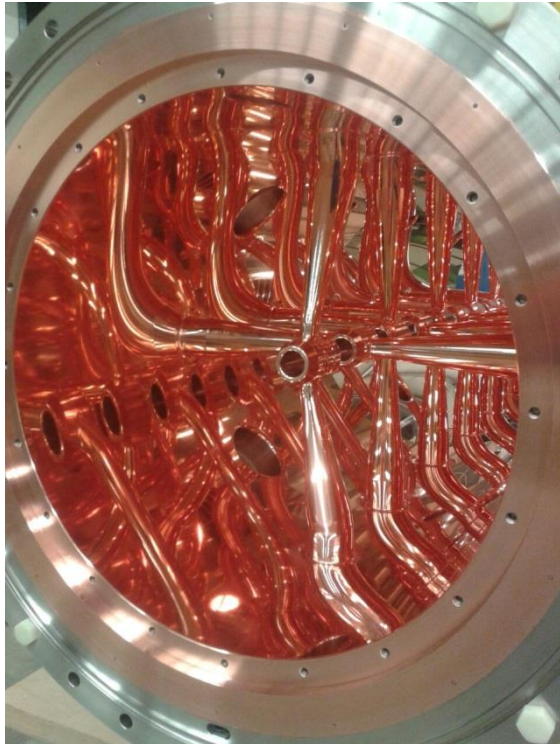


Specific Controls Requirements for pLinac

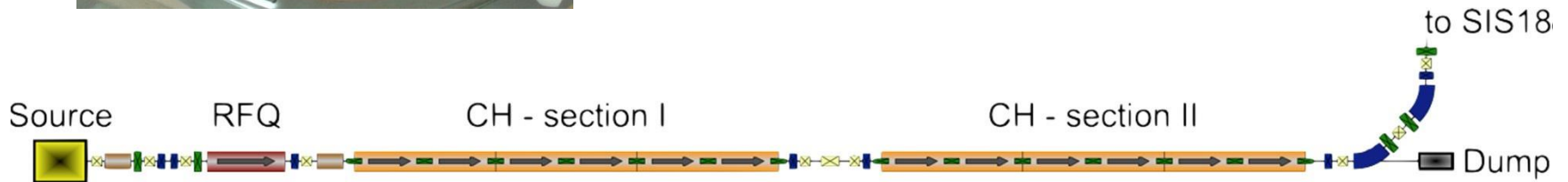
**Workshop on
*Controls Developments for FAIR Commissioning and the
Operation of the existing Accelerator Complex***

17 Sep 2020 C. Kleffner PLI

Overview



Beam Energy (MeV)	70 → 68
Design Current (mA)	70
Beam Pulse (μs)	36
Repetition Rate (Hz)	4 → 2,7
Frequency (MHz)	325.224
Beam Loading (peak) (MW)	4.9
RF Power (peak) (MW)	2.2
Klystron (3 MW Peak Power)	7
Solid State Amplifier	3
Total Length (RFQ + CH)	≈ 27 m

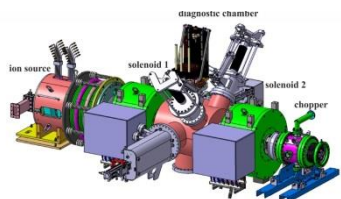


overall design

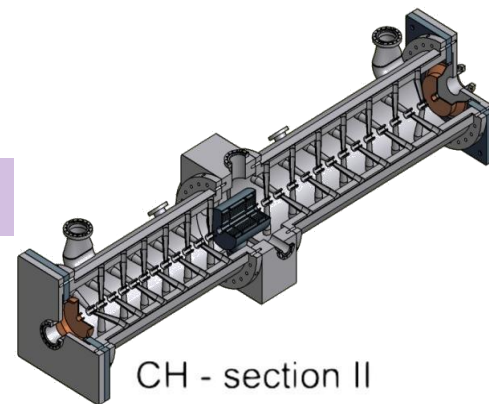


- 2.45 GHz ECR source generating 100 mA of 95 keV protons
- LEBT & diagnostics chamber:
faraday cup / allison scanner / wien filter
- ladder 4-Rod RFQ with chopper and a beam dump in front
- Six normal conducting crossbar cavities of CCH and CH type arranged in two sections with intermediate diagnostic section

CEA



IAP



Source

RFQ

CH - section I

CH - section II

to SIS18

Dump

pLinac: main devices

Control System Standard Devices

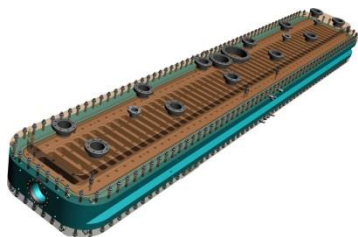
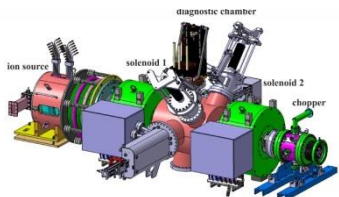
RF: 7 klystrons & modulators / 3 transistor amplifiers
 vacuum devices / pulsed power supplies / movable dev.
 GSI (FAIR) beam instrumentation devices

Non-Standard Standard Devices

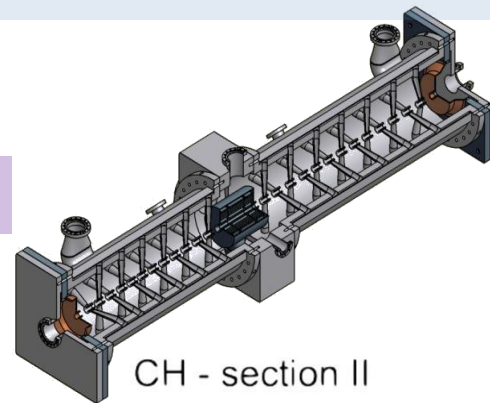
CEA Ion Source, LEBT, BI, Chopper: *Labview* → *LSA*
 mobile testbench with special BI devices during
 construction / set-up phase in the accelerator tunnel



CEA



IAP



Source

RFQ

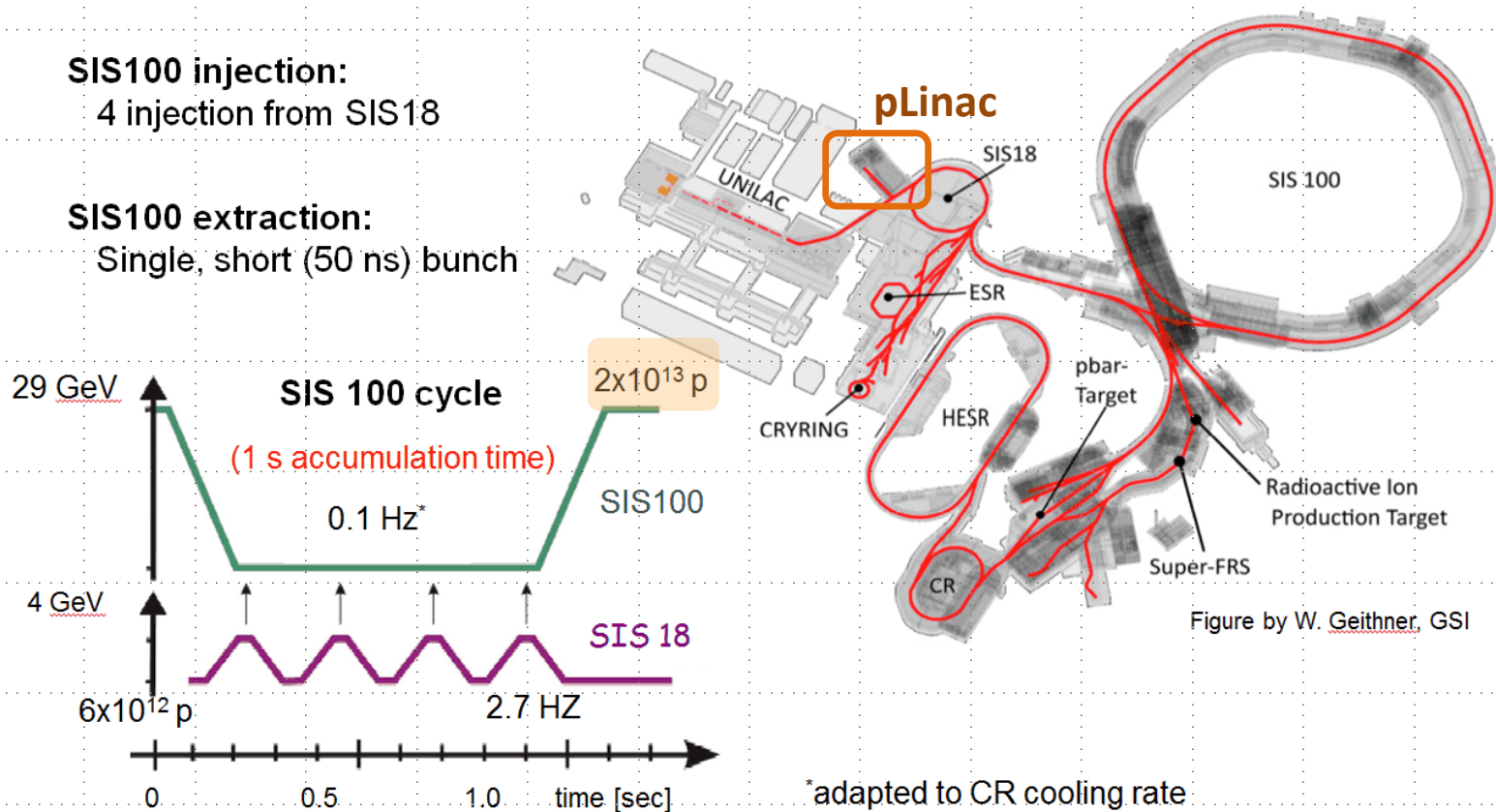
CH - section I

CH - section II

to SIS18

Dump

FAIR primary beam chain: Protons



FAIR booster operation: Protons



antiproton production chain in a periodic pattern

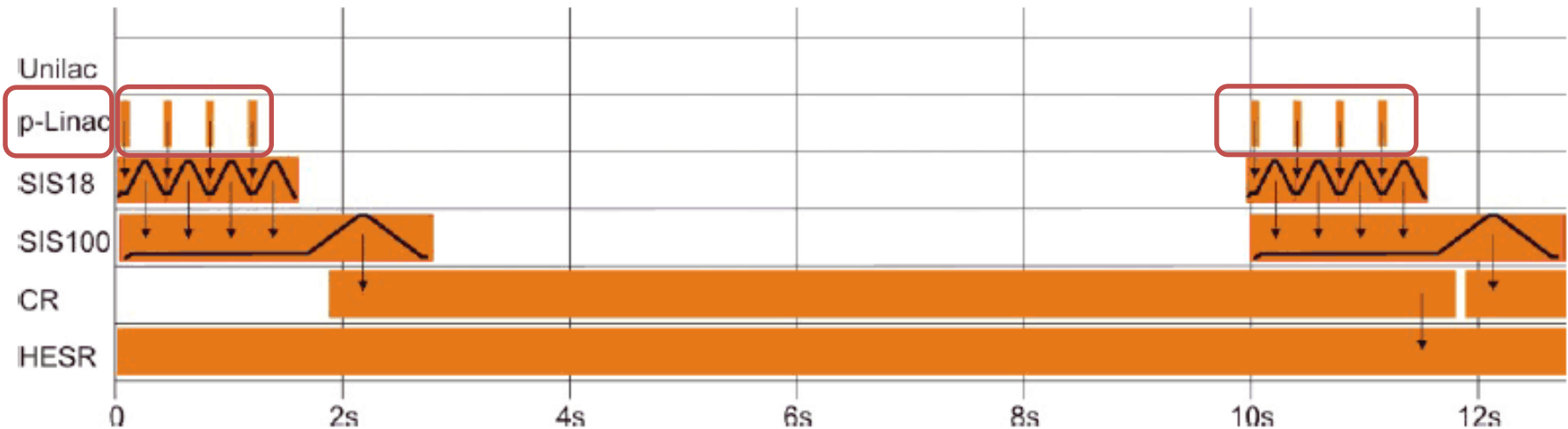
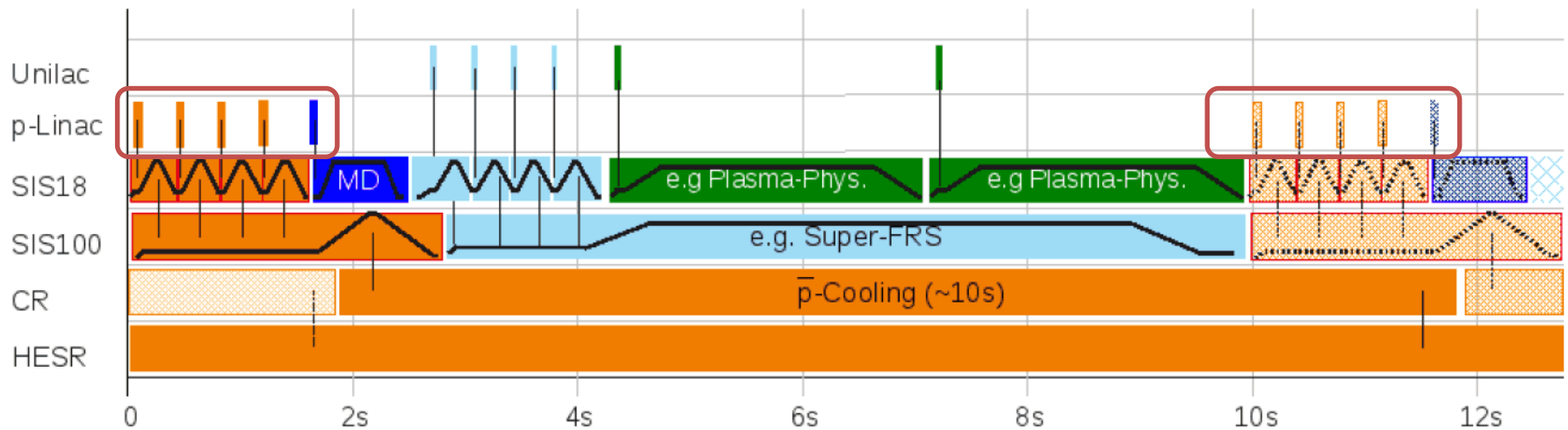


Figure 4-8: Reference Beam Production Chain "Production and Accumulation of Antiprotons"

FAIR parallel operation

*parallel operation
example pattern with periodic antiproton chain*



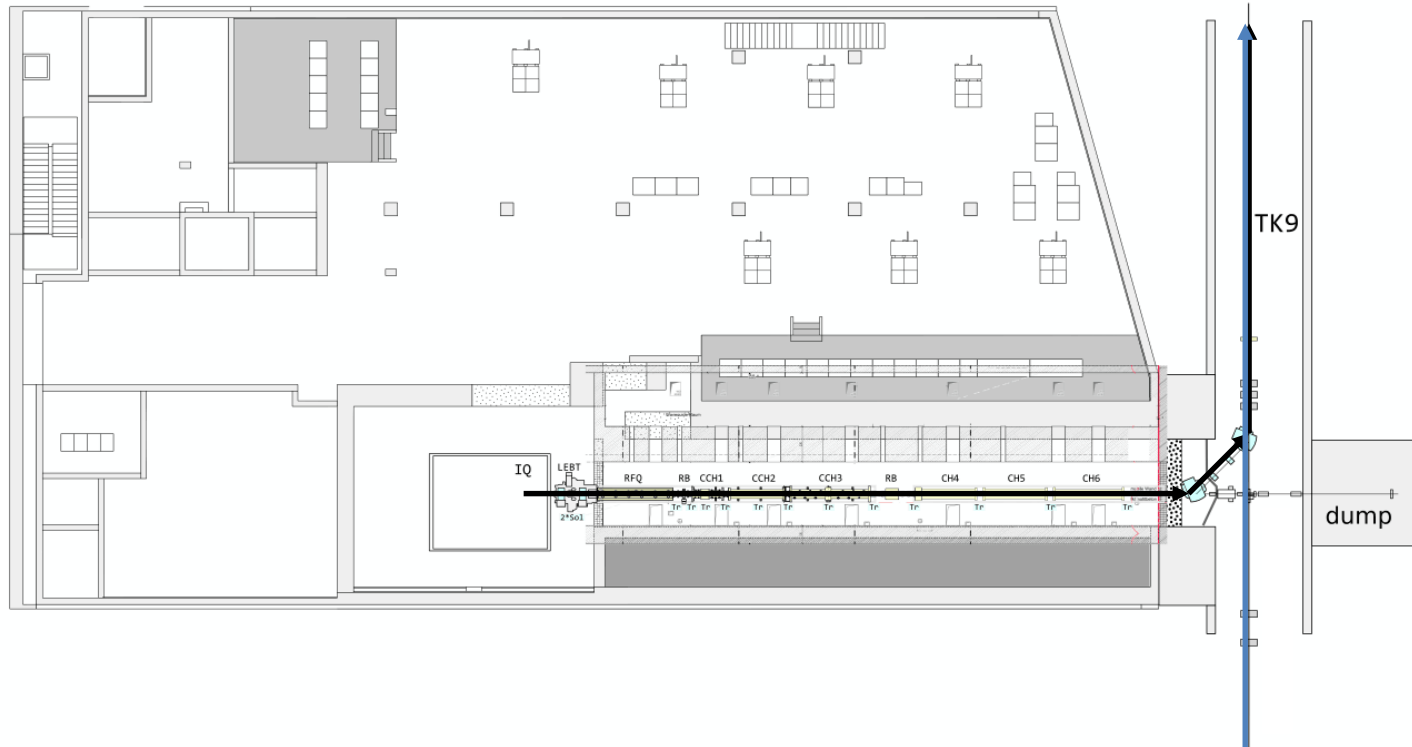
parallel operation of Unilac and pLinac the TK !

pLinac booster mode



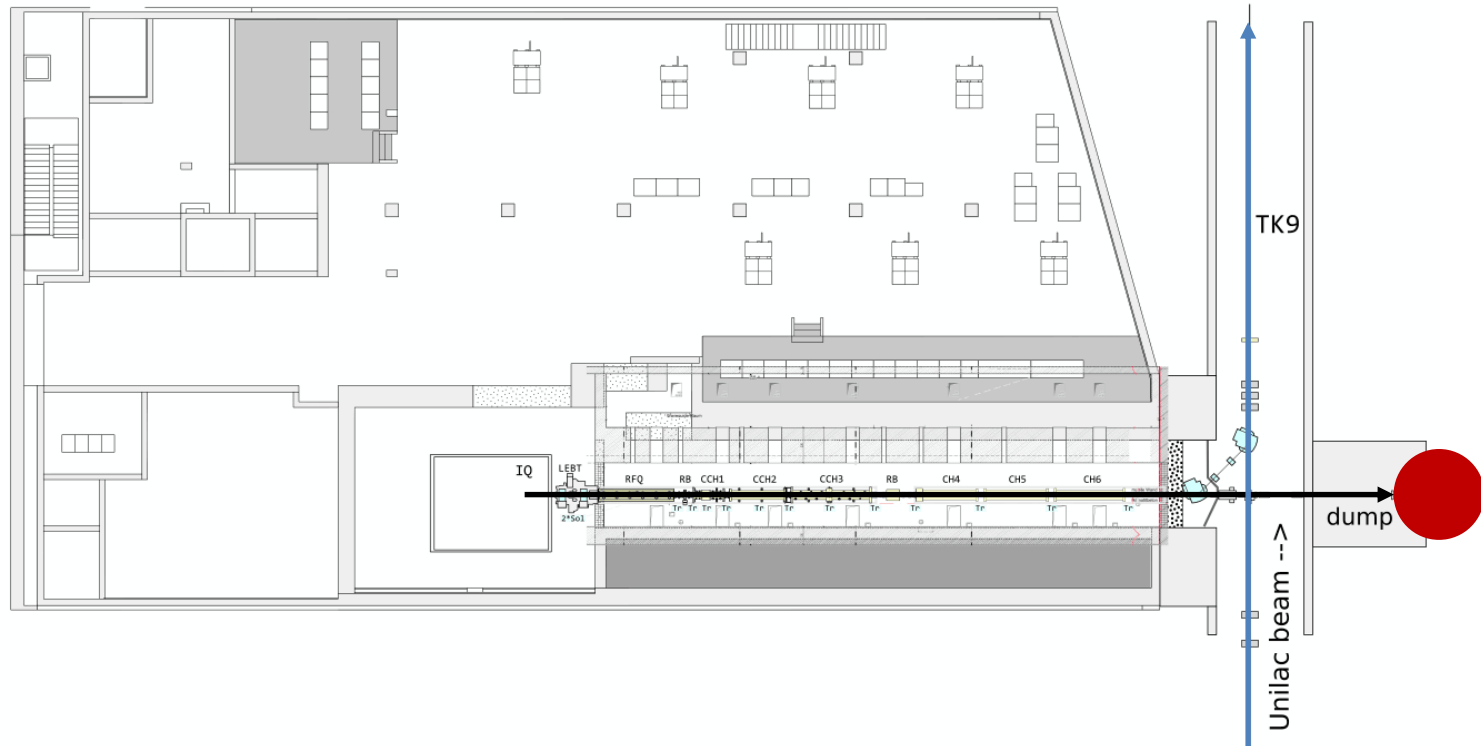
pLinac

SIS18



pLinac / Unilac parallel operation mode

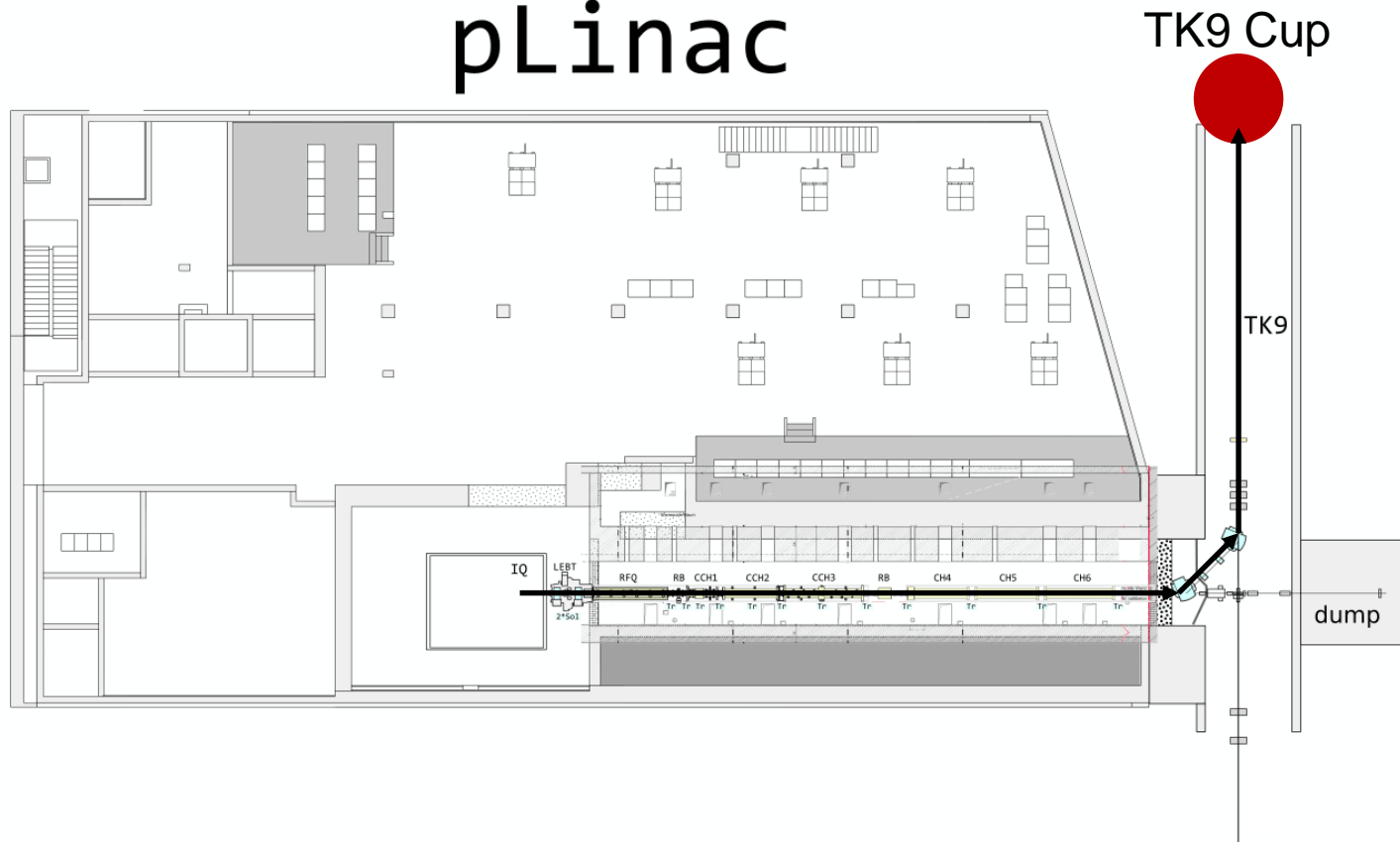
pLinac



- **periodic** operation mode (i.e. 0,5 Hz)
- *independent* to Unilac operation mode

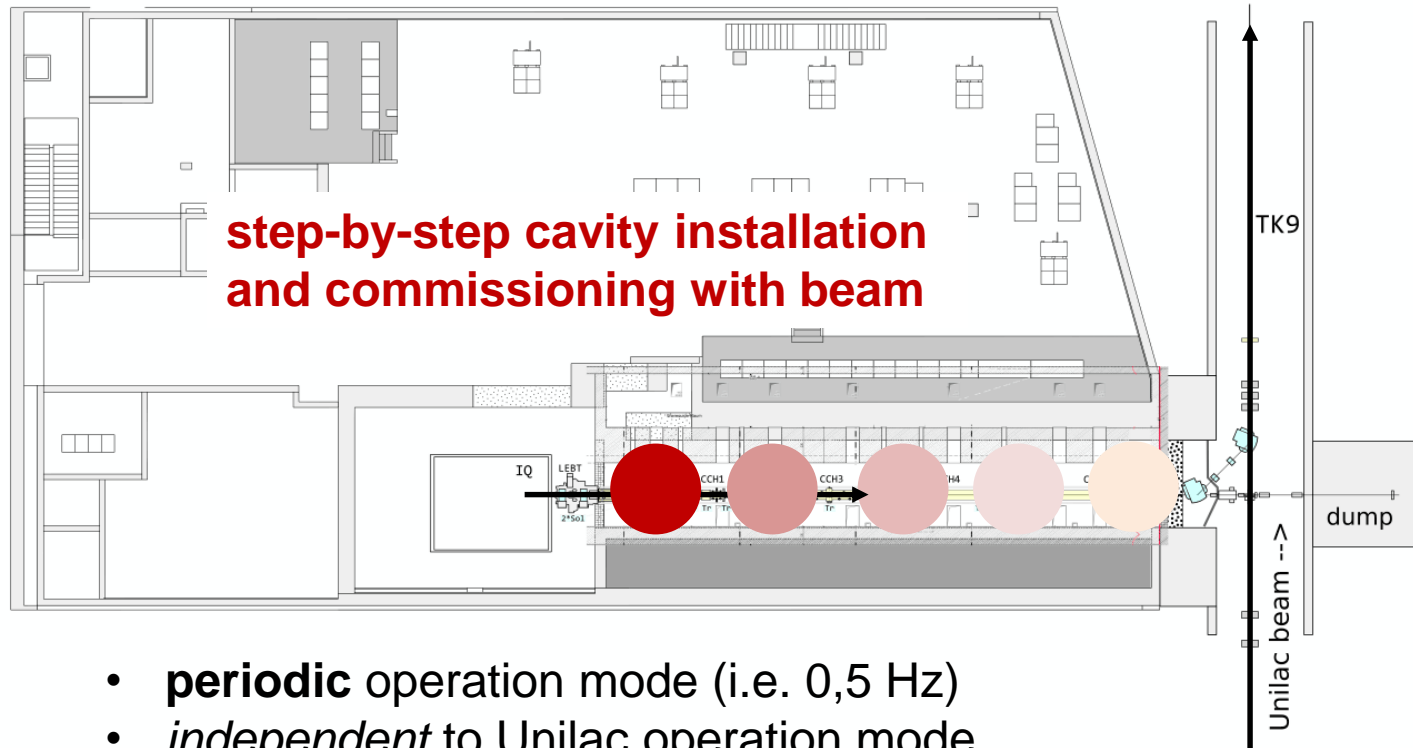
pLinac machine-test with TK

pLinac



- **periodic** operation mode (i.e. 0,5 Hz)
- **exclusive** pLinac

pLinac



- **periodic** operation mode (i.e. 0,5 Hz)
- *independent* to Unilac operation mode
- **support** of mobil testbench (spektrometer, beamshape monitor, emittance measurement
- **Start 2023** after ion source installation

pLinac demands



- **support of all devices including mobile testbench**
- **parallel / independent operation: timing / sequencer**
- **stability pulses for RF systems (2,7 Hz ?)**
- **parameter scans (orchestrated operation) of parameters should be possible**
- **(spektrometer, amplitude/phase scans,...)**
- **support for machine dependant applications?**

thank you for your attention