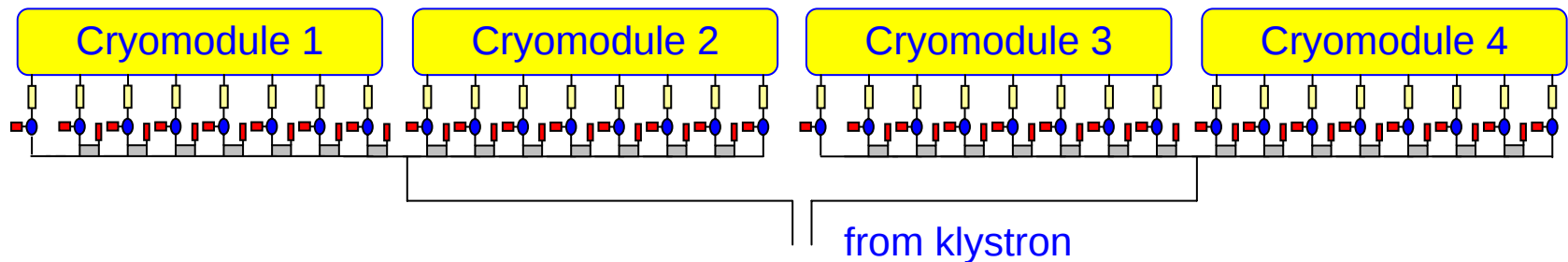


Waveguide distribution for XFEL

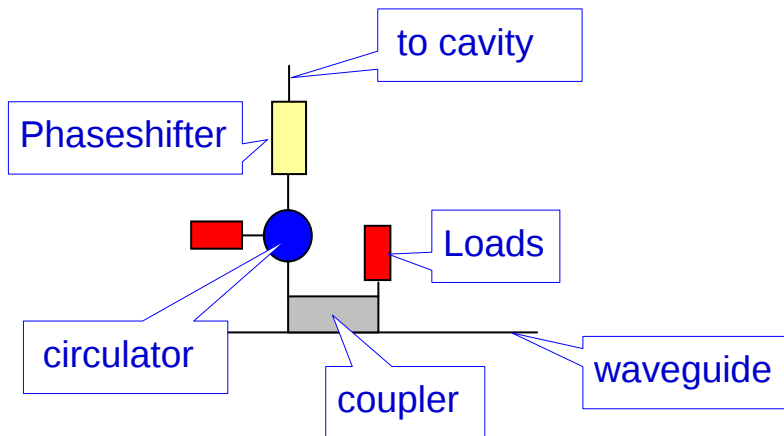
V.Katalev
MHF-p



Basic principles of RF power distribution



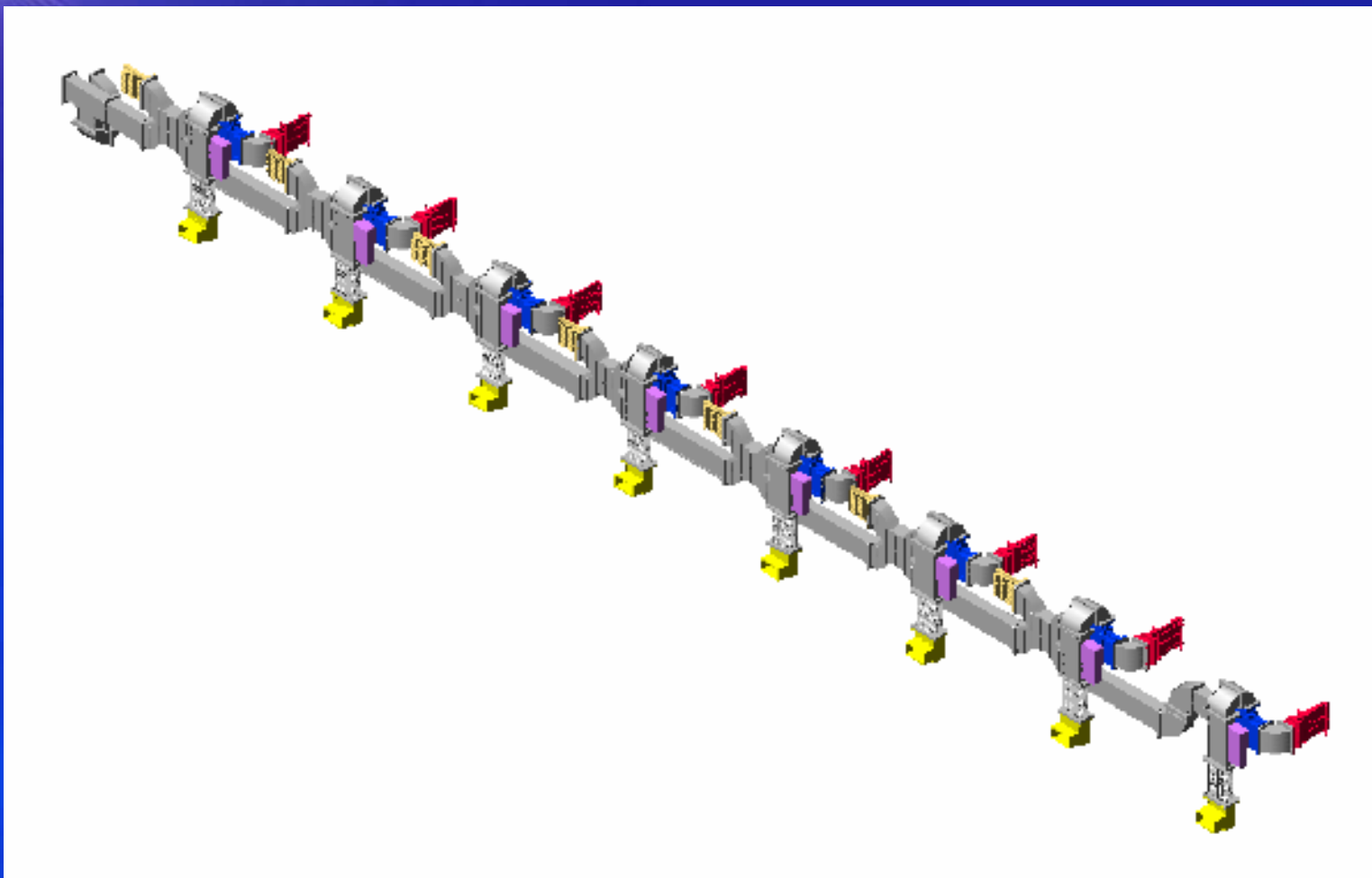
Basic unit of waveguide system



- Multibeam klystron feeds 4 cryomodules with 5.2 MW RF power (RF station)
- A cryomodule consists of 8 sc cavities
- Each cavity receives 120 kW (320 max) peak RF power through the basic unit



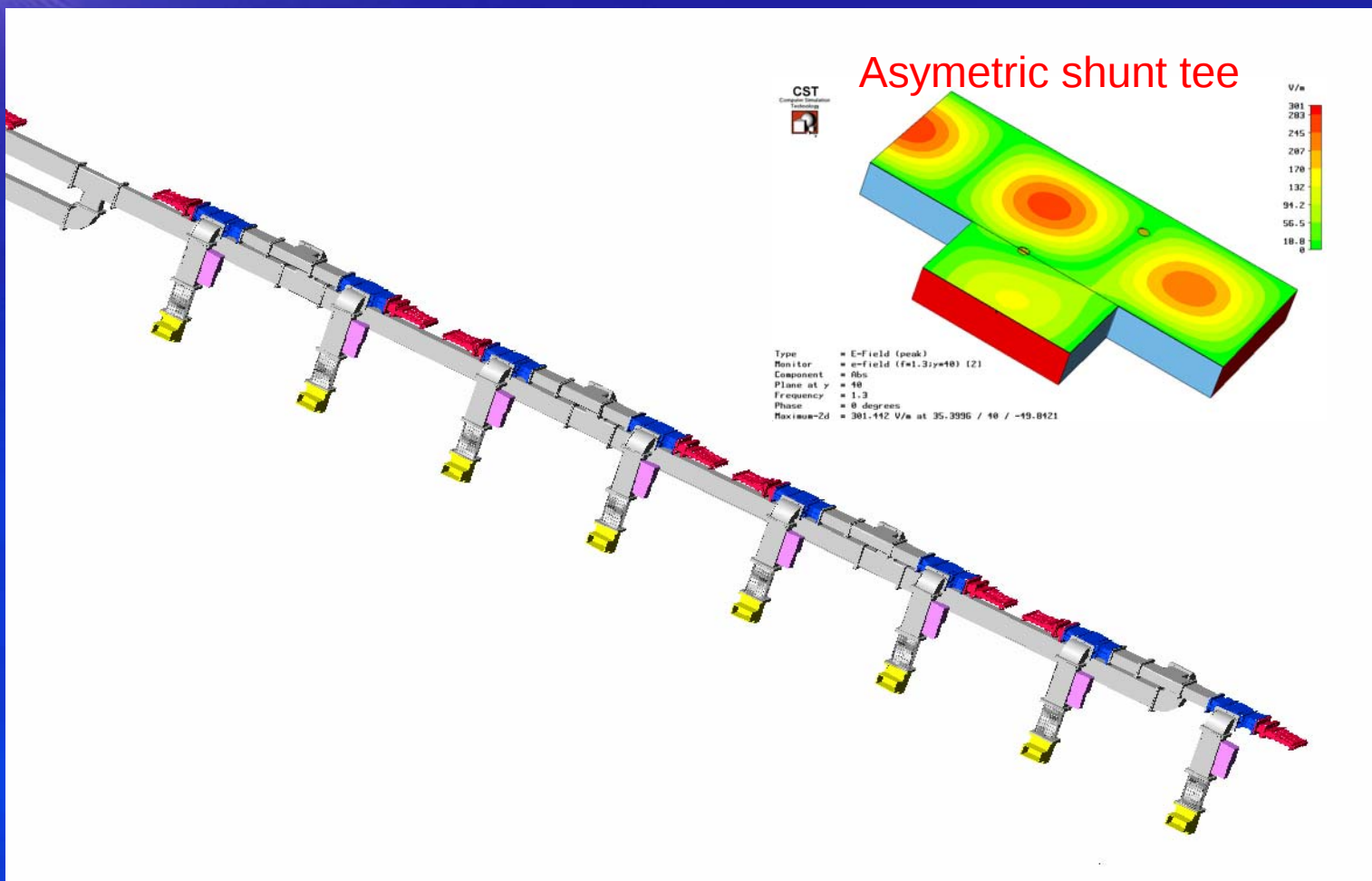
TTF like waveguide system for one cryomodule



Waveguide distribution for XFEL



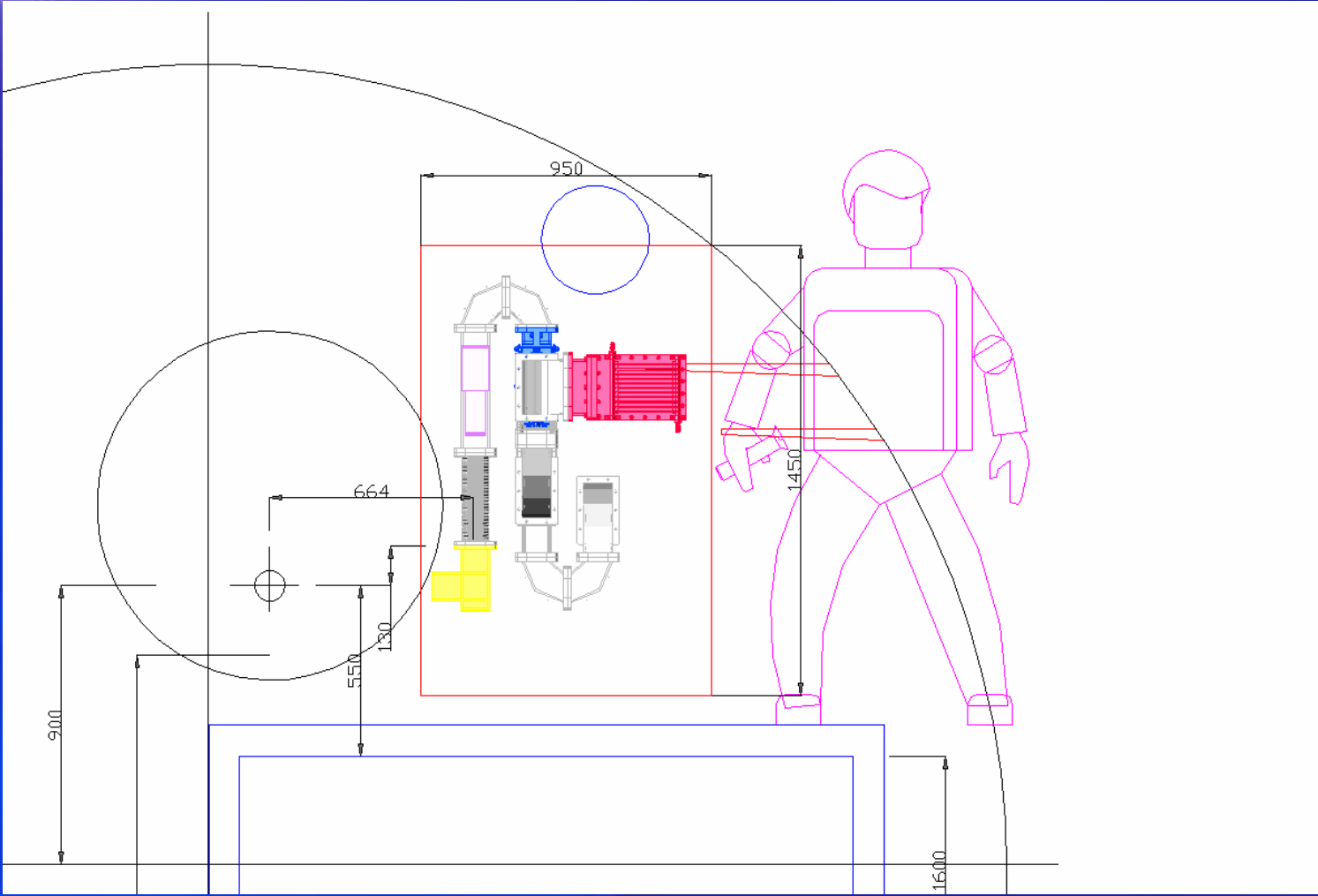
Waveguide system with asymmetric shunt tee





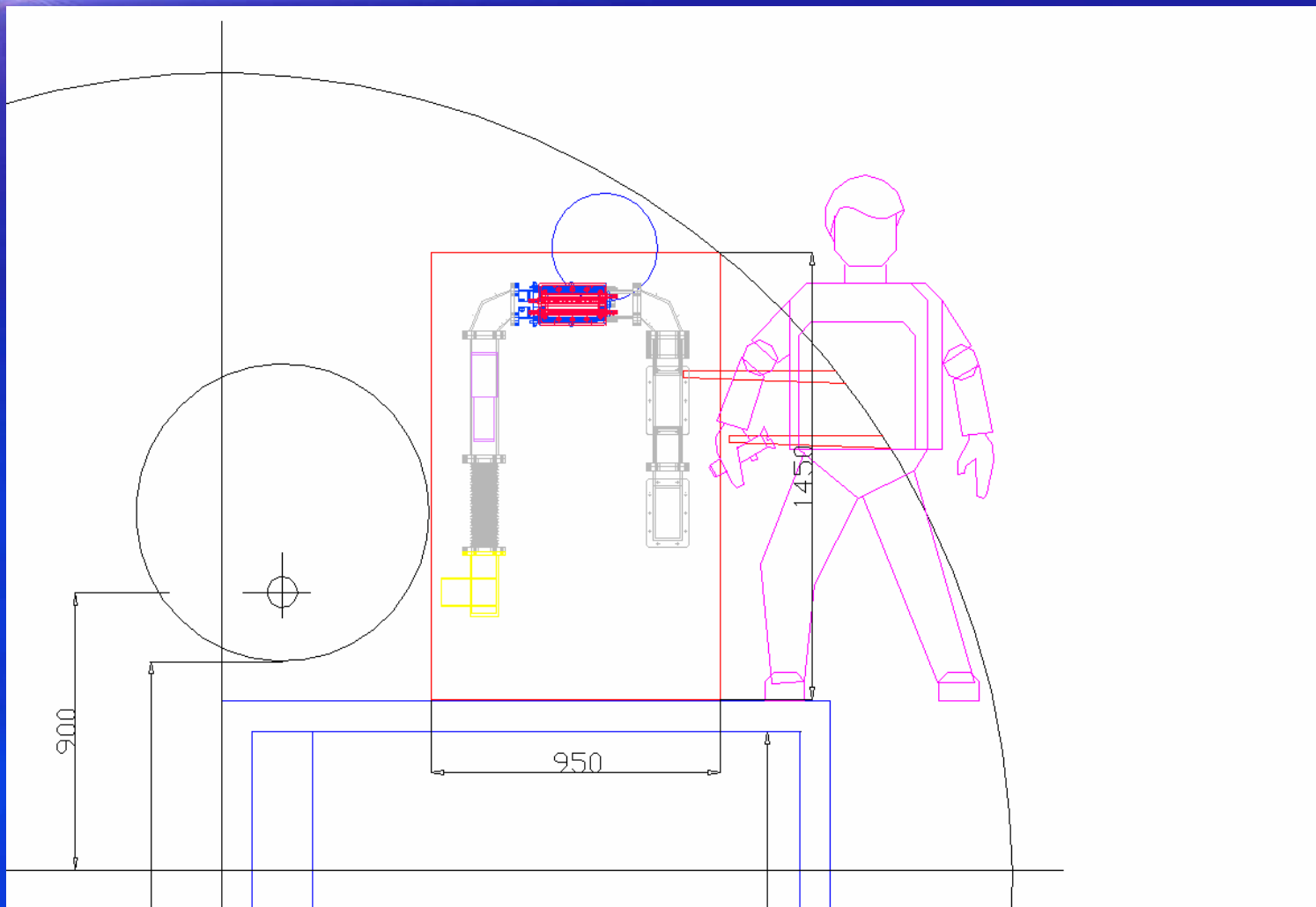
Tunnel crosssection for waveguide distribution

Waveguide distribution for XFEL





Tunnel crosssection for waveguide distribution



Waveguide distribution for XFEL



WG componets for distribution system

Waveguide & flange type: WR650 with PDR14

- **Isolator 350 kW**
- **Phaseshifter (movable & fixed)**
- **Power coupler – hybrid and shunt tee**
- **Dummy load 2 kW**
- **Bellows**
- **E,H bends and straight waveguide**
- **Harmonic filter**
- **Directional coupler**
- **Arc detector**
- **Dry air filling of waveguide**

Waveguide distribution for XFEL



WG componets for one RF station

	Component	1 distribution	2 distribution
1	Isolator 350kW	32	32
2	Phaseshifter (M + F)	32 + 28	32 + 12
3	Hybrid	28	--
4	Shunt tee	2	30
5	Dummy load 2 kW	28	--
6	Straight wg (m)	51 + 16	67 + 16
7	E + H bend	106 + 16	70 + 8
8	Bellow	40	40
9	Directional coupler	2	2
11	Harmonic filter	2	2
12	Arc detector	2	2

Waveguide distribution for XFEL



WG componets for XFEL (30 RF station)

	Component	1 distribution	2 distribution
1	Isolator 350kW	960	960
2	Phaseshifter (M + F)	960 + 840	960 + 360
3	Hybrid	840	--
4	Shunt tee	60	900
5	Dummy load 2 kW	840	--
6	Straight wg (m)	2010	2490
7	E + H bend	3180 + 480	2100 + 240
8	Bellow	1200	1200
9	Directional coupler	60	60
11	Harmonic filter	60	60
12	Arc detector	60	60

Waveguide distribution for XFEL



Assembling & test of waveguide distribution

Waveguide distribution for one cryomodule

- **Assembling on the ground**
- **Phase tuning**
- **Water test**
- **Full RF power test (no input control of wg components)**
- **Changing of components (if it's necessary)**
- **Transport waveguide system and Installation into tunnel**



Schedule of waveguide distribution assembling

- We need to assemble, test and install in tunnel 120 waveguide distribution systems
- For one WG system per week (ideally) it takes 120 weeks i.e. about 3 years!
- We have not enough storage place and therefore it's necessary to make very on-time delivery schedule for each waveguide component



Summary

- For some of the components DESY has developed a layout which might be shared with possible suppliers
- DESY finalizes specification for each component of waveguide distribution system in following years
- Request for quotations will be send out 2007/2008
- Details of the schedule should be discussed with each producer in 2007/2008



Thank you for attention