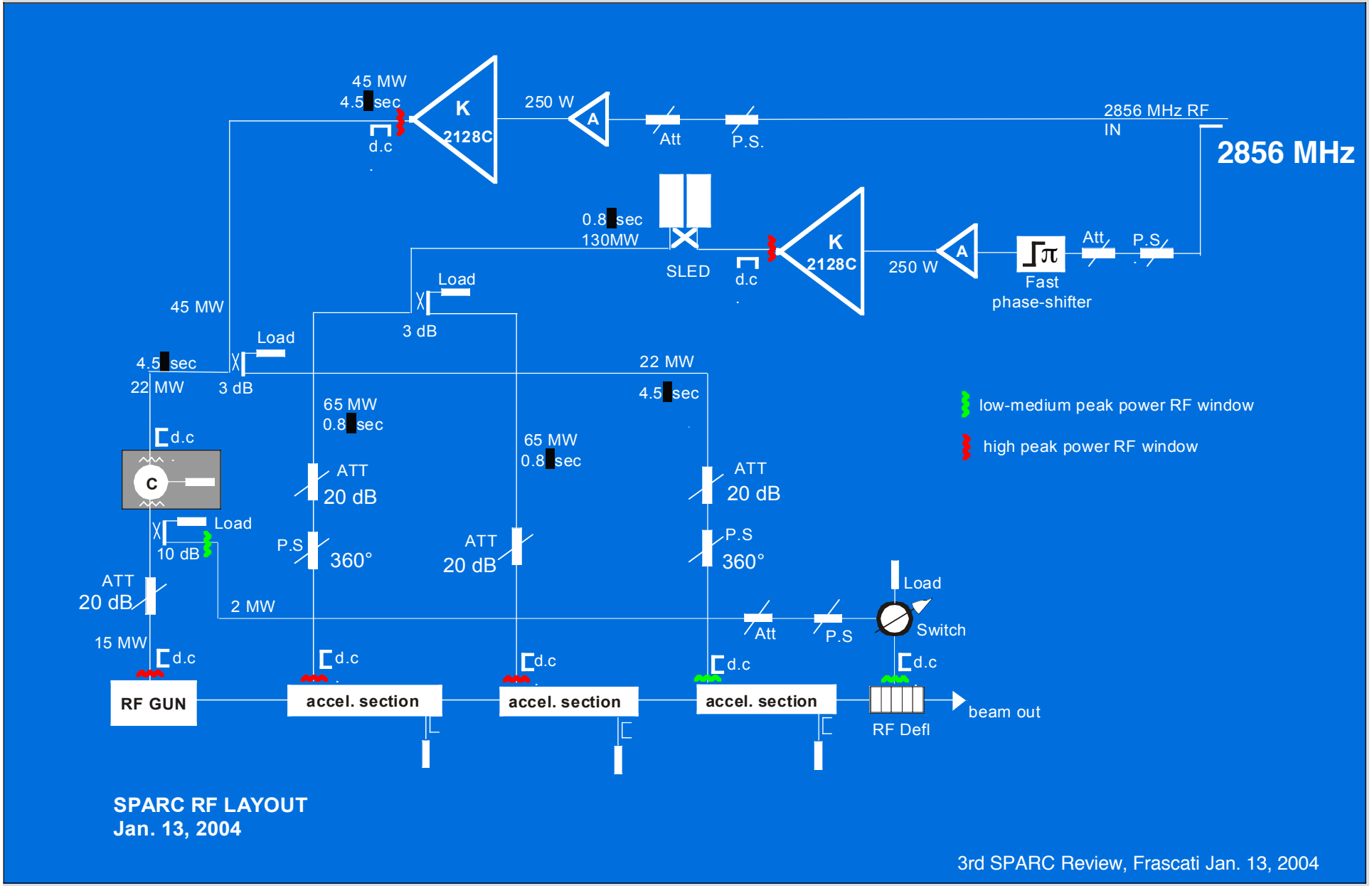
SPARC project

STATUS of the RF SYSTEM

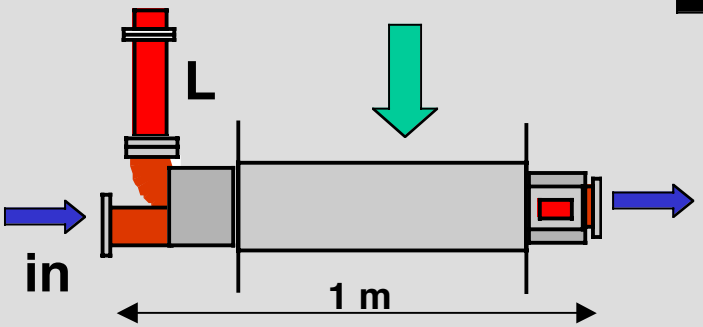
R. BONI ….. *on behalf of the SPARC team*



SPARC RF LAYOUT
Jan. 13, 2004

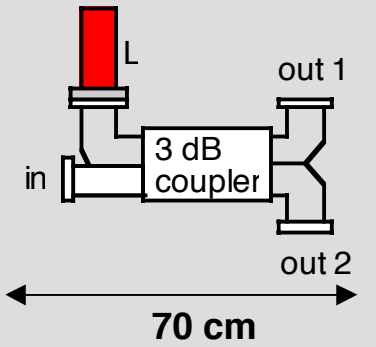
Status of the Orders & Tenders

1) Ferrite Circulator (**USA**)



ordered (PO/2568)
delivery Jan. 2004

2) Power Dividers (**China-IHEP**)



2 units

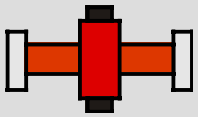
ordered (PO/2573)
delivery Apr. 2004

3) Direcional Couplers (**China-IHEP**)

12 units

ordered (PO/2568)
delivery June 2004

4) Low Peak Power
RF Windows (**China - IHEP**)

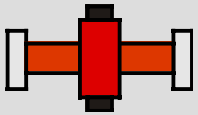


5 units

< 30 MWp

ordered ➔ Oct. 2003
delivery ➔ Sept. 2004

5) High Peak Power
RF Windows (**USA**)



5 units

65 MWp

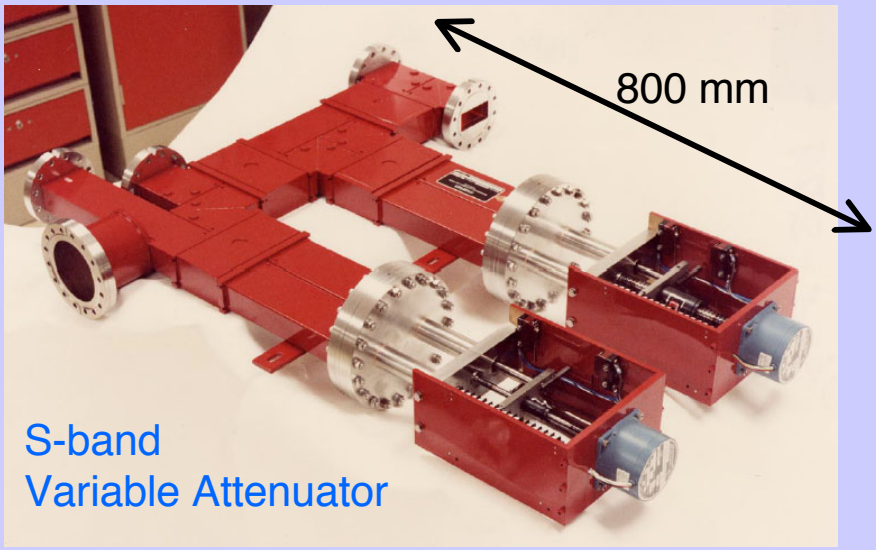
2 items ordered
delivery ➔ May 2004

3 items being ordered
delivery ….. Sept 2004

6) Variable Attenuators and Phase Shifters

Tender to be completed

expected delivery ➔ Dec. 2004



S-band
Variable Attenuator

we need

4 variable Attenuators

& 2 variable Phase Shifters

8) Solid state 250 W_{peak} power amp. (klystron RF drivers)

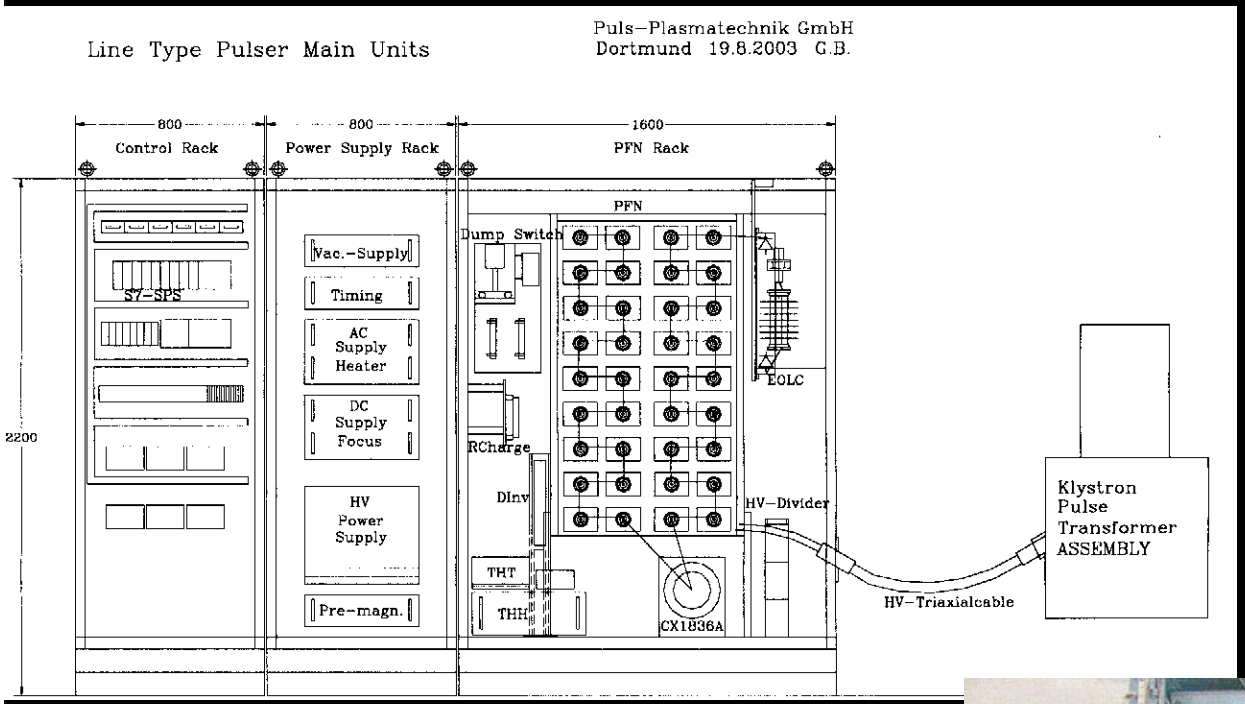
Tender → completed

Supplier → MILMEGA Ltd (UK).

Order → Febr. 2004

Delivery → **October 2004**.

1 psec rms pulse-to-pulse phase stability



9) MODULATORS

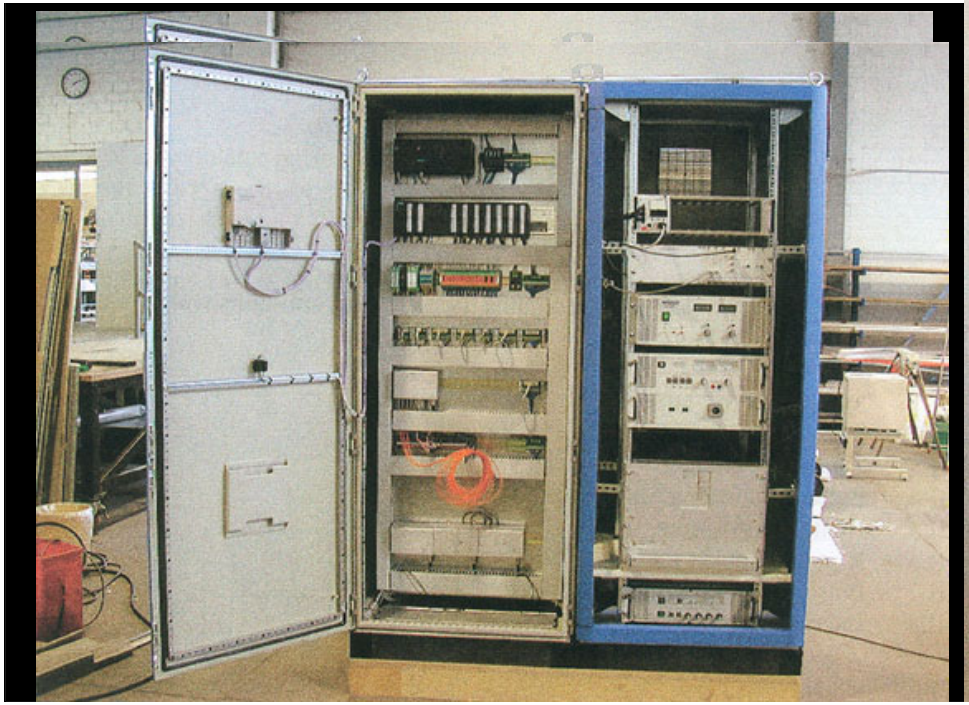
The Supplier will be the

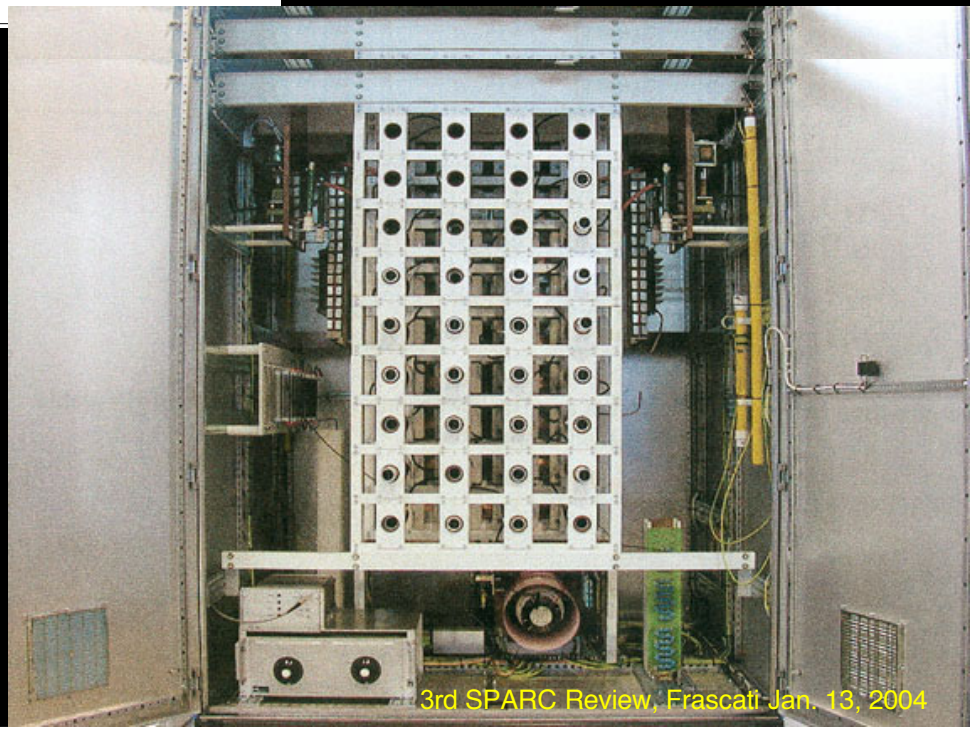
" Puls-PlasmaTechnik " (D)

P.P.T. have already supplied High Power Modulators to other Accelerator Laboratories. The delivery of the 1th unit is scheduled 15 months from the order

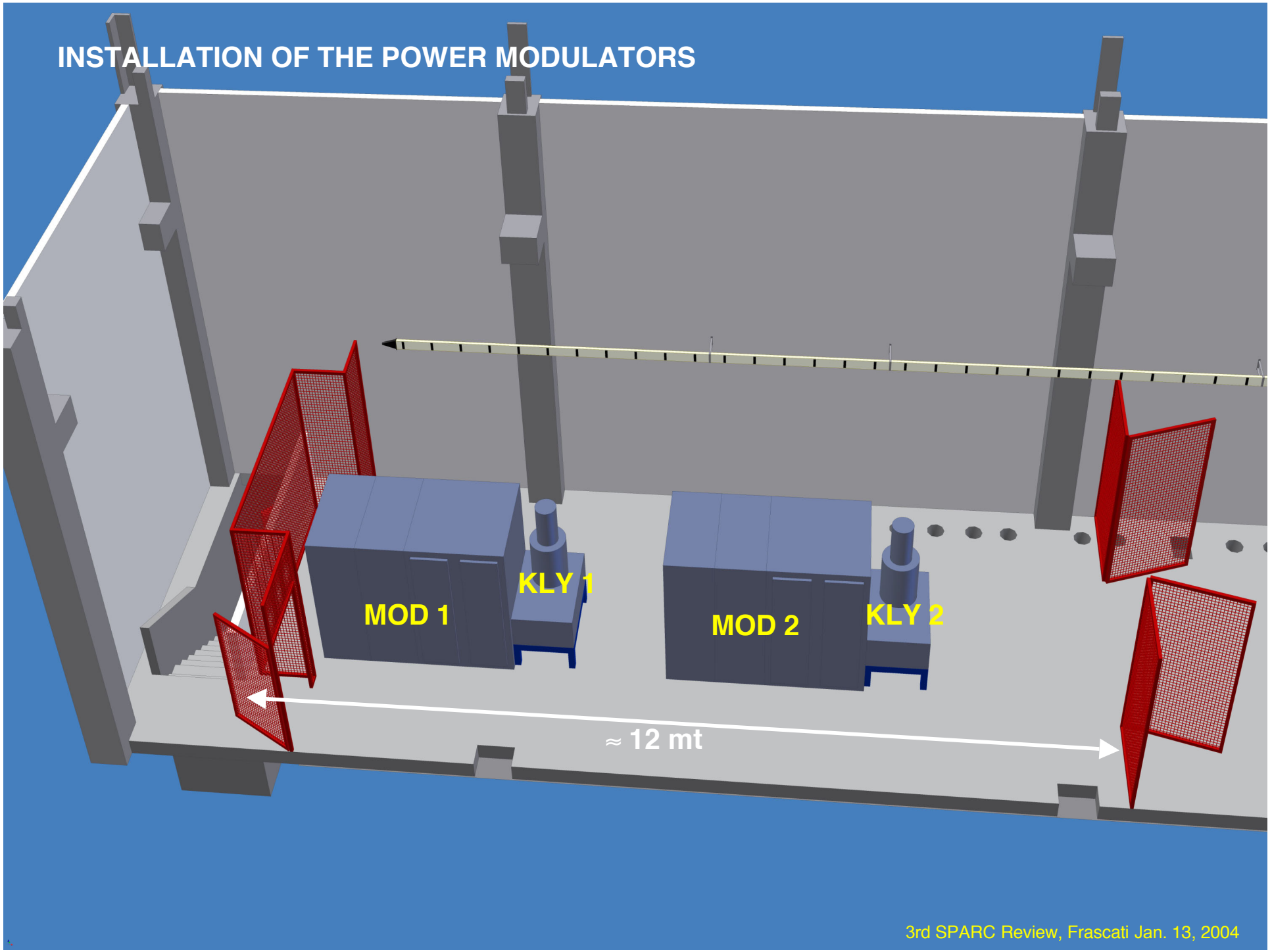
ORDER ..... JAN 2004

1th Unit DELIVERY ..... MAY 2005





INSTALLATION OF THE POWER MODULATORS



9) Accelerating Sections

The Supplier will be the Japanese company **MITSUBISHI HEAVY INDUSTRIES**.
Mitsubishi is the supplier of High RF Field Structures to numerous Accelerator Far East Laboratories (KEK, Taiwan, Pohang).
Delivery of 2 units is foreseen by **January 2005**.

E > 30 MV/m ⇒ ***guaranteed !!***

11. Field level

1)KEK ATF actual result : 40MV/m peak(1 μ s width 25pps, nominal 30MV/m)
after 600h(200h SLED off +400h SLED on) RF aging

2)sp8 actual result : 30MV/m peak(4 μ s width 60pps, nominal 18MV/m)

MITSUBISHI is strongly involved in R&D of high gradient RF structures

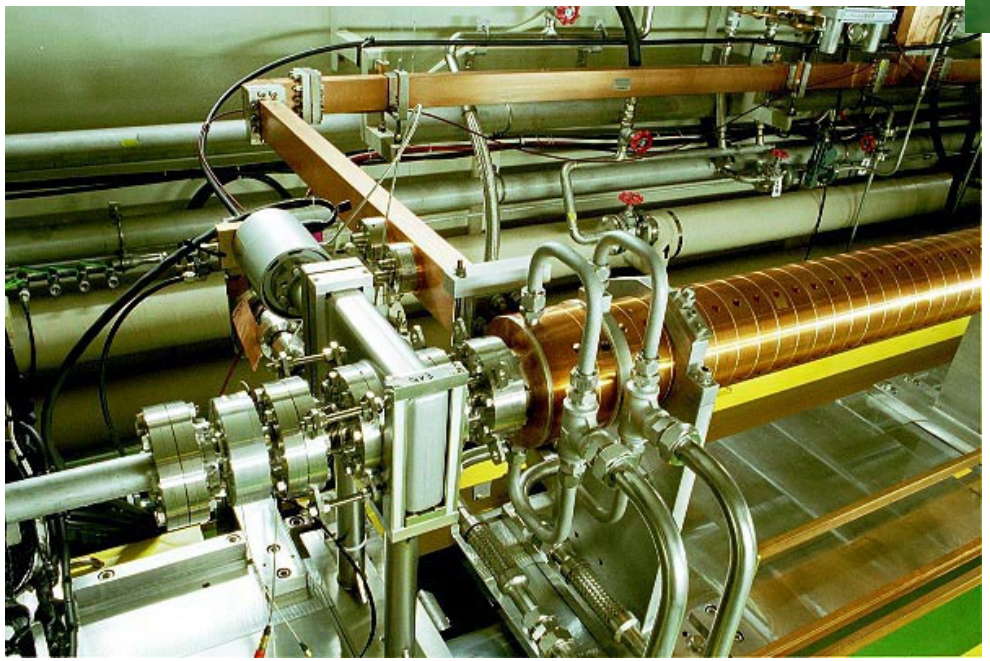
TH403 - High Gradient Tests on S-band Accelerating Structure

Y. Igarashi, S. Yamaguchi, Y. Higashi, A. Enomoto, T. Oogoe, K. Kakihara, and S. Ohsawa (KEK)

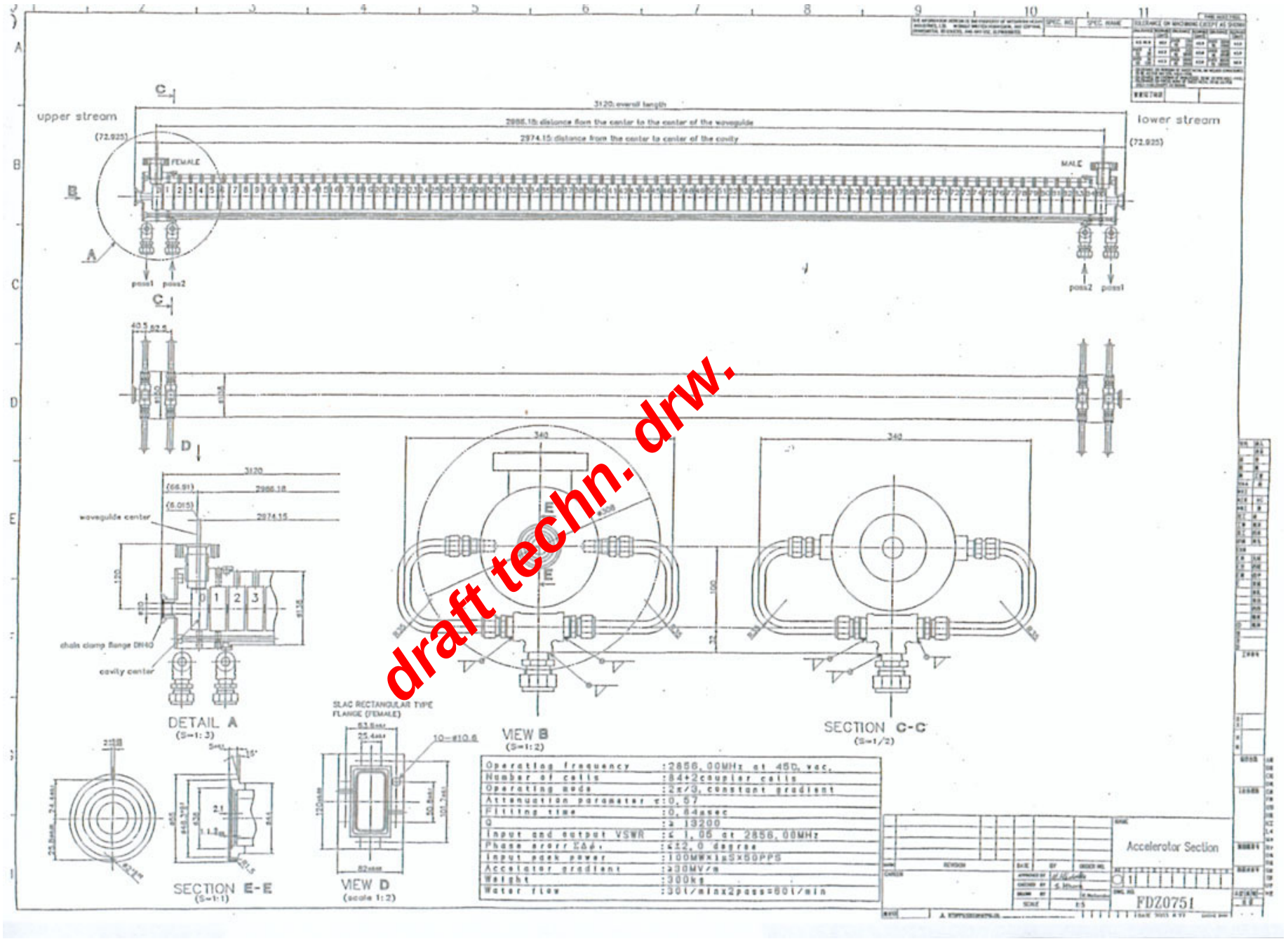
Accelerating gradient of electron linacs is limited by rf breakdown in its accelerating structure. Improvement of the breakdown limit is therefore indispensable for the future upgrade of the KEKB injector linac as well as the linear collider. High-power tests were performed on a conventional S-band 2m-long accelerating structure for the KEKB injector linac. An average accelerating gradient of 40MV/m and a field enhancement factor of 53 were obtained after conditioning with $1x10^8$ rf shots. Results of high-power test after pure-water high-pressure rinsing of the structure will also be presented.

MITSUBISHI

LINAC CONFERENCE 2002

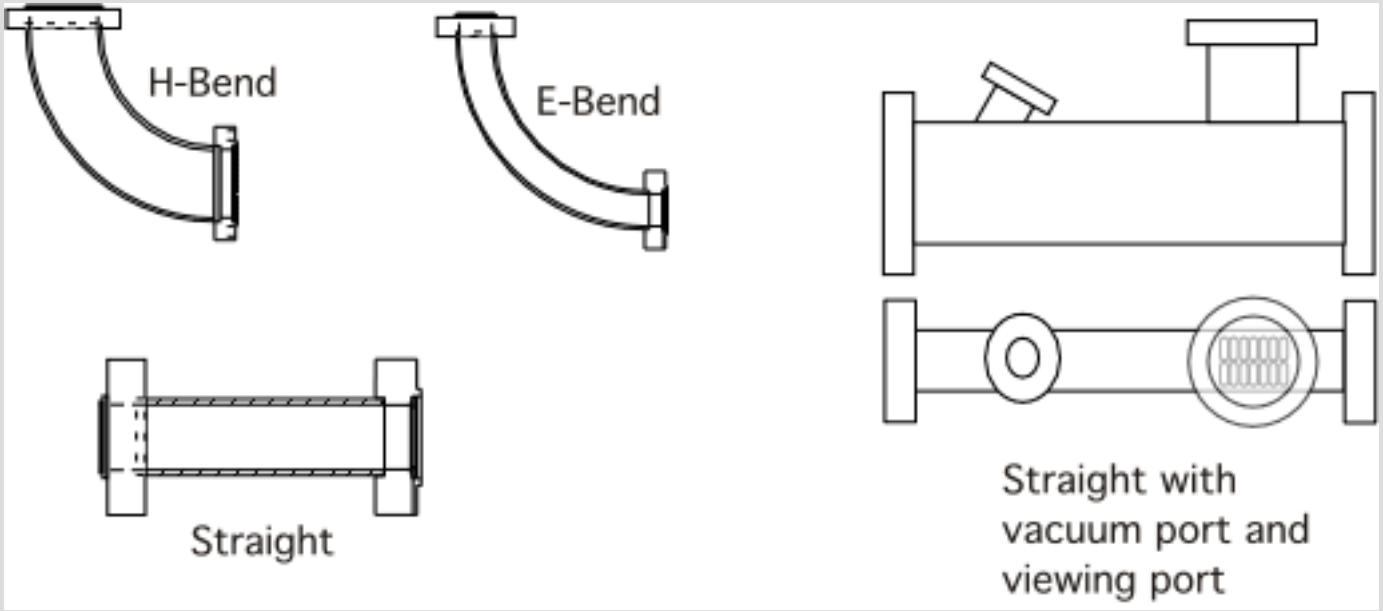


S-band accelerating structures at the POHANG ACC. LAB. (2 GeV LINAC) manufactured by MITSUBISHI


upper stream
lower stream
3120 overall length
2986.18 distance from the center to the center of the waveguide
2974.15 distance from the center to center of the cavity
FEMALE
MALE
DETAIL A
(S=1:3)
SECTION E-E
(S=1:1)
VIEW D
(scale 1:2)
VIEW B
(S=1:2)
SECTION C-C
(S=1/2)
draft techn. drw.
Operating frequency :2856.00MHz at 45D. sec.
Number of cells :84+2coupler cells
Operating mode :2π/3, constant gradient
Attenuation parameter τ:0.57
Filling time :0.64μsec
Q :≥ 13200
Input and output VSWR :≤ 1.06 at 2856.00MHz
Phase error tol. :±2.0 degree
Input peak power :100MWx1μSx50PPS
Accelator gradient :≥30MV/m
Weight :300kg
Water flow :30l/minx2pass=60l/min
Accelerator Section
FDZ0751

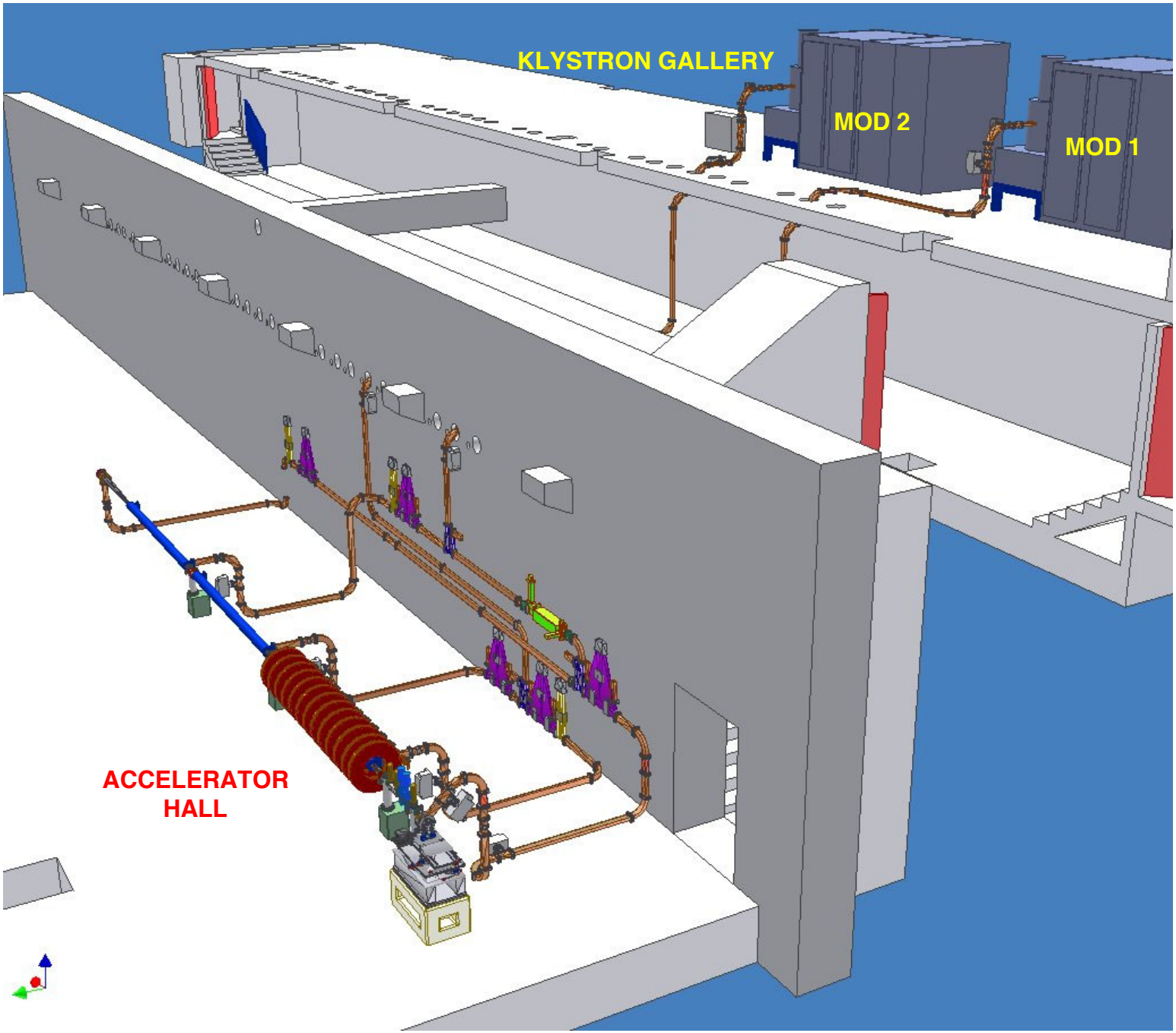
7) Rectangular S-band waveguides

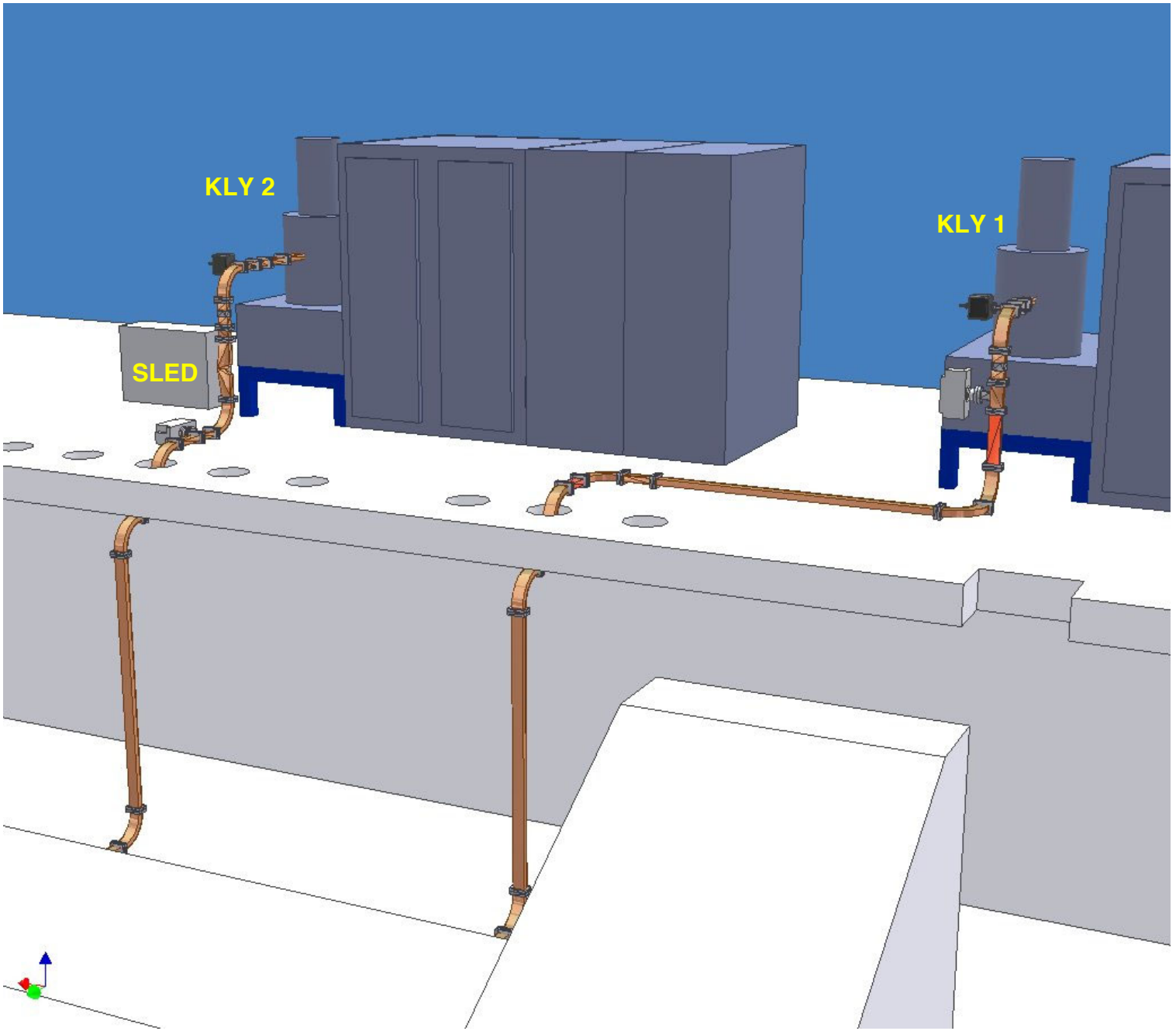
request for tender ➔ Jan 2004
expected delivery ➔ end 2004

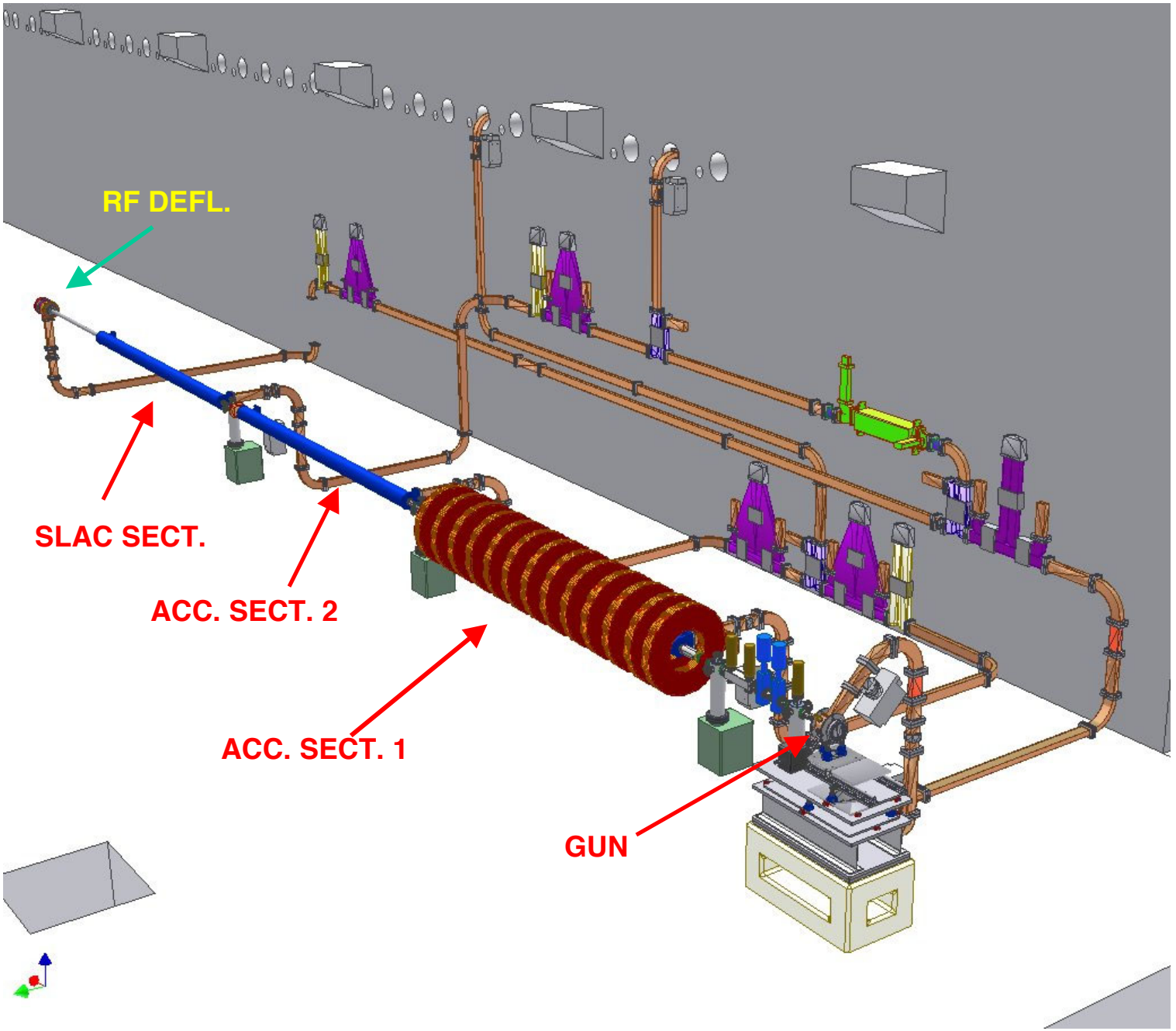


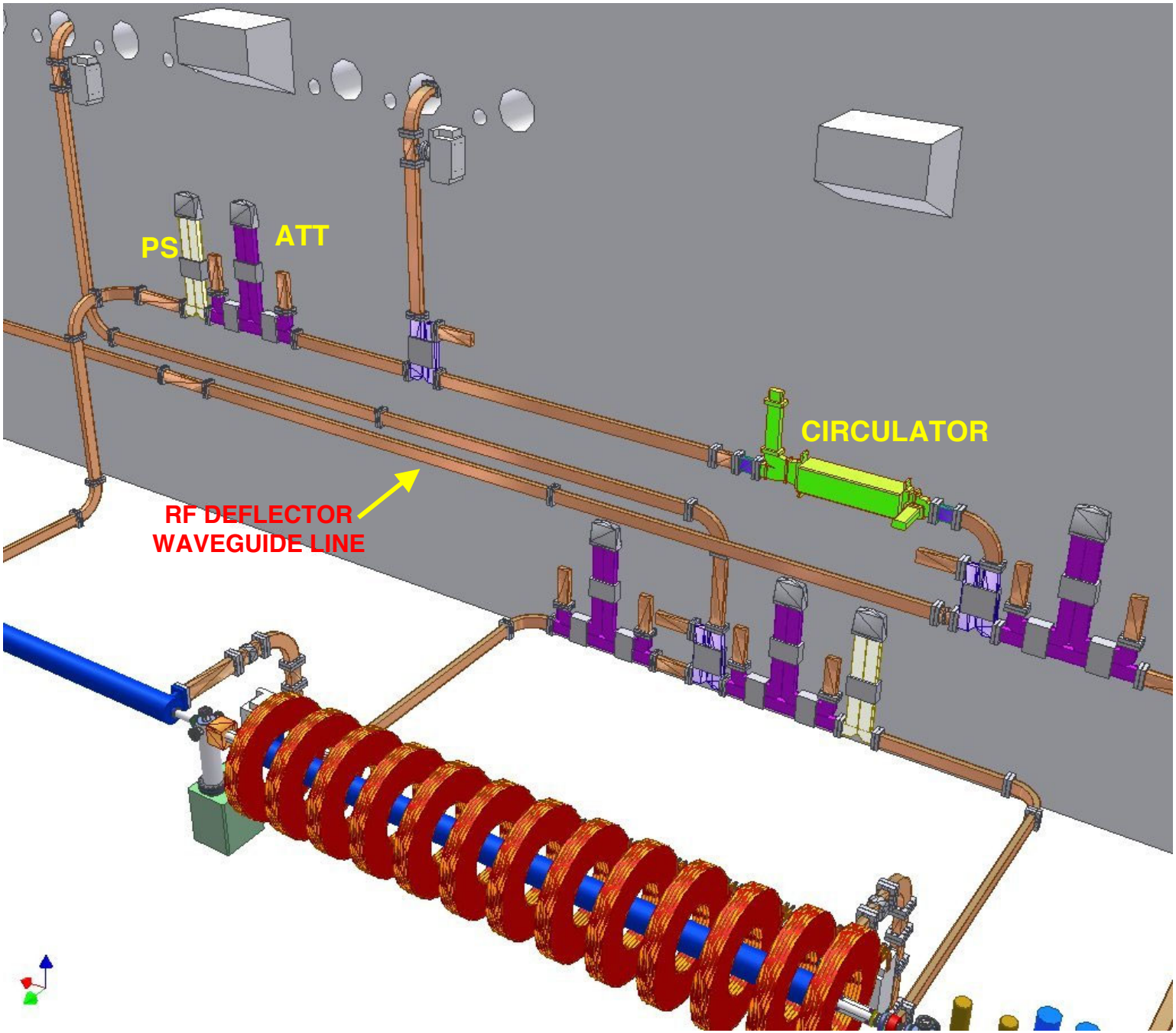
Specifications

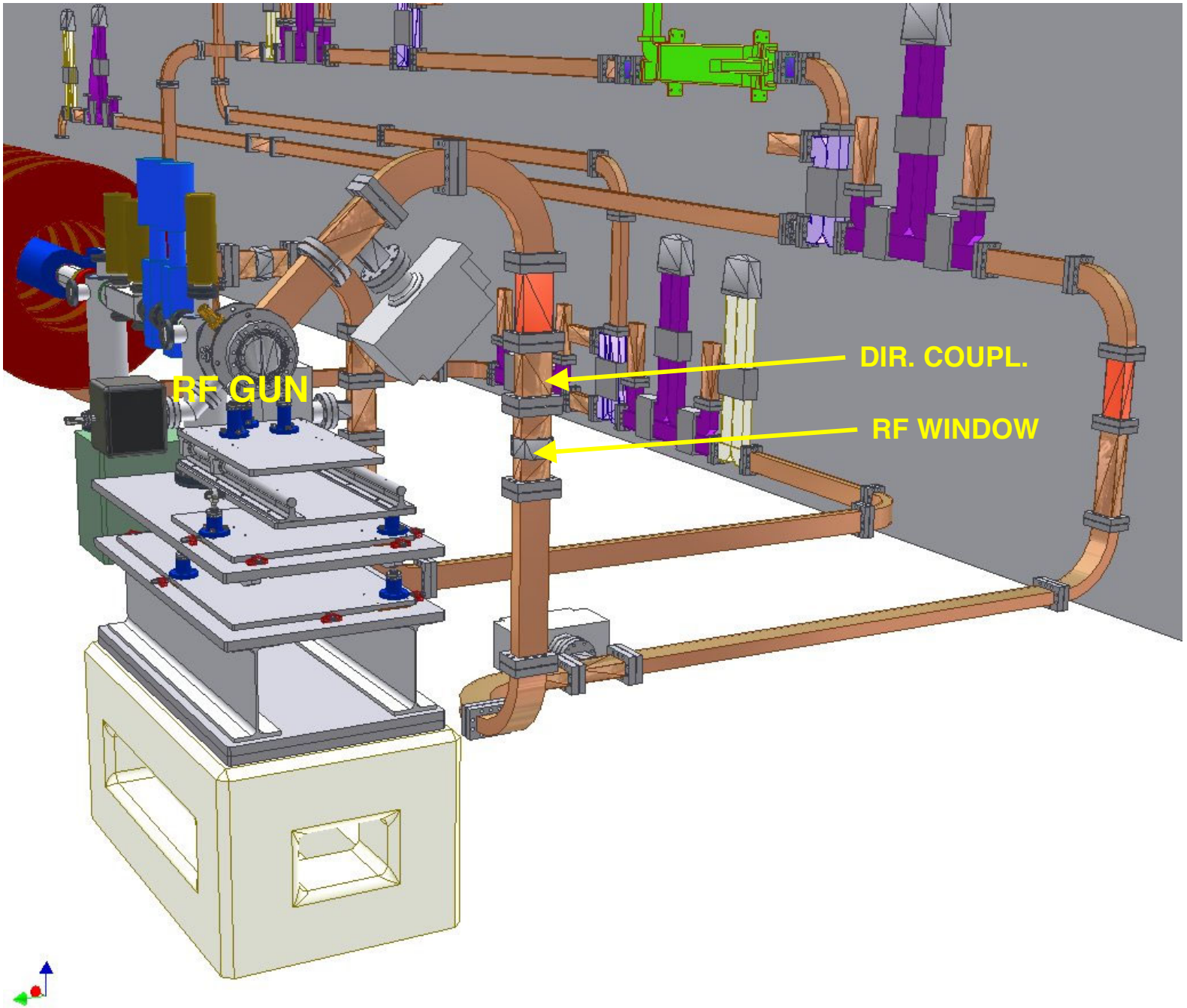
size …… WR284 (74 x 36 mm)
material ……. …….. OFHC copper
operation in vacuum ……10 nTorr


KLYSTRON GALLERY
MOD 2
MOD 1
ACCELERATOR
HALL


KLY 2
KLY 1
SLED


RF DEFL.
SLAC SECT.
ACC. SECT. 2
ACC. SECT. 1
GUN


PS
ATT
CIRCULATOR
RF DEFLECTOR
WAVEGUIDE LINE


RF GUN
DIR. COUPL.
RF WINDOW

WAVEGUIDES SYSTEM PROCUREMENT

1) **Define precisely, with the CAD drw, length and n° of Straights and number of Bends.**

   … within …….. January 2004

2) **Ask INFN to authorize the bid (*gara a trattativa privata)***

   ….. authorization …….. Febr. 2004.

   …… nomination of the Commisson …… March 2004

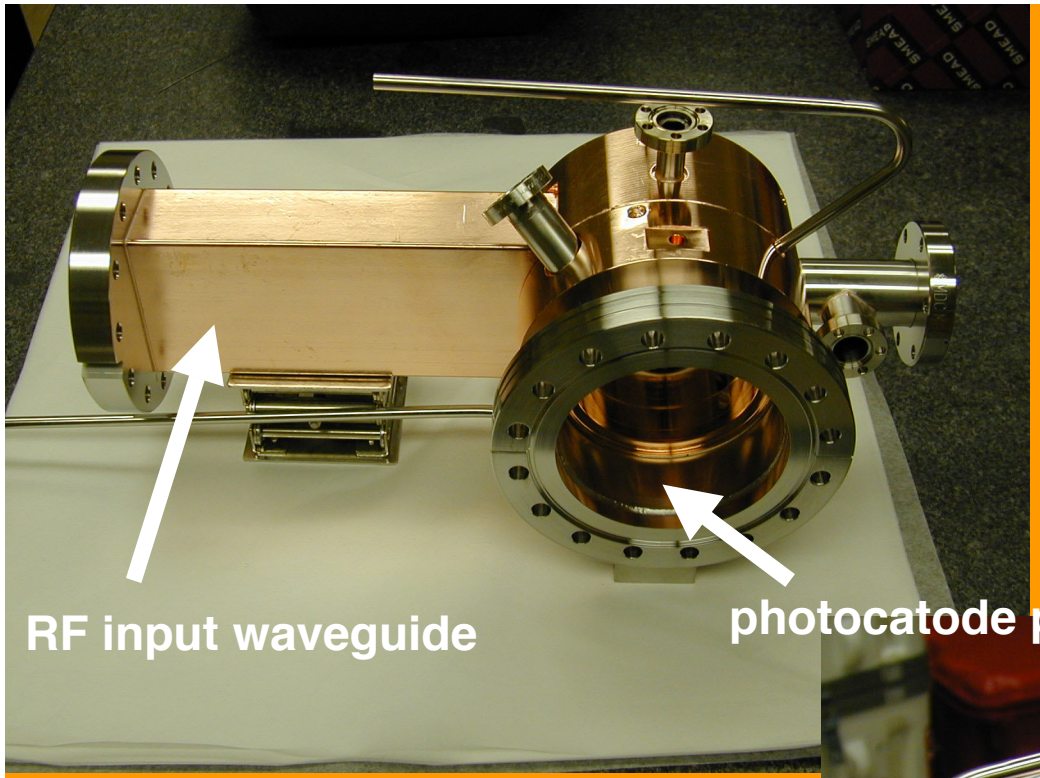
   About 7 months

3) **Execute the tender: invitation, Commission meetings, Council of Dir. Approval,**

   … emission of the order …… September 2004

4) **Delivery of 1th group of waveguides …… April 2005**

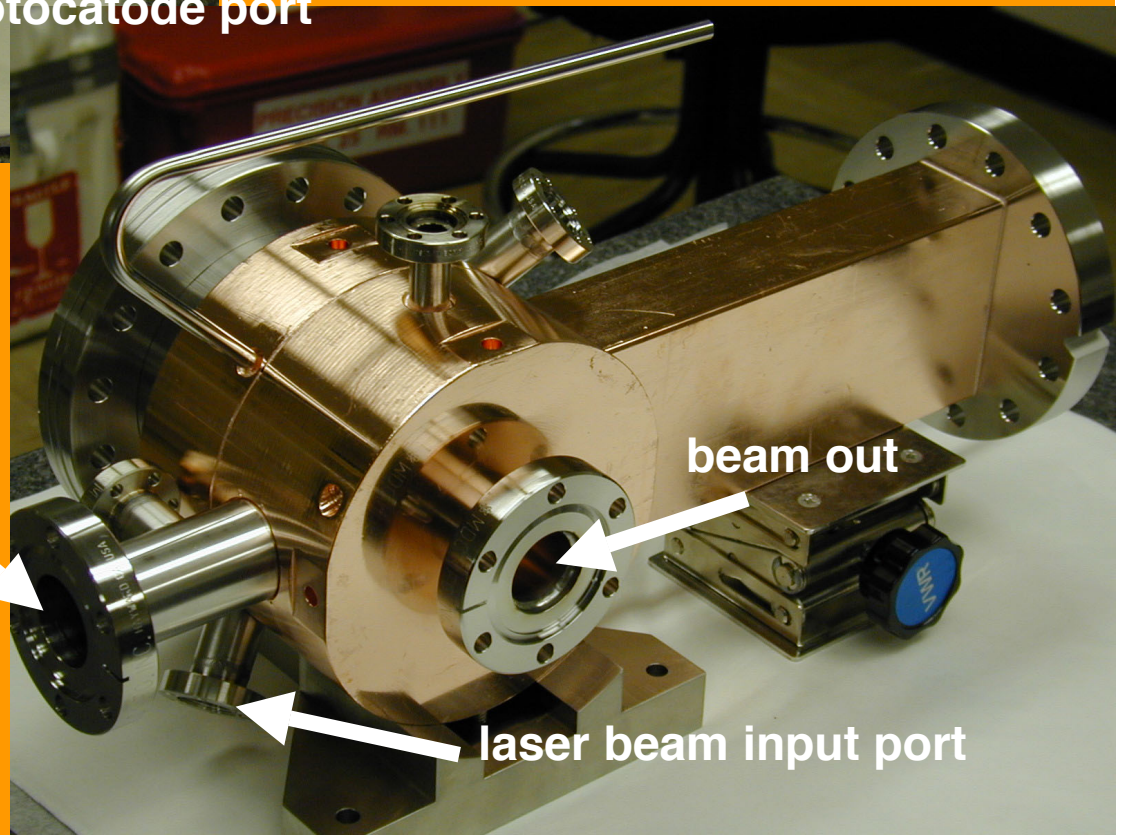
   …… delivery of 2nd group of waveguides …… June 2005



RF GUN

"UCLA-INFN collaboration"

2856 MHz
15 MW RF input
6 MeV beam out energy



DELIVERY …… sept. 2004

CONCLUSIONS

RF DESIGN → ***FROZEN***

ORDERS → ***almost completed***

MILESTONES

- **ACCELERATING SECTION DELIVERY** → **APRIL 2005**
- **WAVEGUIDE SYSTEM INSTALLATION** → **APRIL – JULY 2005**
- **RF STATIONS INSTALLATION & TESTS** → **MAY – JULY 2005**