Work Package 2

2.1: Automated 30 GHz high gradient test stand
2.2: Two-beam test stand in CLEX
2.3: rf pulse compressor

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CLIC Collaboration meeting
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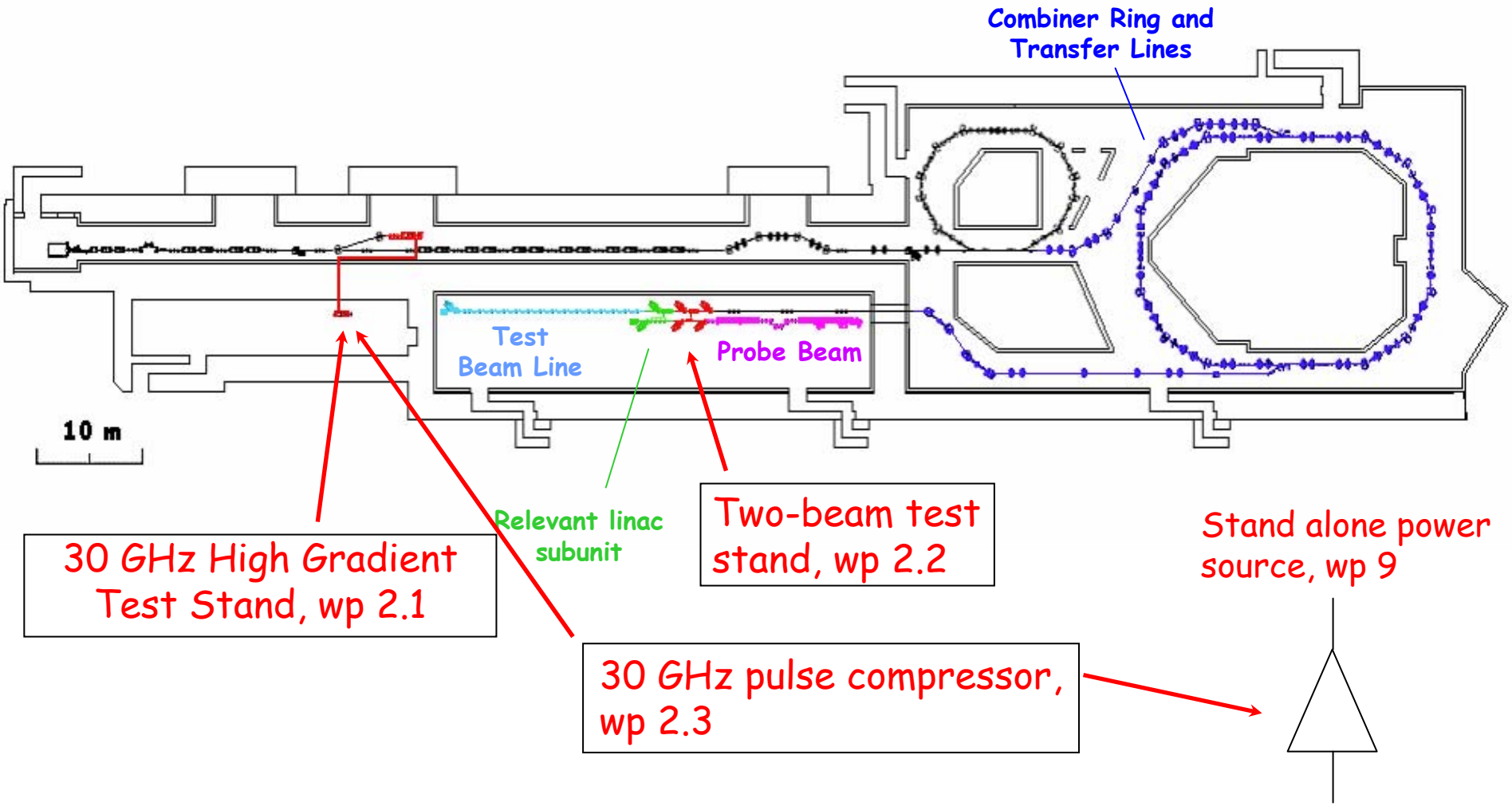
Work package 2: physical location



Motivation

Demonstration of an accelerating gradient of 150 MV/m and a power production of 600 MW are key goals for the CLIC study - R1 in TRC.

Attaining these goals will require substantial technological developments coupled with a high-paced structure testing program, wp 7.

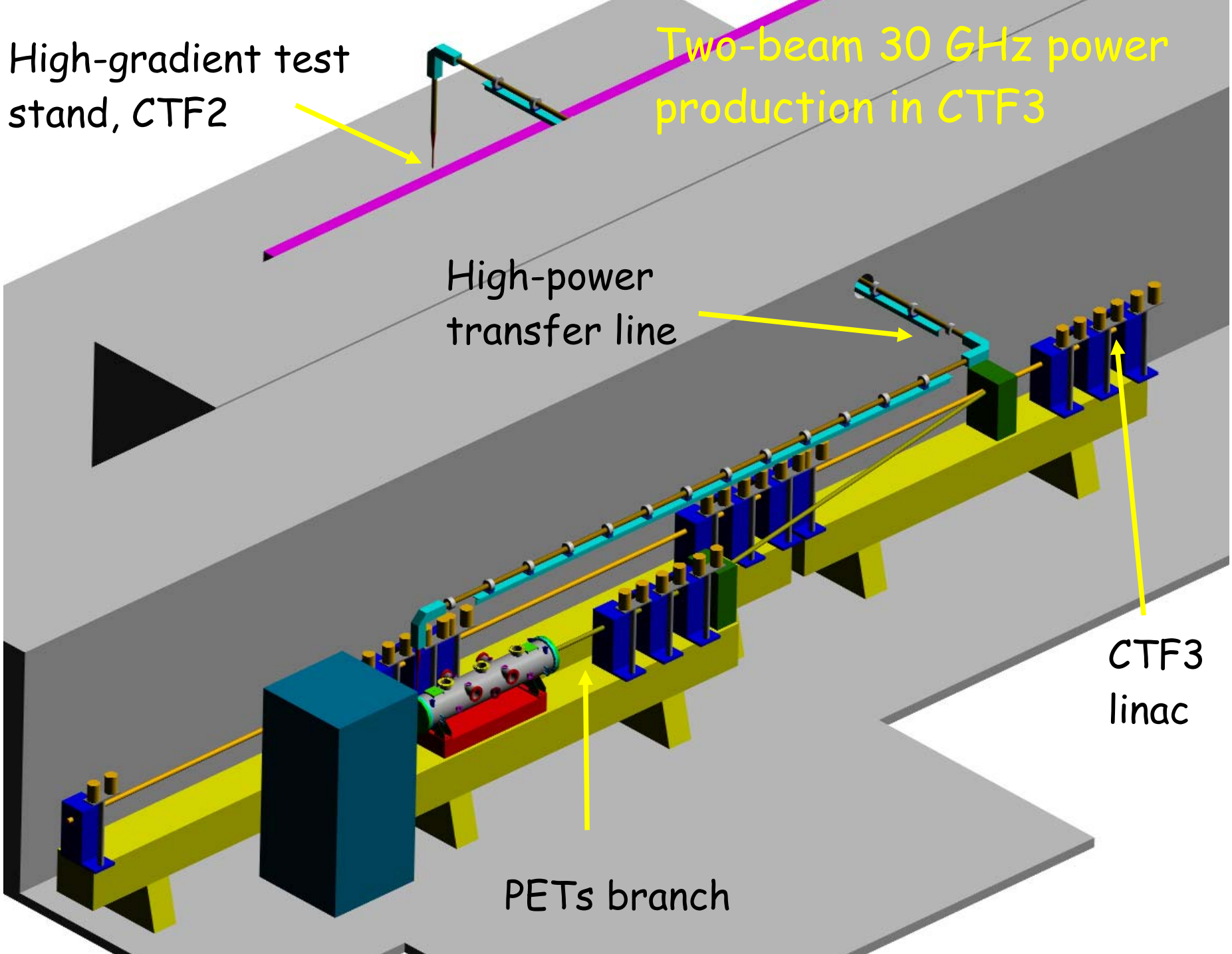
Essential to the success of the testing program are two experimental areas, wp's 2.1 and 2.2,
and an rf pulse compressor, wp 2.3, to ease requirements on the rf power source.

Structure test stands - general

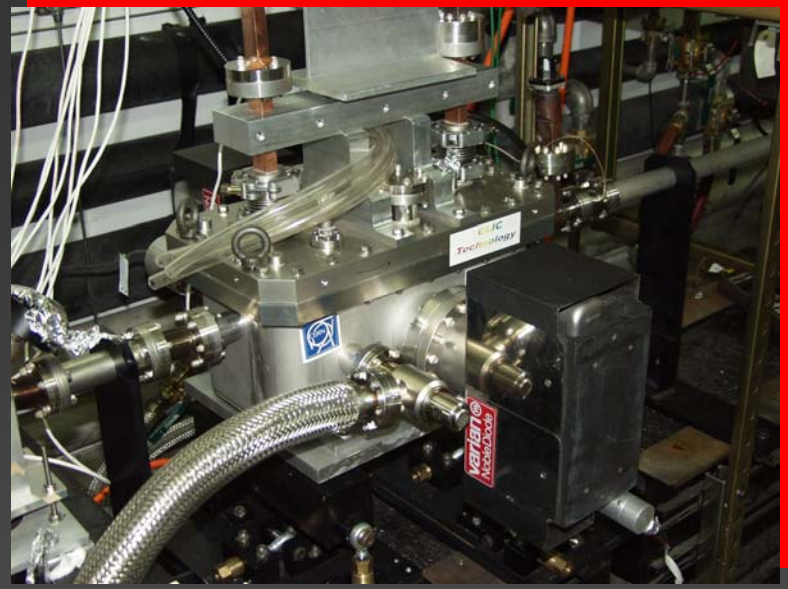
Equipped to host test structures,
- Vacuum, bake-out
- Water cooling
- Alignment

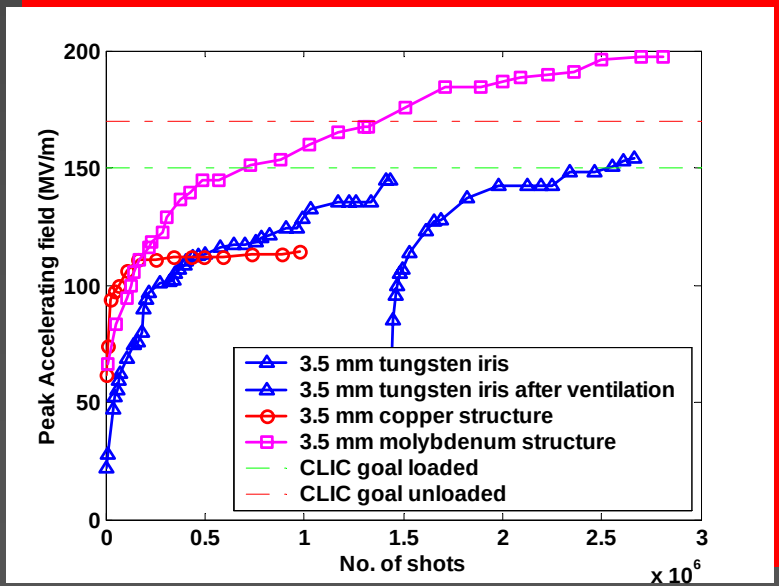
Instrumented to,
- Detect rf breakdowns and control rf power source to make automated conditioning
- Make measurements during breakdown to gain insight into rf breakdown and guide structure development – rf signals, vacuum, emitted light
- Data acquisition system

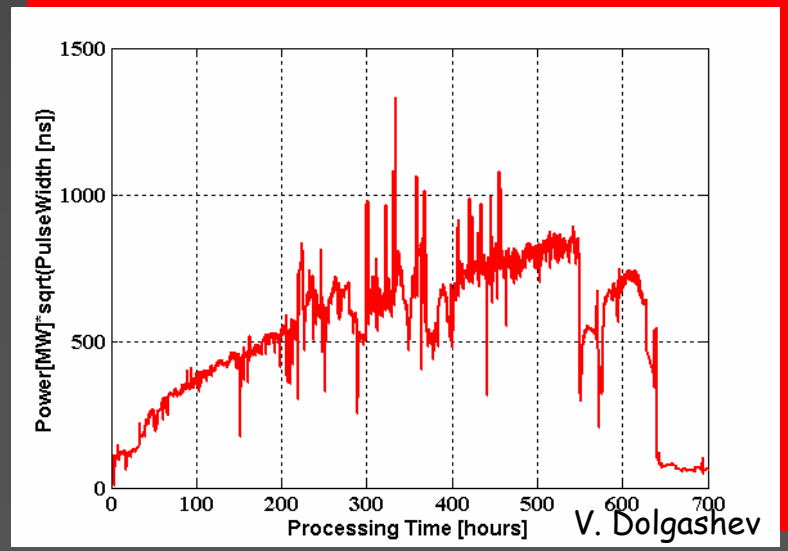
Integrated with CTF3 beam, wp 2.2,
- Magnet elements for transmission through structures
- Instrumentation for beam transmission
- Measure beam/structure interactions, especially at high power levels – for example, show full gradient acceleration


High-gradient test stand, CTF2
Two-beam 30 GHz power production in CTF3
High-power transfer line
CTF3 linac
PETs branch

Test stands, CTFII and NLCTA, and results







Work package 2.1
Automated 30 GHz high-gradient test stand

Primary objective: High-power test accelerating structures throughout the development program

Some features,

- vacuum chamber with quick turn-around, residual gas analysis,
- fast current monitors for time resolved emitted currents,
- rf signal detection electronics,
- current spectrometers for energy resolution of emitted currents,
- optical spectrometers for analysis of emitted light spectra,
- acoustic sensors,
- cooling-water temperature measurements,
- high speed data acquisition and analysis system to monitor conditioning and control automated CTF3 power production mode operation.

Work package 2.2
Two-beam test stand

Primary objectives: Drive transfer structures up to full power and accelerate probe beam at full gradient/pulse length.

Some features,

- optical design and magnetic elements for transmission of the drive/probe beams through the transfer/accelerating structures,
- beam spectrometers for measurement of energy loss/gain through transfer/accelerating structures,
- diagnostics, auxiliary systems duplicated from work package 2.1

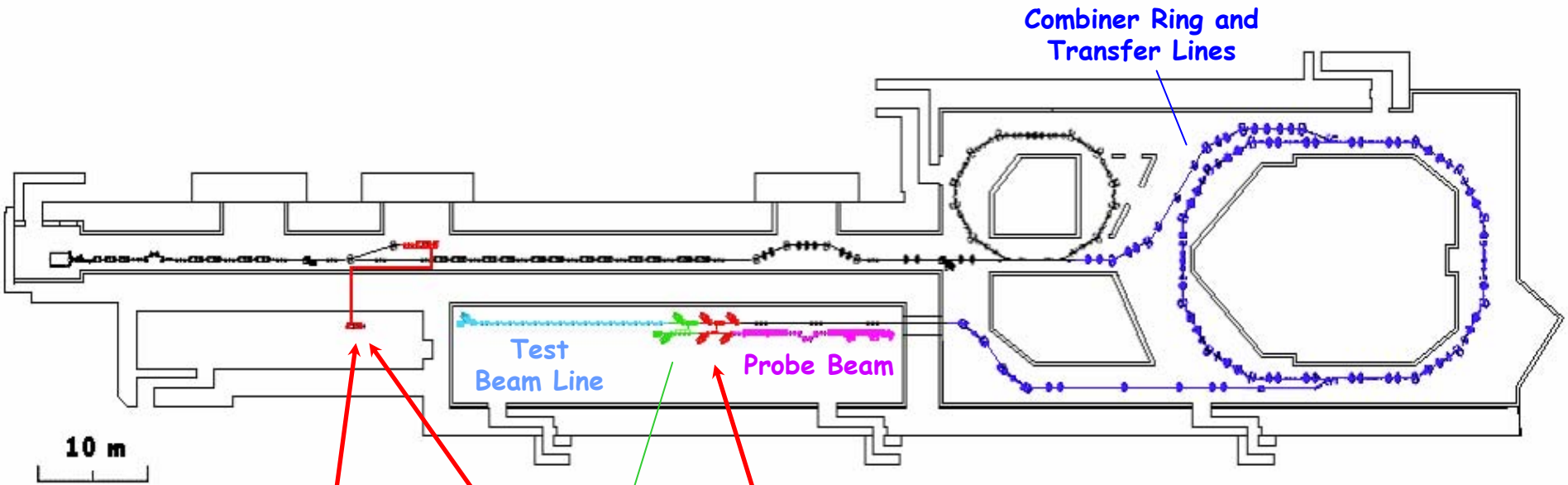
Work package 2.3
30 GHz pulse compressor

Primary objective: Reduce peak power requirements of rf power source (either CTF3 or stand-alone device, wp 9) for accelerating structure testing. Peak power down to 50 MW from 200 MW.

Some features,

- Compress to 60 ns in initial phase
- Over-moded high-power line to be commissioned in autumn
- Compactness is not an issue
- Efficiency not an issue so factor 4-5 power ratio accessible
- No need for exotic solutions (sorry) – straight forward SLED2 OK
- Many other waveguide components needed as well…

Work package 2: timescale



30 GHz High Gradient Test Stand, wp 2.1

2004/2005

Relevant linac subunit

Two-beam test stand, wp 2.2

2007

Stand alone power source, wp 9

30 GHz pulse compressor, wp 2.3

2005

Preliminary cost estimate:

wp 2.1 and 2.2: Global 3 MCHF, 10 my
Many possibilities to subdivide

Wp 2.3: Budget allocated for fabrication in CLIC program, 50 KCHF
Need partner for development/design/overall responsibility.
Of course,
Better to have collaborator pay for all of it.