WG1: Linacs with focus on ILC & XFEL

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Objectives of Working group

- Describe specifications of European-XFEL and ILC
  - **High preciseness and large scale**
- State-of-the-art technology used for XFEL and ILC
  - **ATCA/uTCA AMC card**
  - **High resolution fast field-detector (10^-4)**
  - **Long haul phase reference**
  - **ILC baseline**
  - **Alternative ideas of rf detection**
- International collaboration

Agenda

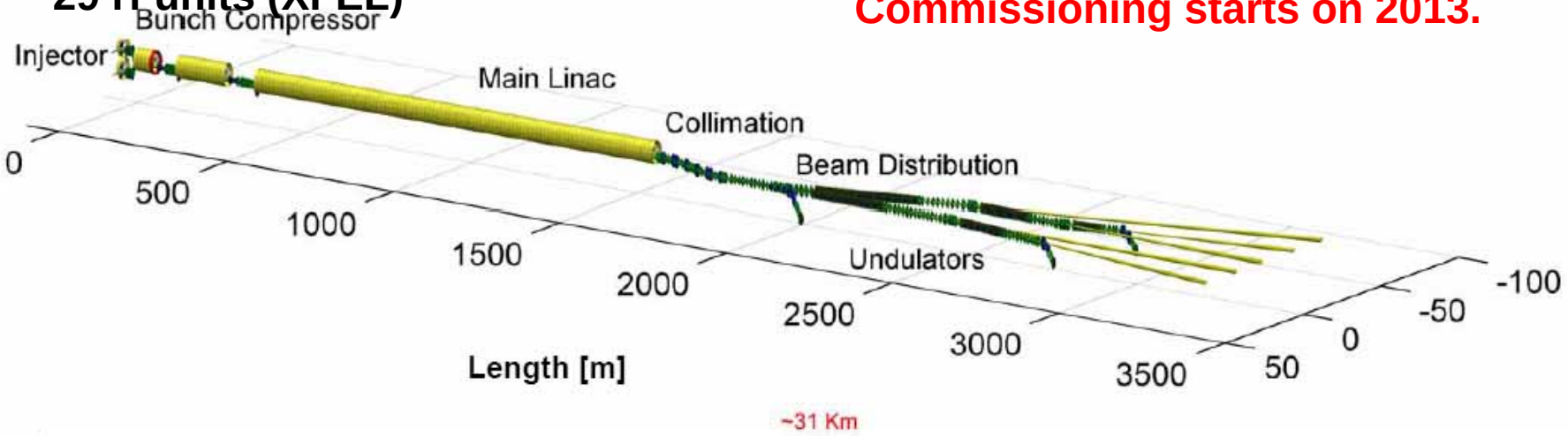
(Each <8 min. talk +4 min. discussion)

1) “Objectives of Working group” (Shin Michizono)
- comparison between XFEL and ILC (high precision v.s. large scale)
2) “XFEL LLRF requirements and schedule” (Frank Ludwig)
3) “Simcon and AMC board” (Tomasz Jezynski)
4) “High precision rf detector” (Frank Ludwig)
5) “Experiences of klystron operating point at FLASH and necessary FB margin” (Valeri Ayvazyan)
6) “Phase reference system at ILC” (Frank Lenkszus)
7) “ILC-LLRF baseline hardware” (Brian Chase)
8) “Alternative design for ILC-llrf” (Larry Doolittle)
9) “Multi-intermediate-frequency mixture” (Toshihiro Matsumoto)
10) “Example of international collaboration” (Gustavo Cancelo)

European-XFEL and ILC

29 rf units (XFEL)

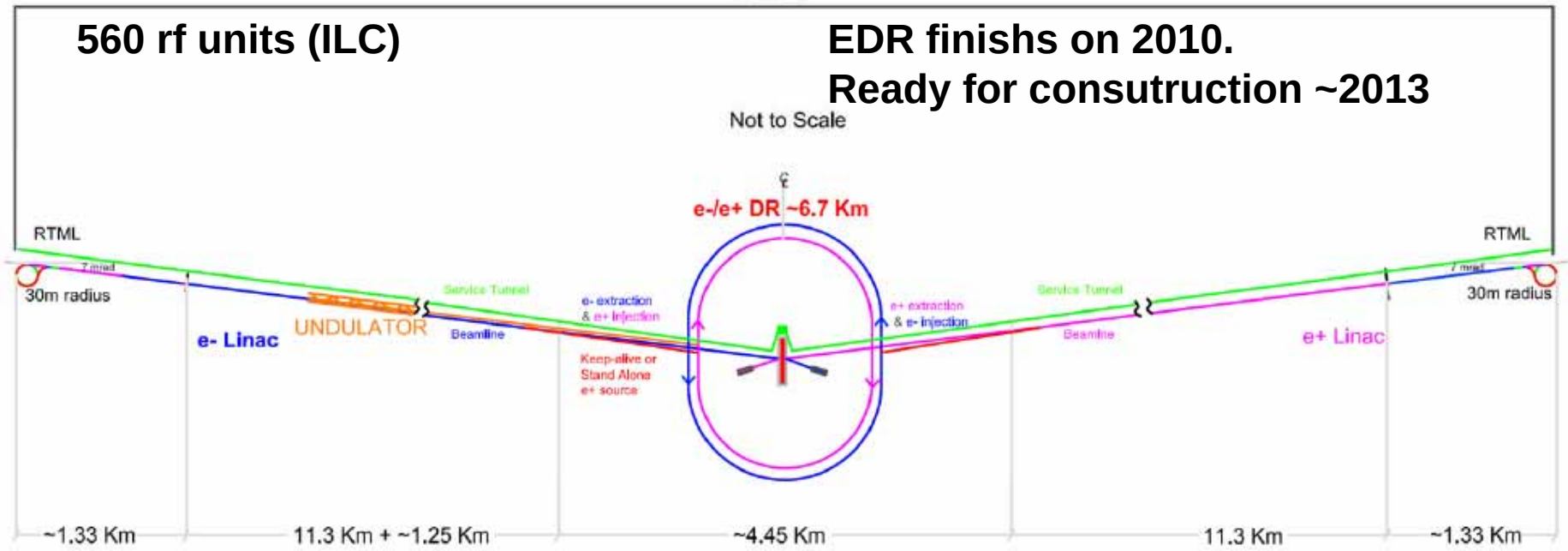
Commissioning starts on 2013.



~31 Km

560 rf units (ILC)

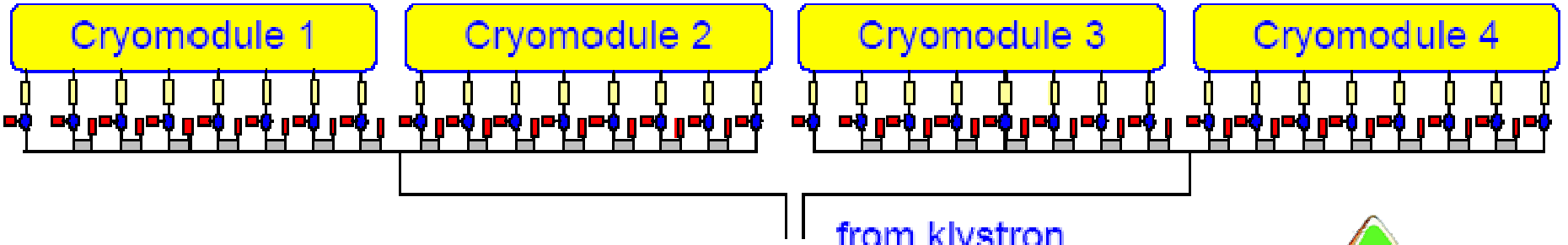
EDR finishs on 2010.
Ready for consutruction ~2013



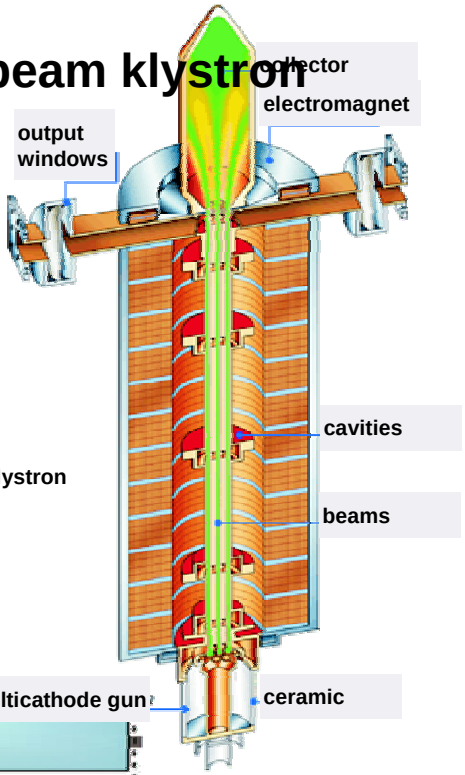
Schematic Layout of the 500 GeV Machine

European-XFEL and ILC (2)

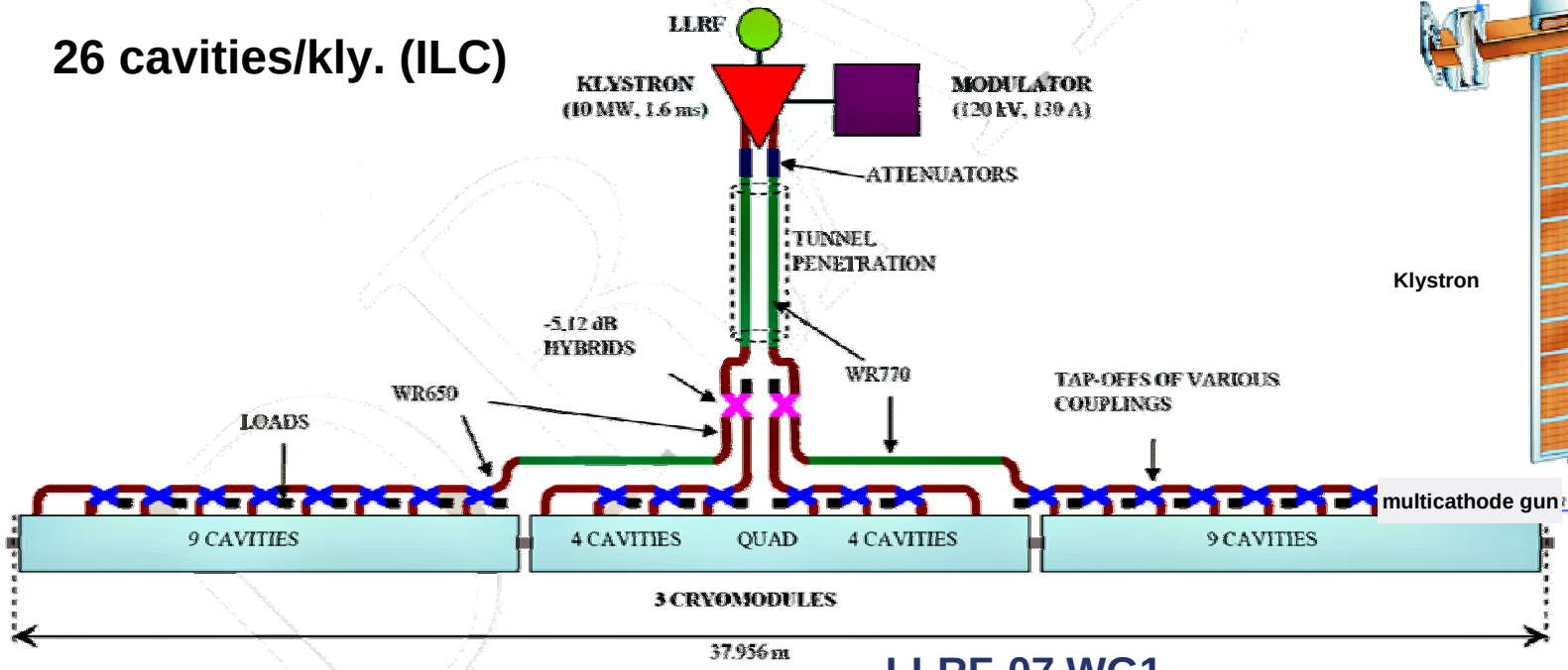
32 cavities/kly. (XFEL)



10 MW multibeam klystron



26 cavities/kly. (ILC)



Specifications

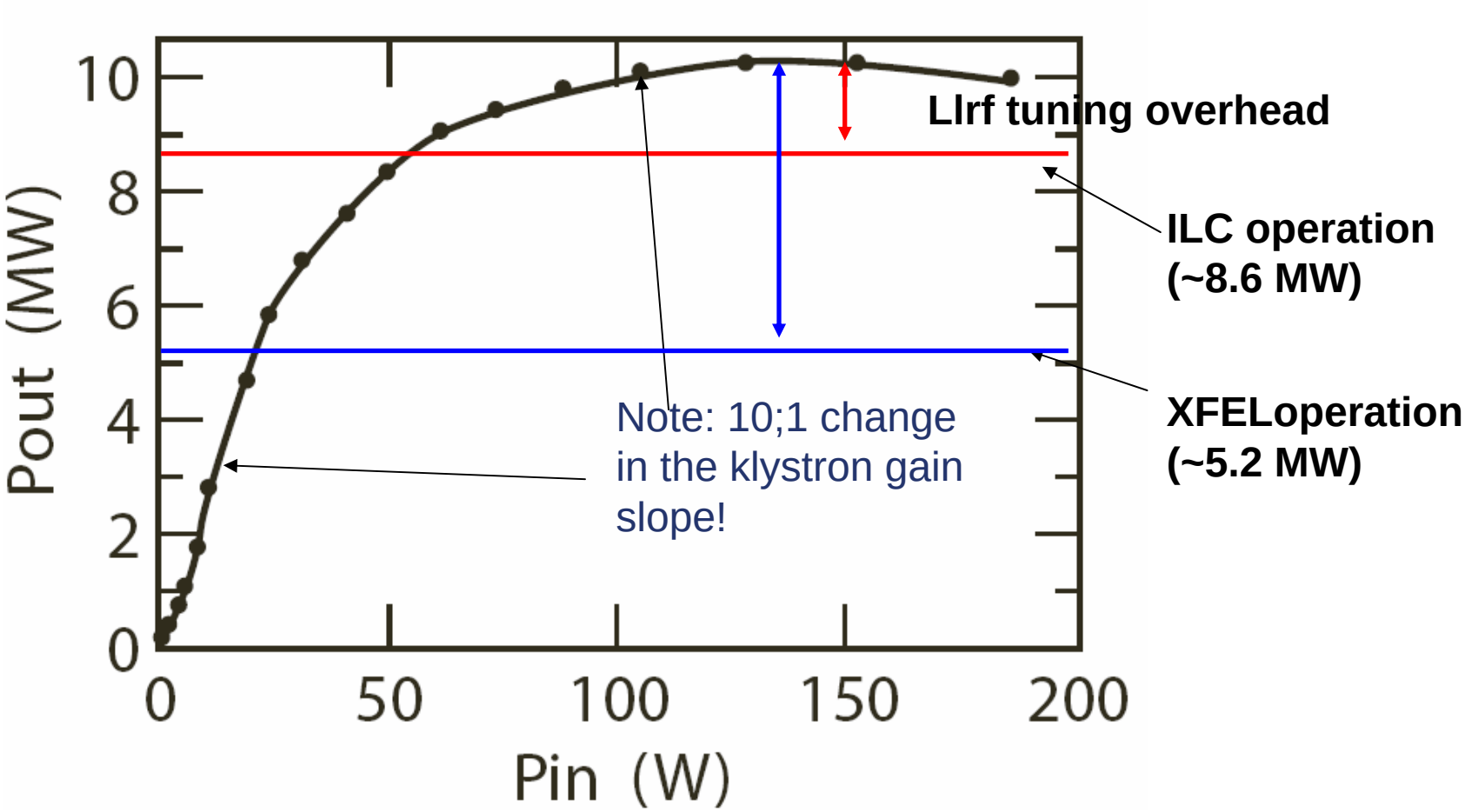
		XFEL	ILC
amplitude stability (correlated)	[%]	0.01	0.07
amplitude stability (un-correlated)	[%]		1.05
phase stability (correlated)	[deg.]	0.01	0.24*
phase stability (un-correlated)	[deg.]		0.48*
number of tunnels		1	2
number of rf units		29	560**
number of cavities per klystron		32	26
average cavity gradient	[MV/m]	23.6	31.5
maximum cavity gradient	[MV/m]	28.5	33
beam current	[mA]	5	9
HLRF klystron power	[MW]	10	10
klystron operation point	[MW]	5.2	8.6
rf loss at waveguide	[%]	6	7
tuning overhead	[%]	92.3	16.8
* @ Bunch compressor			
** Main linac only			
***8.6MW=8MW(cavity input)*1.07(waveguide loss)			

XFEL: High precision

ILC: Large scale and higher gradient

LIrf Operating Point

- Tuning overhead (16%) budget @ ILC
  - 1% (beam current compensation) (1% fluctuation)
  - 2.5% (HLRF) (1% HV fluctuation)
  - 2% (detuning; microphonics+Lorentz force)
  - 10.5% Feedback headroom



International collaboration

International collaboration is necessary for big projects such as XFEL and ILC
-Regular meeting
-Experiments