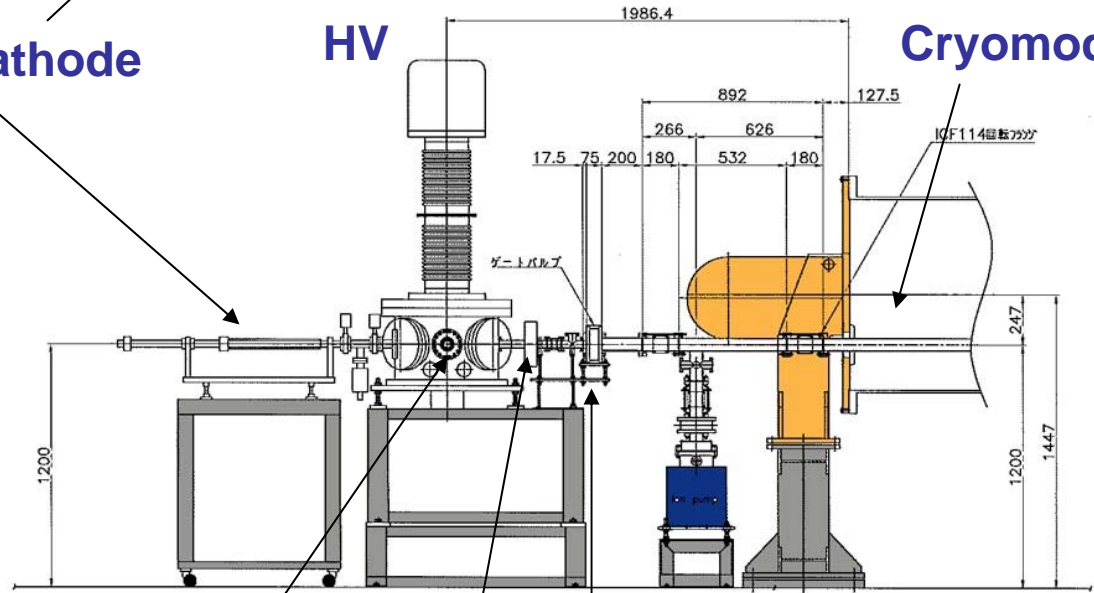
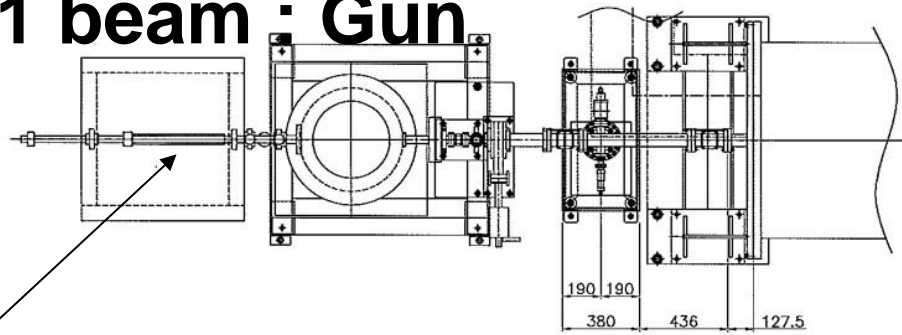
Plan of STF phase1 beam : Gun

200KV DC gun
Cs-Te photo-cathode
Nd YLF 266nm Laser

Load-lock of Cs-Te photo-cathode



Existing photo-cathode DC gun



Cathode chamber
solenoid
Gate Valve



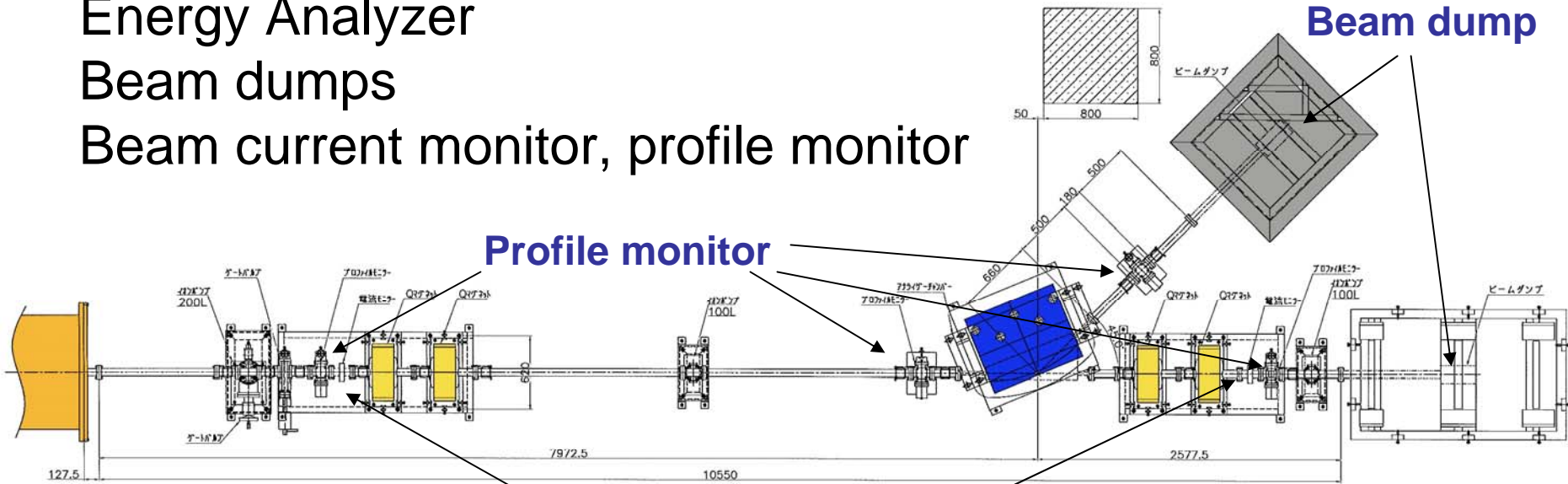
Nd YLF Laser will be borrowed.

Plan of STF phase1 beam : downstream

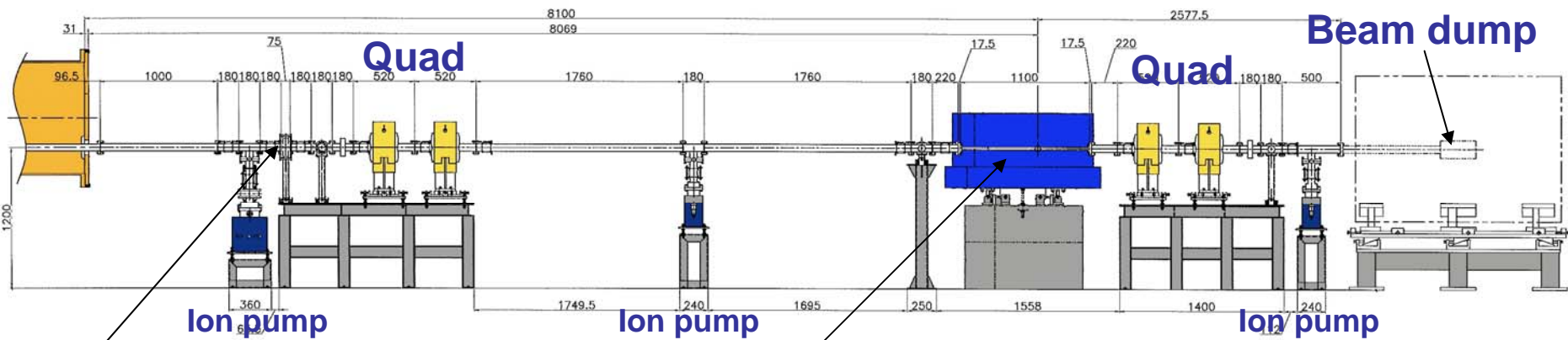
Energy Analyzer

Beam dumps

Beam current monitor, profile monitor



Beam current monitor



Beam dump

Quad

Quad

Ion pump

Ion pump

Ion pump

Energy Analyzer

Gate Valve

Plan of STF Phase 2 beam

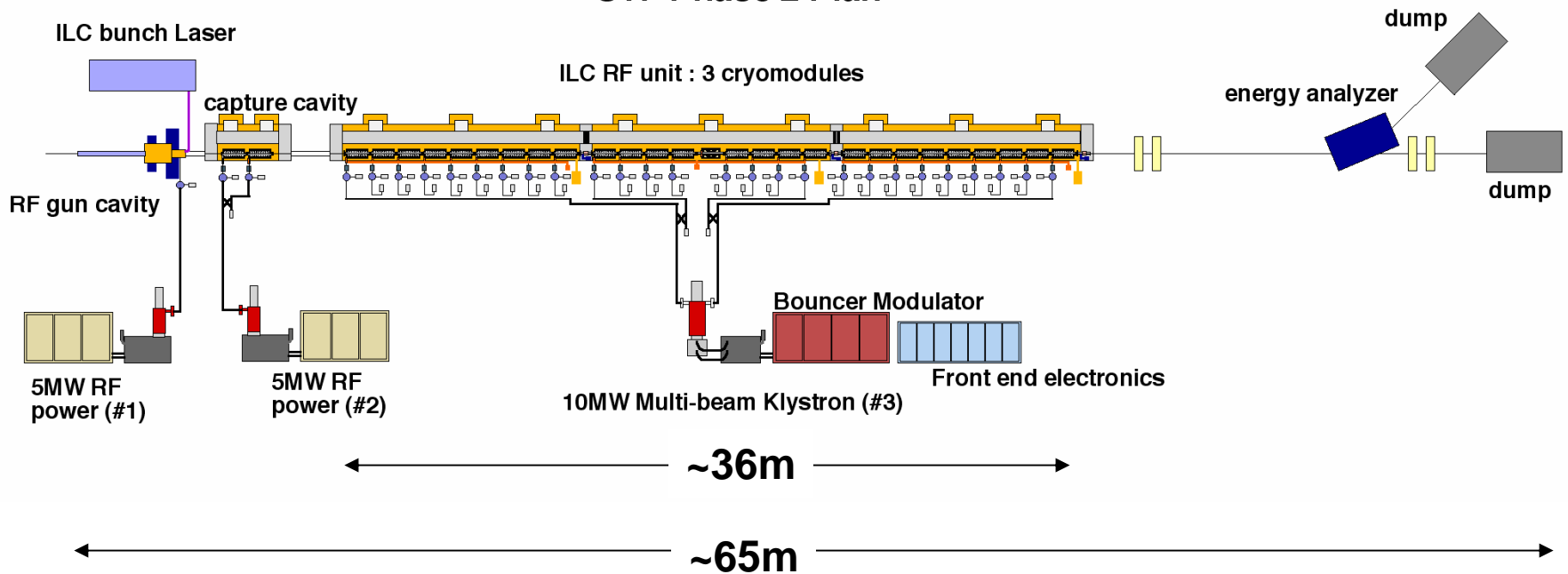
- RF gun (1.3GHz, copper cavity, DESY design, FNAL modification & fabrication)
- Cs-Te cathode (use of ATF cathode technology)
- 5MW klystron (#1) power will be used to RF gun.

- 2 SC cavities for beam capture.
(not yet decided, under designing)
- 5MW klystron (#2) will be used for capture cavities.

- Laser development will be done
in collaboration with ERL group,
with help of LAAA accelerator laser forum in Japan.
(there is possibility of collaboration with Russian lab.)

Plan of STF Phase 2 beam line

STF Phase 2 Plan



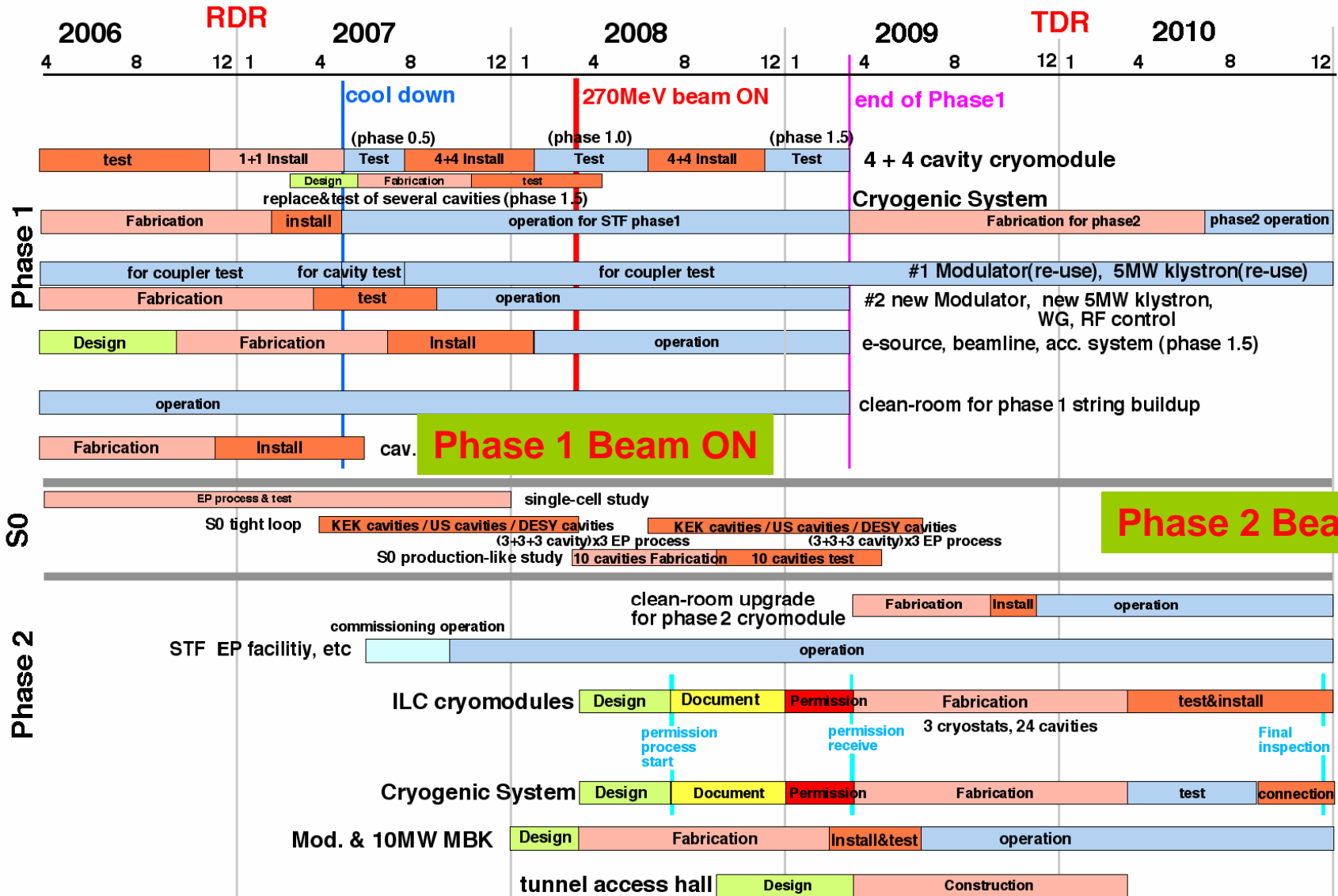
***detail design is not yet done.
(just for imagination)**

Required Laser System

- **10mA average current within a macro-pulse require **4.2W average** laser power with the following conditions;**
 - CsTe photo-cathode
 - 266nm laser energy
 - 1% QE
- **Mode-lock oscillator can make a laser pulse train with several 100 MHz frequency.**
- **Fundamental wave length is not in UV.**
 - Need FHG for Nd:YLF and THG for Ti:Sa.
- **HG crystal however can not be operated in such high average laser power.**
- **Start with lower average power (**~100mW**), upgrade to the higher power. (OPCPA?)**

STF long-term Plan

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