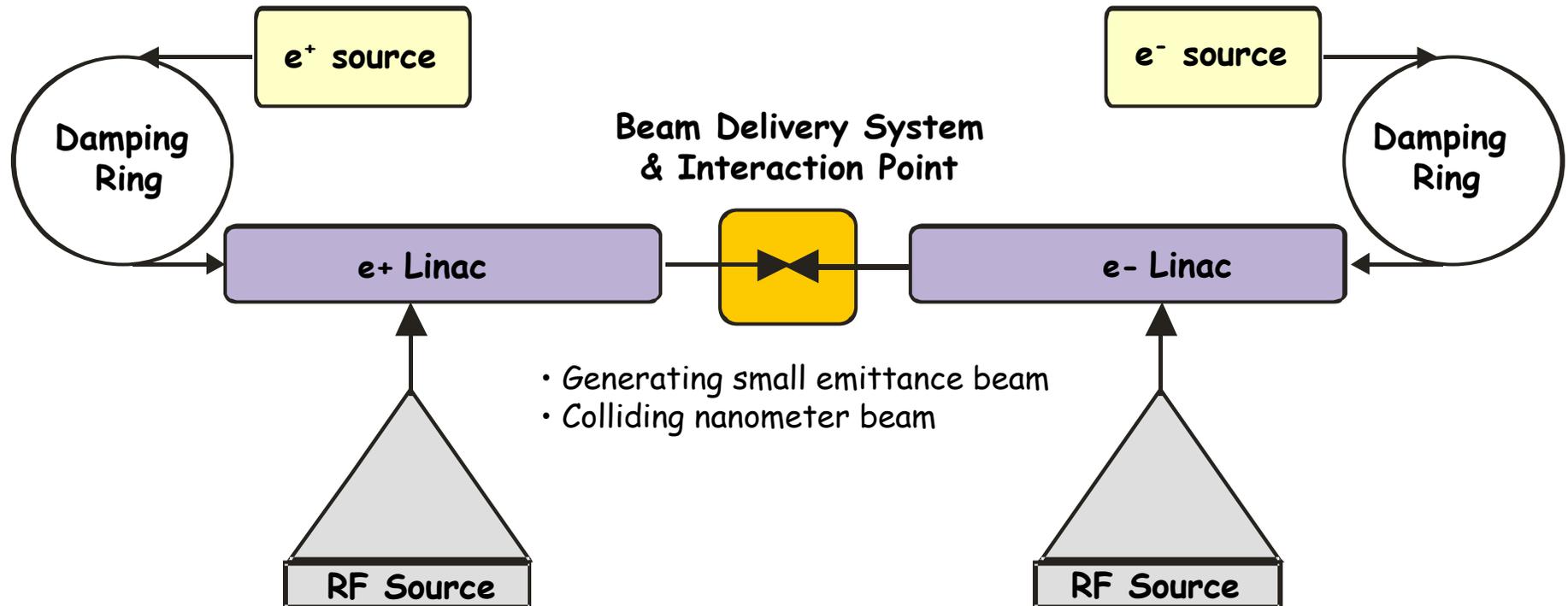


CLIC: the project and the Test Facility 3

- CLIC project
- What have been achieved so far
- The CLIC Test Facility 3

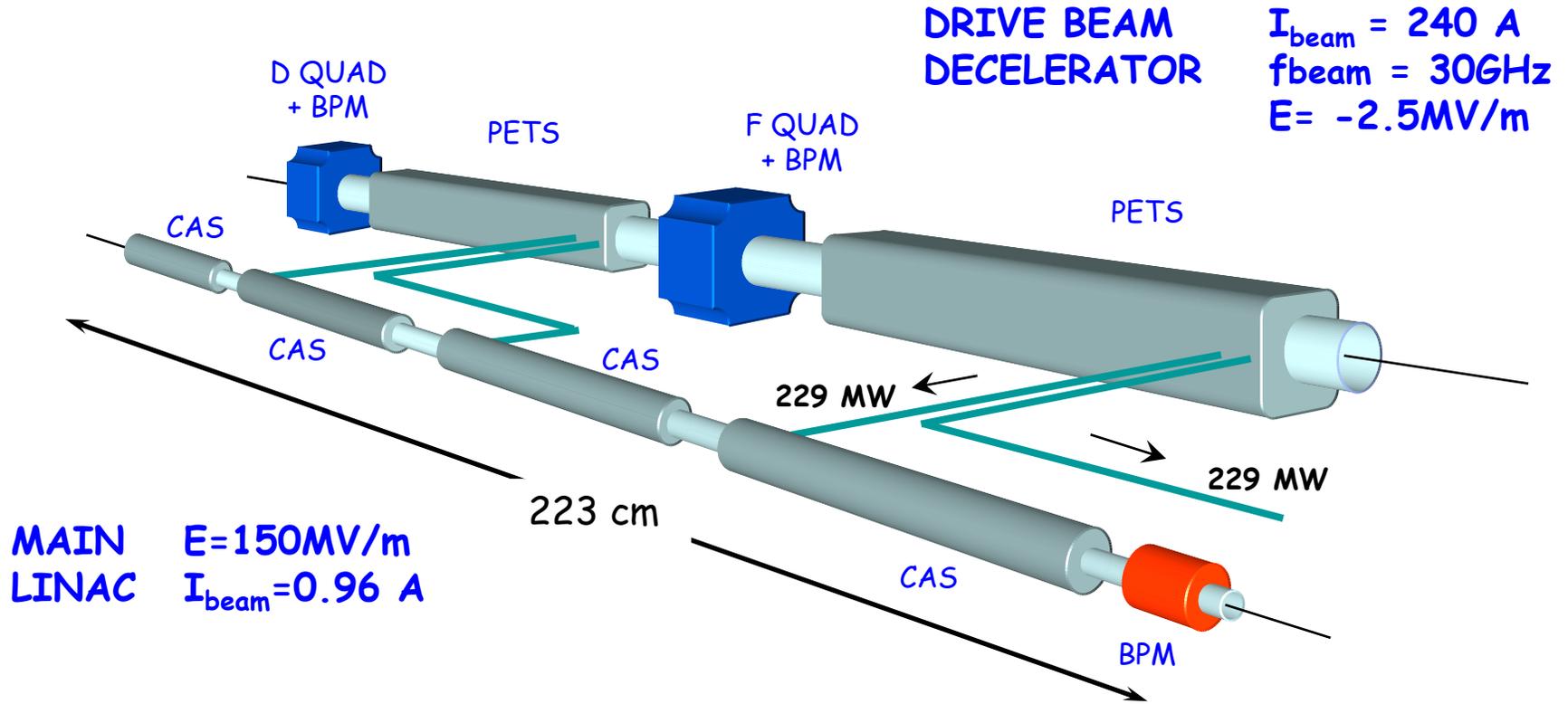
Compact Linear Collider

- 37km long
- 3TeV center of mass energy
- 10^{34} - 10^{35} cm⁻²s⁻¹ luminosity



- Generating small emittance beam
- Colliding nanometer beam

Two-Beam Module of 30 GHz Linac

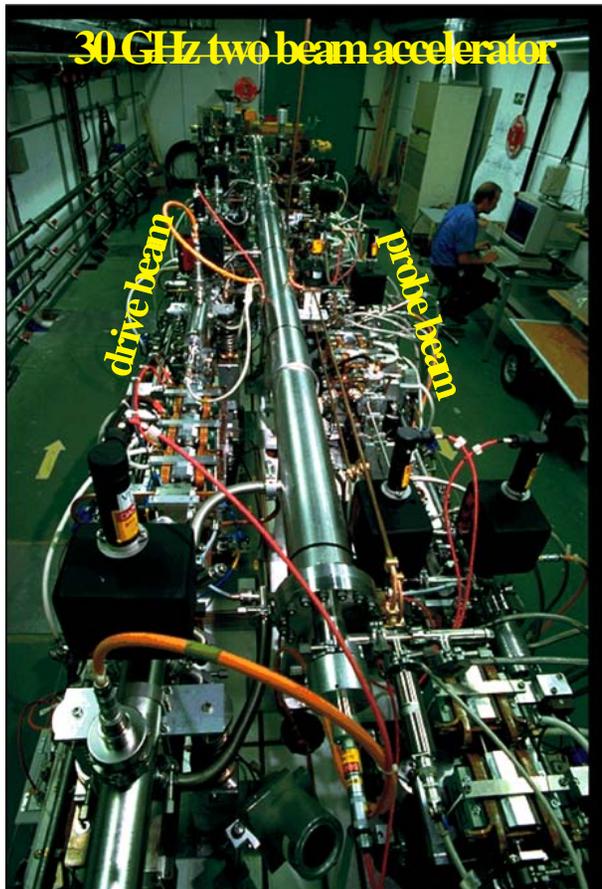


Total AC to beam energy efficiency : 9,8% (40,3% for AC to RF and 24,4% from RF to beam energy)

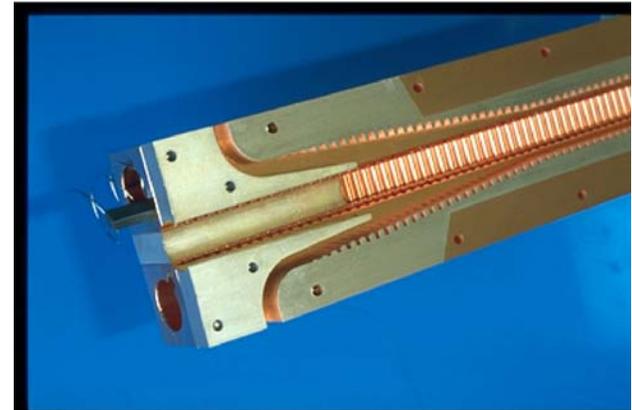
6 years of R&D performed on CTF II

Goals of the CTF II

- Demonstrate the two beam acceleration scheme at 30GHz
- Develop the high gradient 30GHz accelerating cavities technology



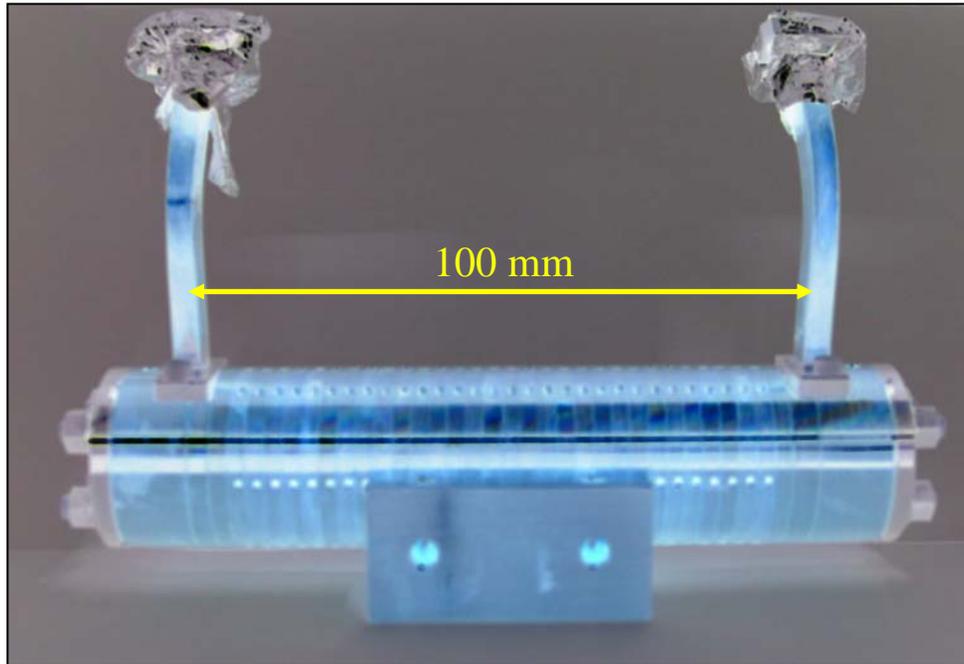
30 GHz power extraction structure for CTF II drive beam (before brazing)



In 1999

- Producing up to 460MW power generated in a long PETS structure
- Accelerating a probe beam in four 30GHz CLIC accelerating structures

Molybdenum-Iris structure, giving best results so far



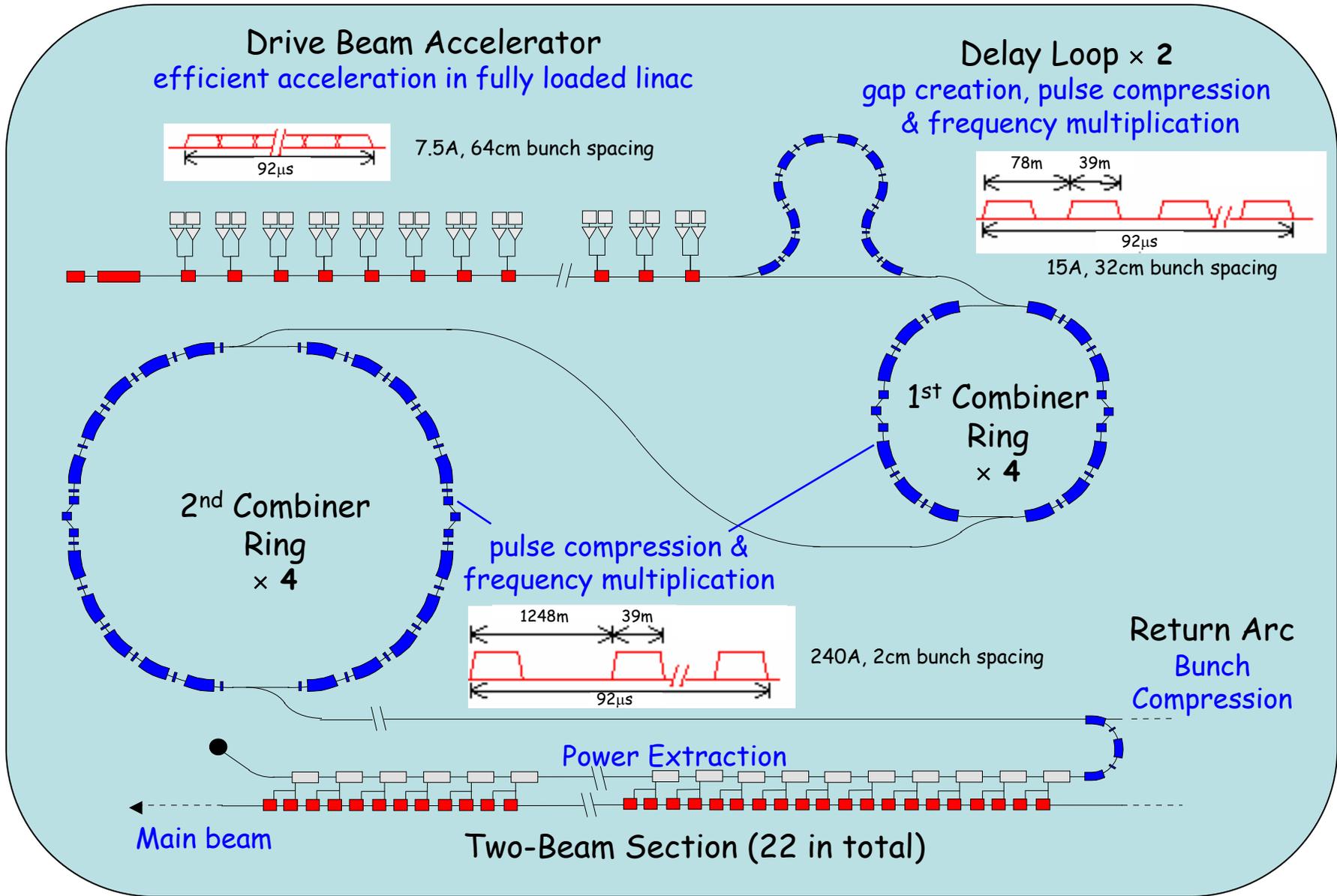
$2\pi/3$ phase advance
3.5 mm aperture
 $\hat{E}_s / \langle E_{acc} \rangle = 2.84$
4.6% v_g/c
 $T_{fill} 8.3$ ns



193 MV/m peak accelerating field
426 MV/m peak surface field

150MV/m average accelerating gradient at 30 GHz over 16 ns

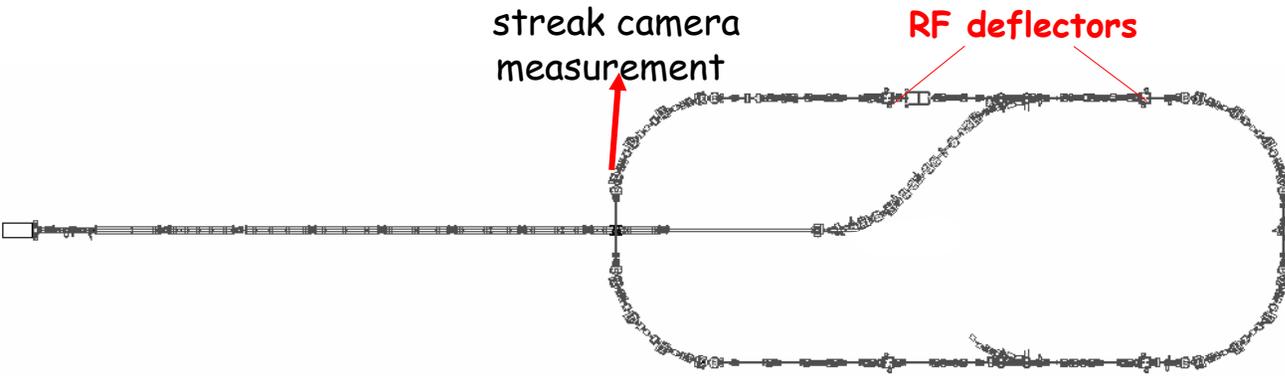
CLIC RF Power Source - Overview



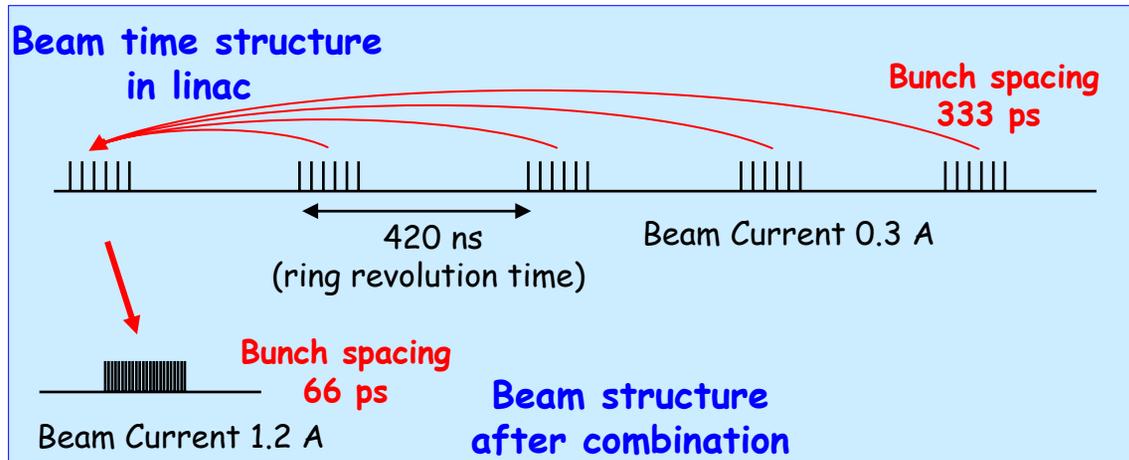
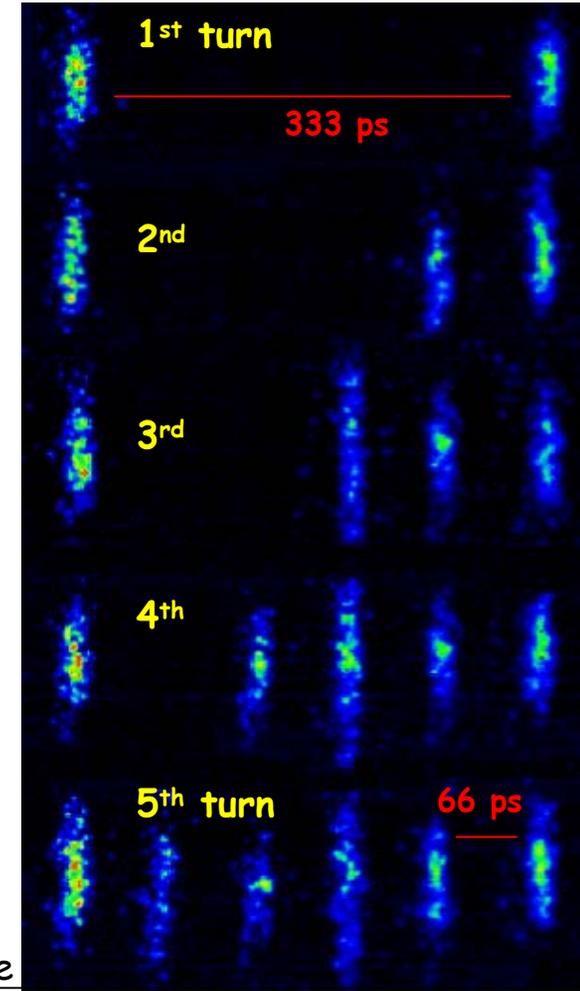
Drive Beam Generation : Bunch frequency multiplication

CTF3 - PRELIMINARY PHASE in 2002

low-charge demonstration of electron pulse combination and bunch frequency multiplication by up to factor 5

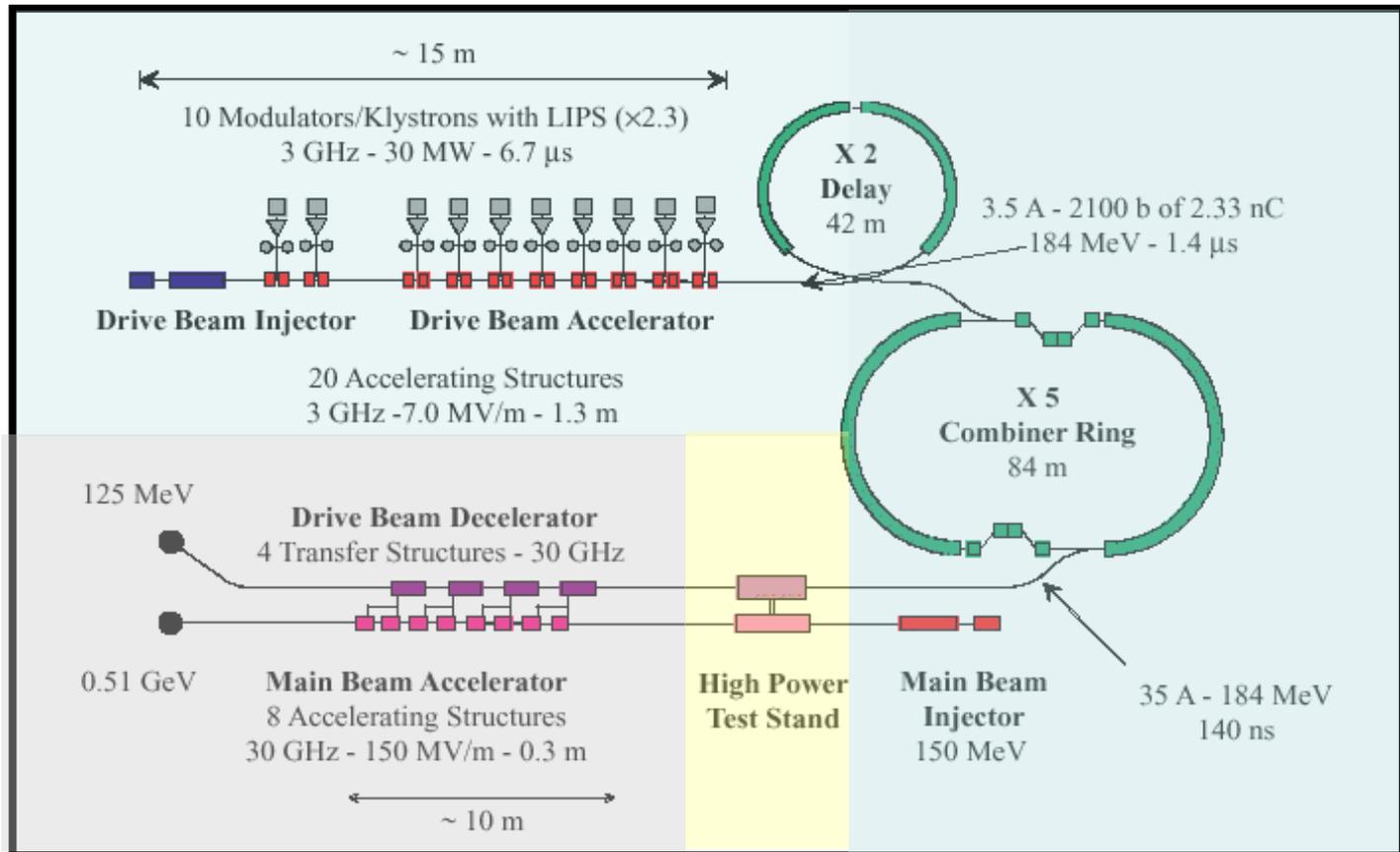


Streak camera image of beam time structure evolution



CTF 3 nominal phase

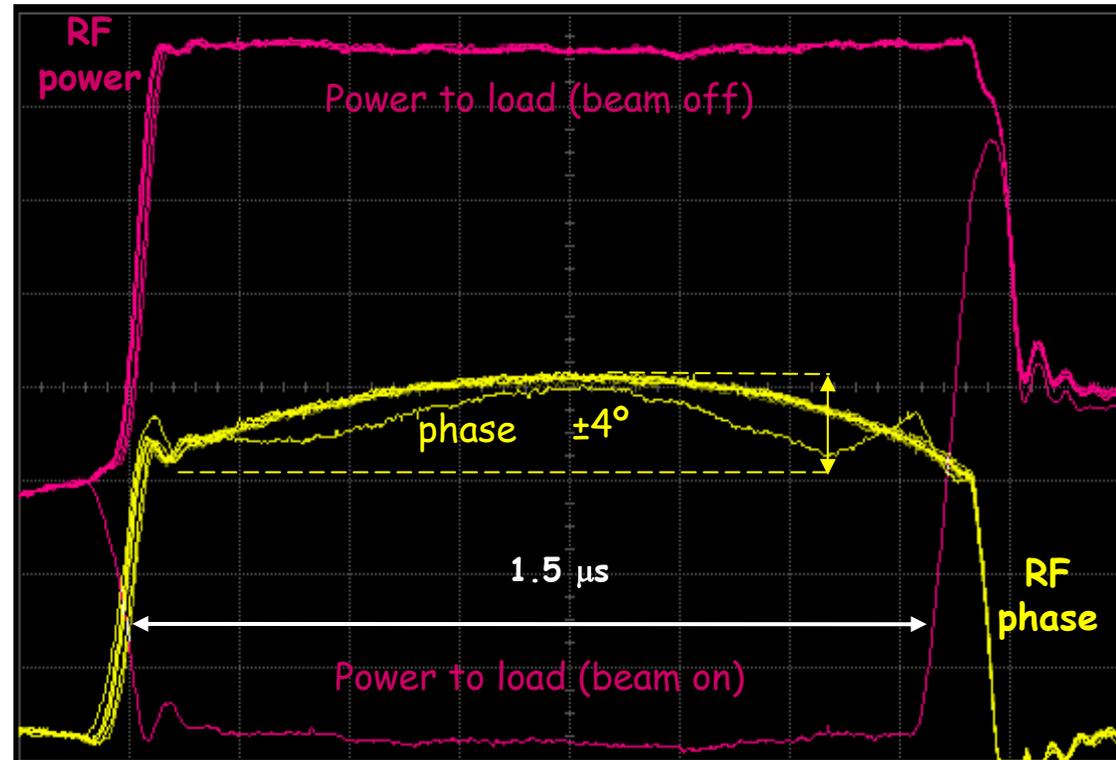
- Demonstration of CLIC drive beam generation at high current
- 30 GHz power source for CLIC cavity testing
- Test of the Drive Beam Decelerator stability
- Test bed for CLIC technology developments : diagnostic,...



Drive beam acceleration in a fully loaded accelerator

RF signals / output coupler of an accelerating cavity

Beam current	4 A
Beam pulse length	1.5 μs
Power input/structure	35 MW
Ohmic losses (beam on)	1.6 MW
RF power to load (beam on)	0.4 MW
RF-to-beam efficiency	$\sim 94\%$
Phase variation along pulse	$\pm 4^\circ$

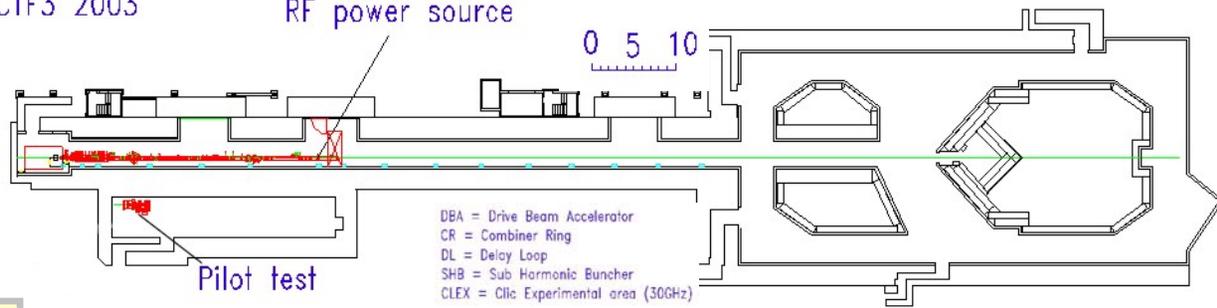


November 2003

CTF3 2003

RF power source

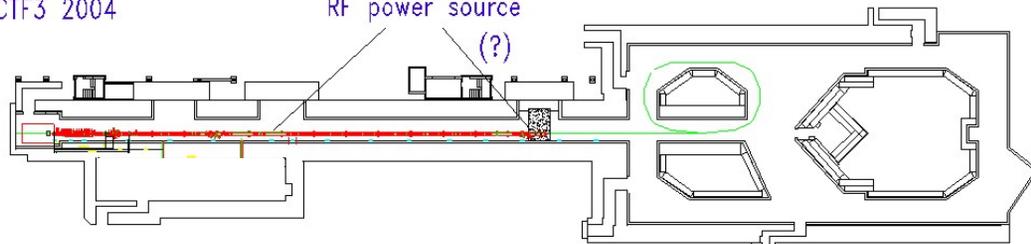
0 5 10



CTF3 2004

RF power source

(?)



CTF3 2005

DL



CTF3 2006

DL

CF



CTF3 2007

DL

CF

CLEX



* Housed in the LEP tunnel

Outlook

Similar interests for CLIC with other collider projects and 4th generation light sources

- Damping Rings, Beam Delivery System and Final Focus
- Beam Instrumentation, Feedback, Vibration and Stabilization
- Photo-injector, Bunch Compression,

CERN mandate is to do develop and provide infrastructure for leading-edge nuclear and particle physics in Europe. Therefore they cannot do substantial work on applications of our technologies beyond this mandate.

Others are of course welcome to do so !

Efficient way of accelerating and producing a high current, high frequency electron beam of moderate energy