



# WP4-Task5: Integration

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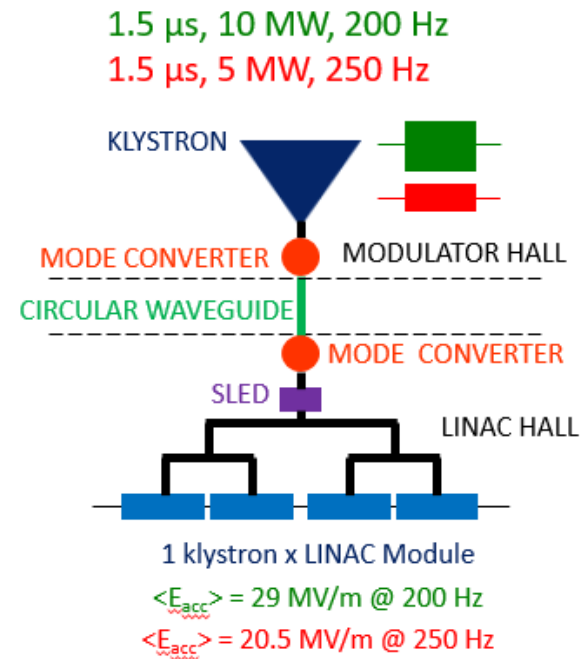
06.06.2019



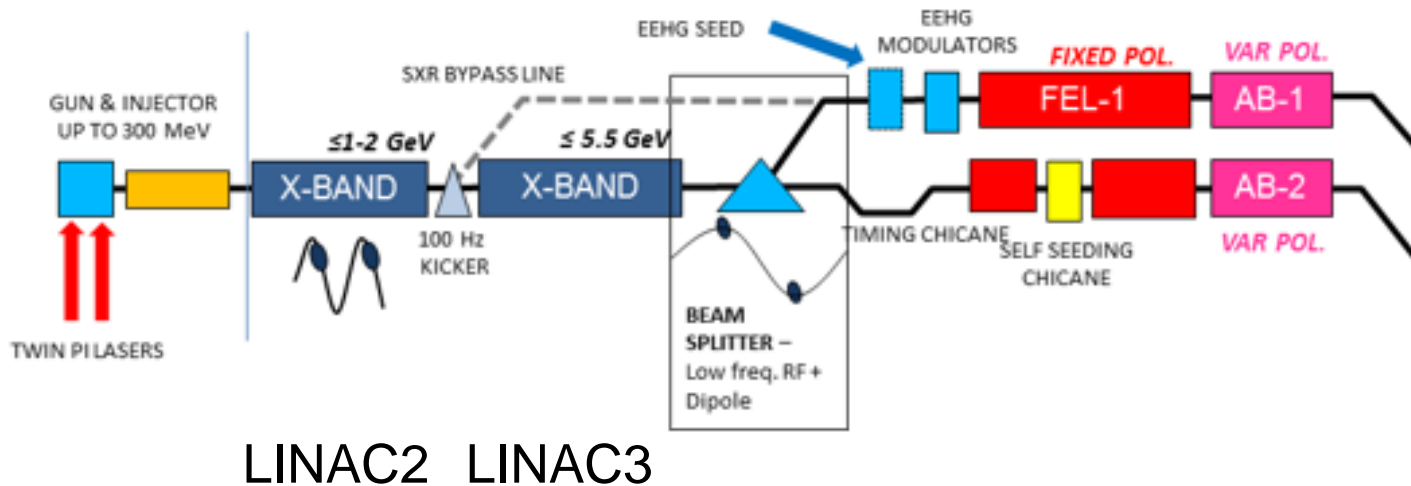
- **Dual mode – Single rf source, single linac run in two operating modes**
- Dual source – Single linac with two sources
- Dual linac – two distinct linacs with different rf sources

Comments:

- Cheapest
- Limited increase in repetition rate
- Linac optics needs to operate at two gradient



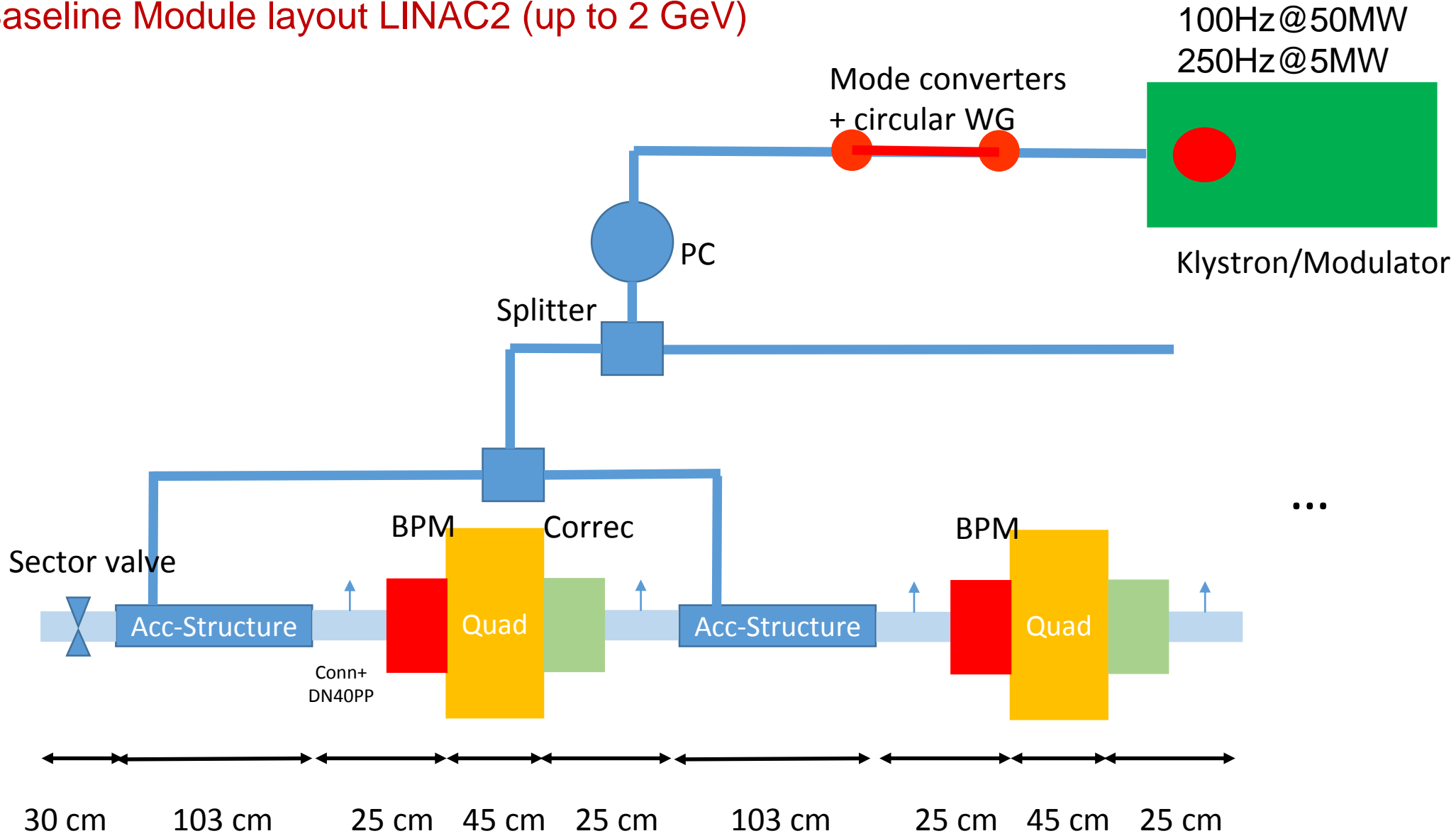
S. Gallo



LINAC2 LINAC3



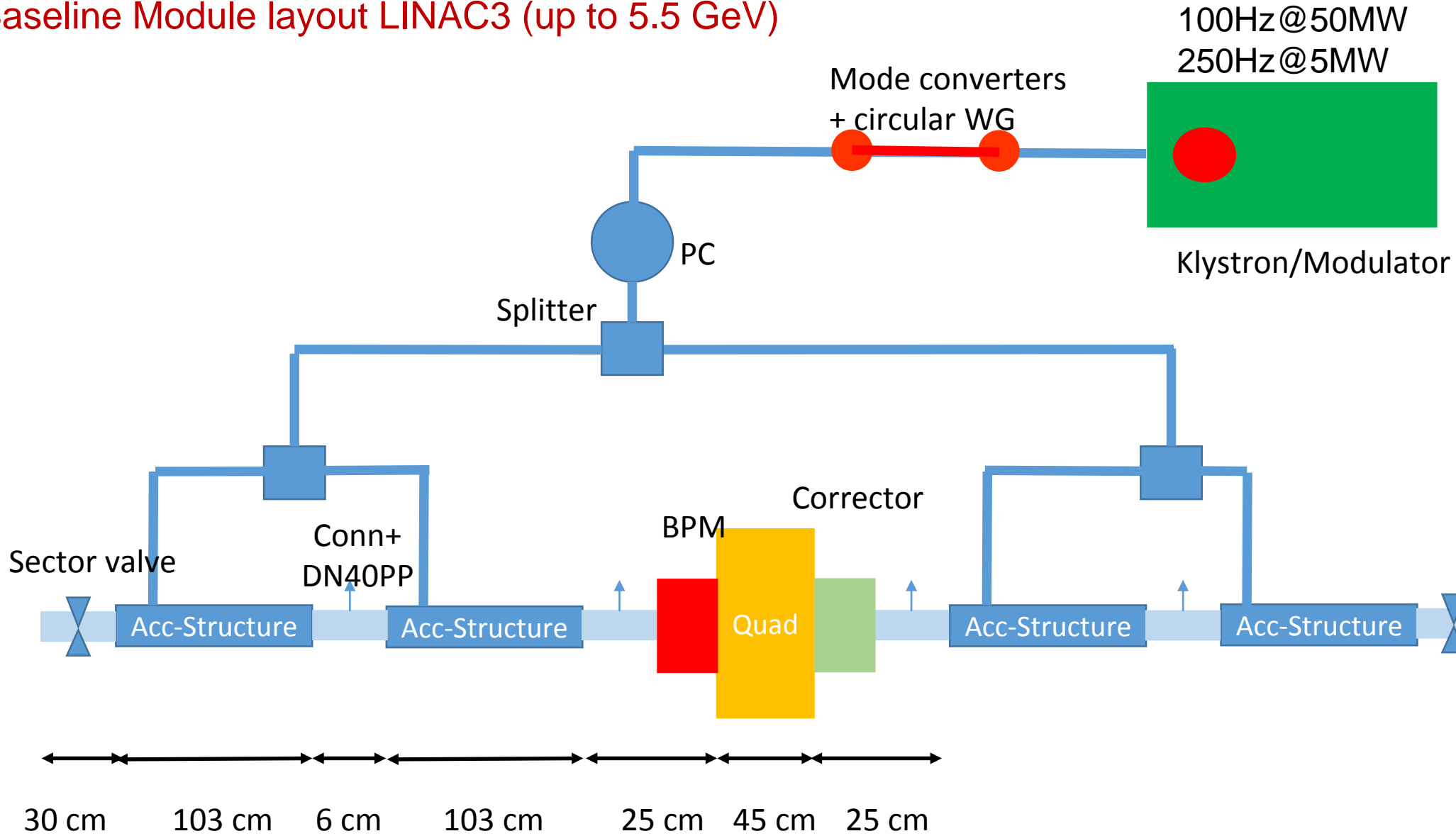
# Baseline Module layout LINAC2 (up to 2 GeV)



Module length: 8.52 m



# Baseline Module layout LINAC3 (up to 5.5 GeV)

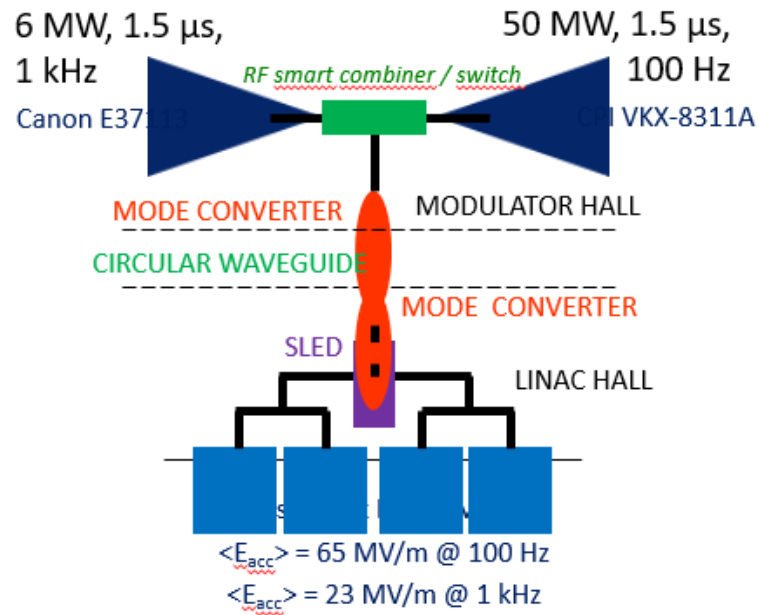


Module length: 6.74 m

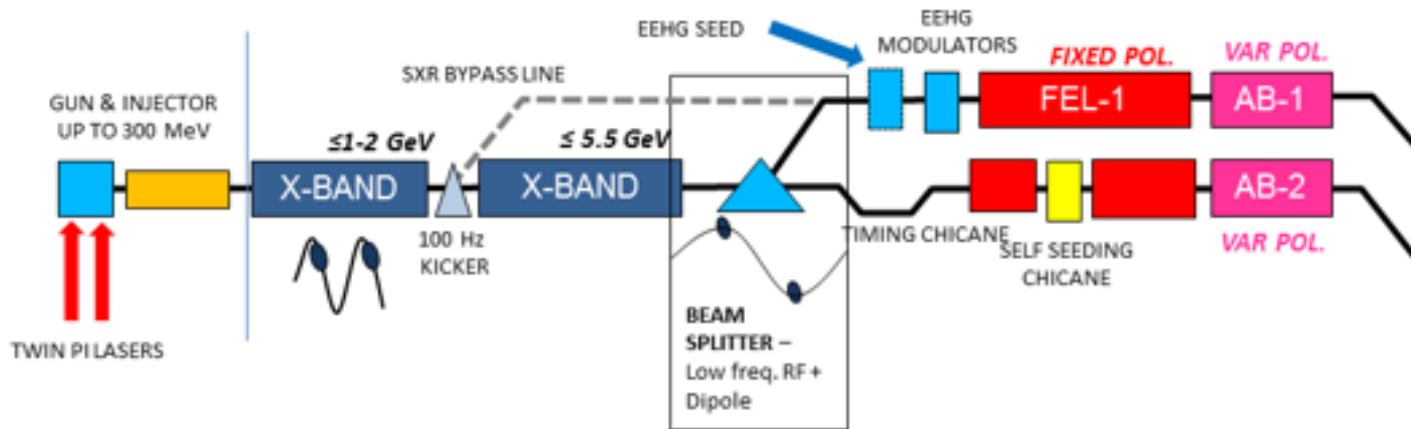
- Dual mode – Single rf source, single linac run in two operating modes
- **Dual source – Single linac with two sources**
- Dual linac – two distinct linacs with different rf sources

Comments:

- More expensive
- Full repetition rate
- Linac optics needs to operate at two gradient



S. Gallo



LINAC2 LINAC3

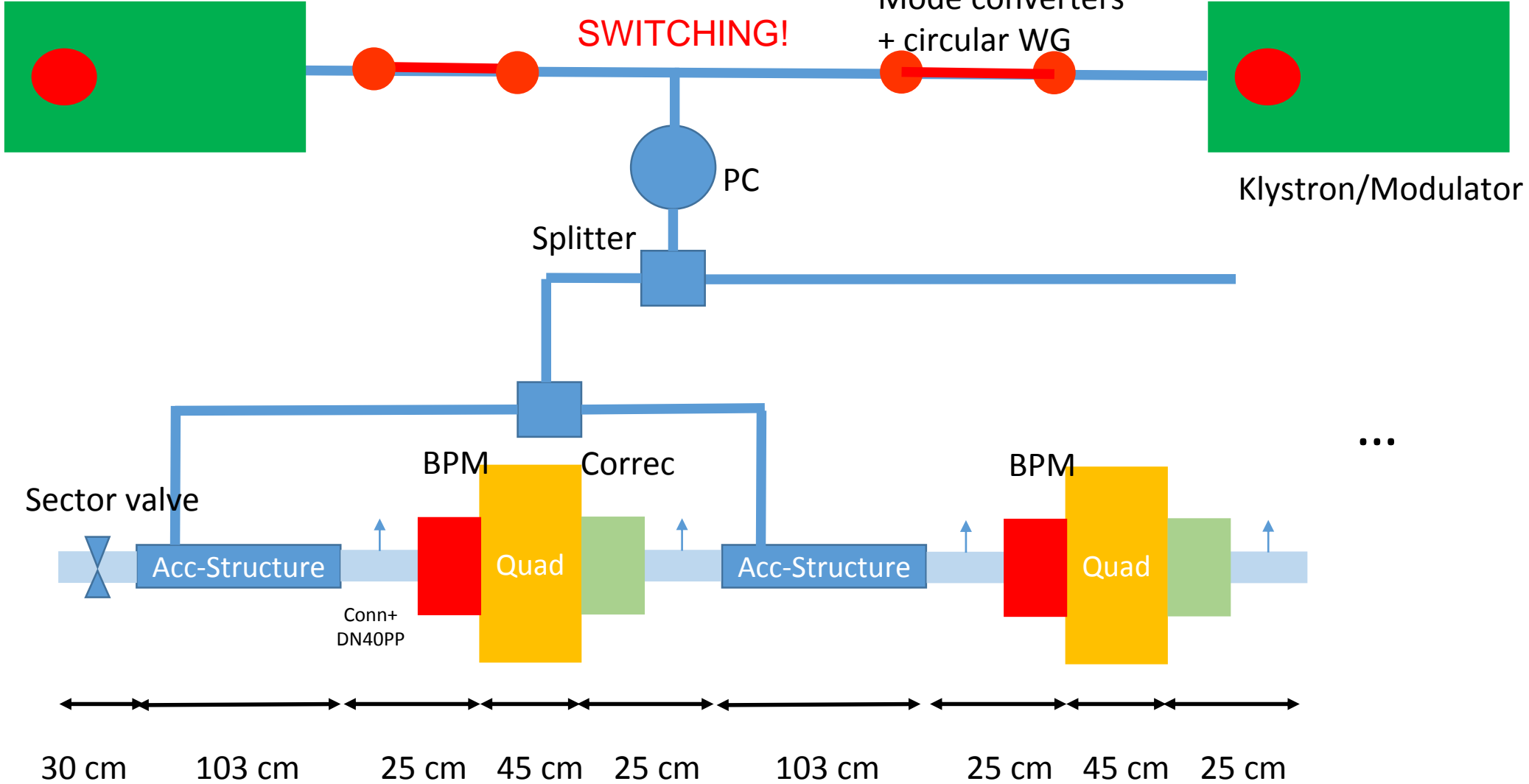


# Baseline Module layout LINAC2 (up to 2 GeV)

1kHz@6MW

Mode converters + circular WG

100Hz@50MW

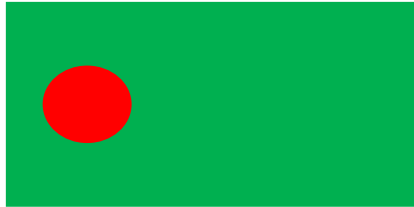


Module length: 8.52 m

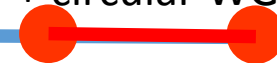


# Baseline Module layout LINAC3 (up to 5.5 GeV)

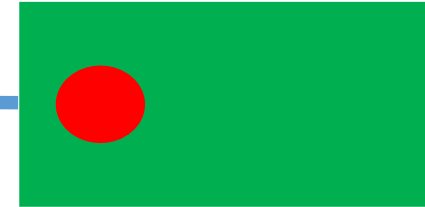
1kHz@6MW



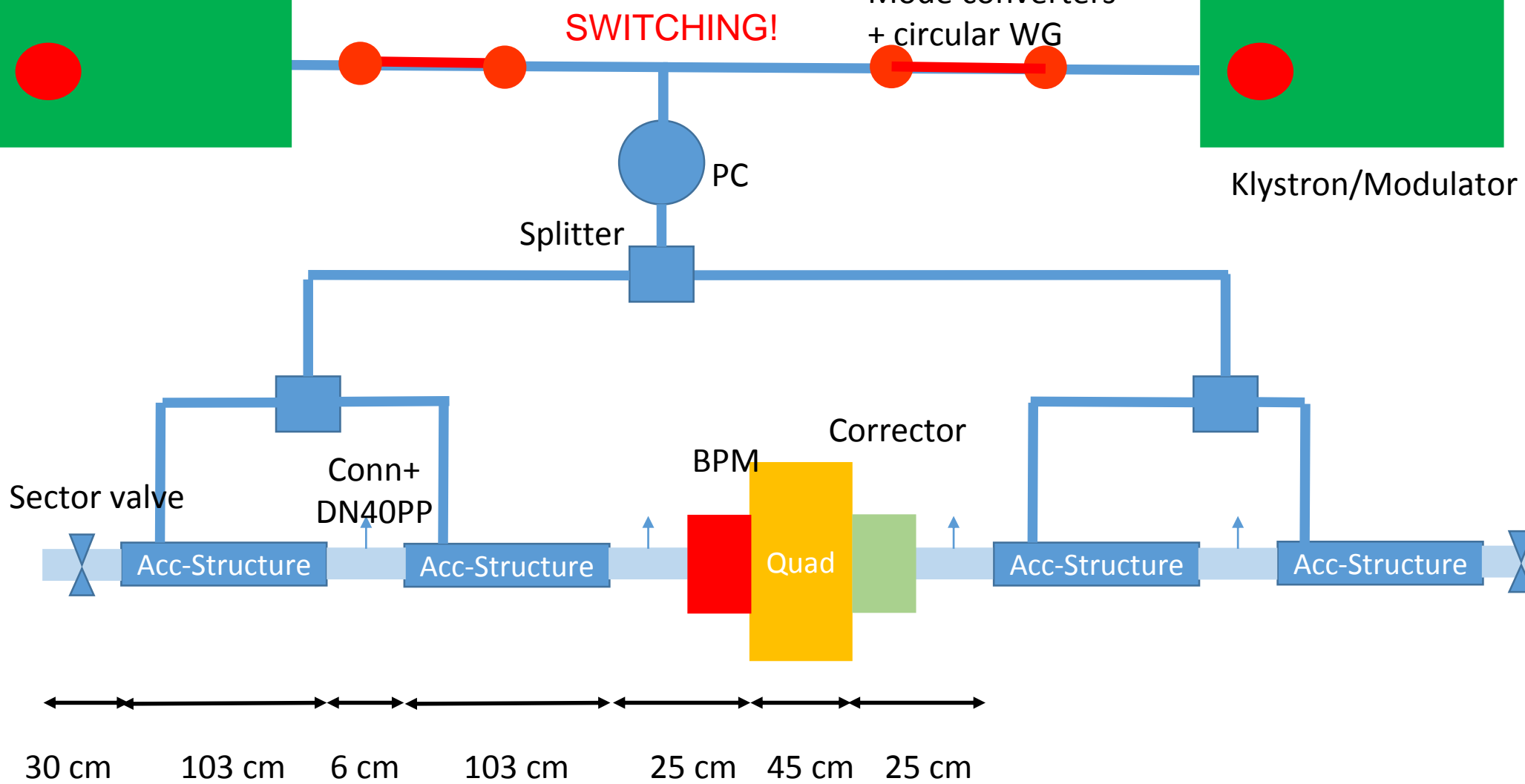
Mode converters + circular WG



100Hz@50MW

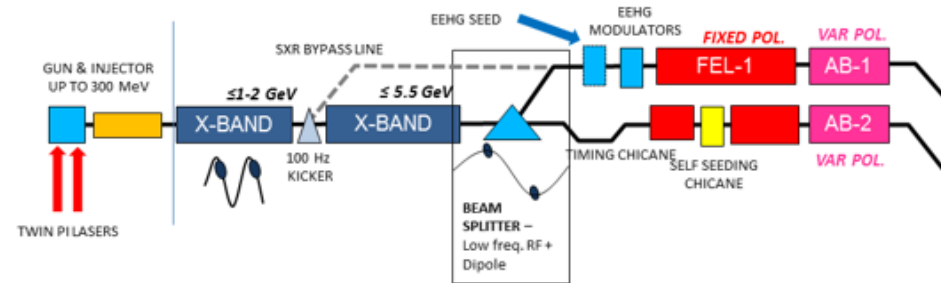


Klystron/Modulator



Module length: 6.74 m

- Dual mode – Single rf source, single linac run in two operating modes
- Dual source – Single linac with two sources
- **Dual linac – two distinct linacs with different rf sources**



## LINAC2 LINAC3

### Comments:

- Luxury version
- Sequence - 9 low energy pulses, 1 high energy pulse, 9 low energy pulses, etc. at a pulse repetition rate of 1 kHz
- Two distinct linac rf systems and modules – high rep rate linac not designed yet
- Longer due to reduced gradient in first module

J. Clarke, N. Thompson

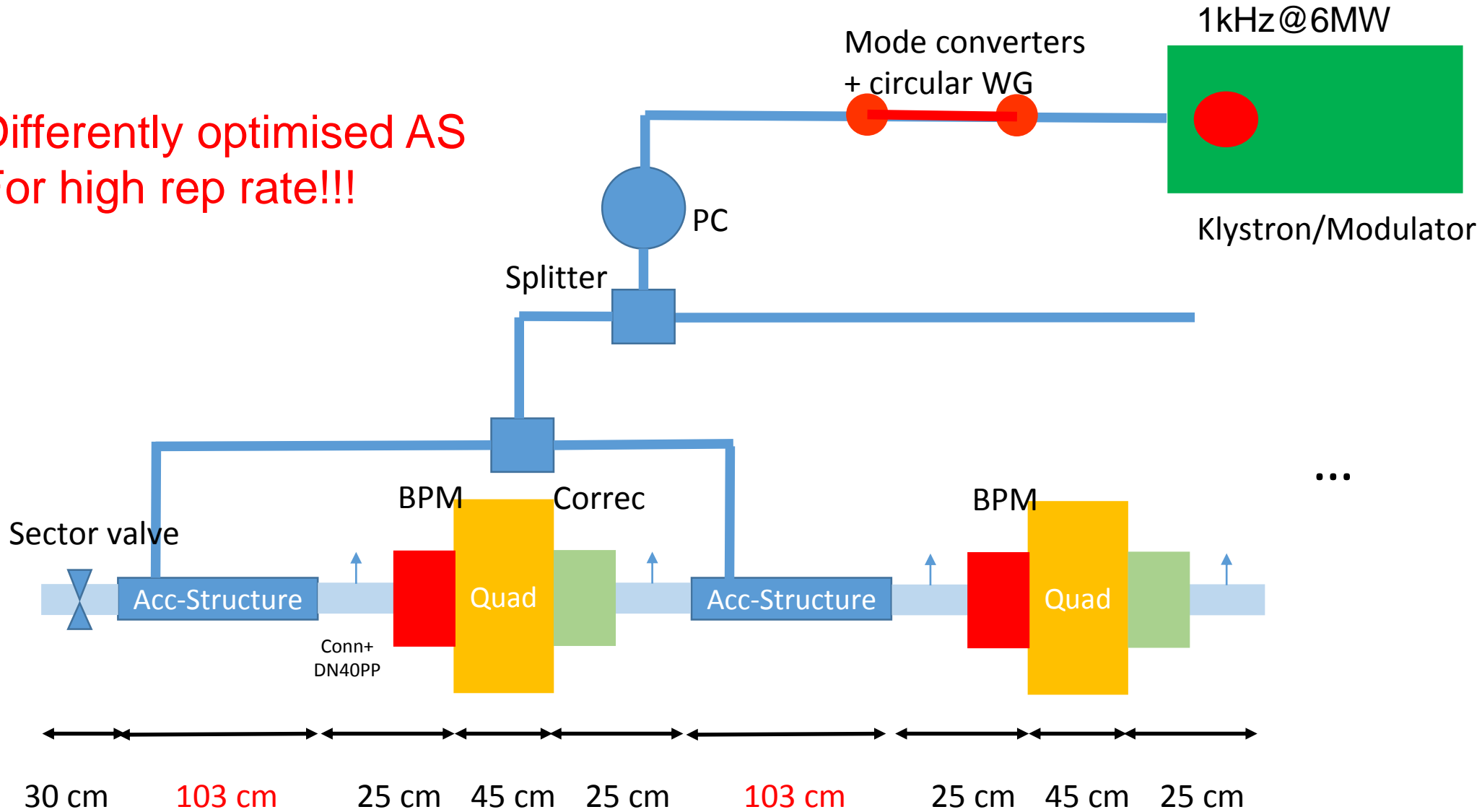
Here we use LINAC2 as the high repetition source and LINAC3 as a booster at low repetition rate





# Baseline Module layout LINAC2 (up to 2 GeV)

Differently optimised AS  
For high rep rate!!!

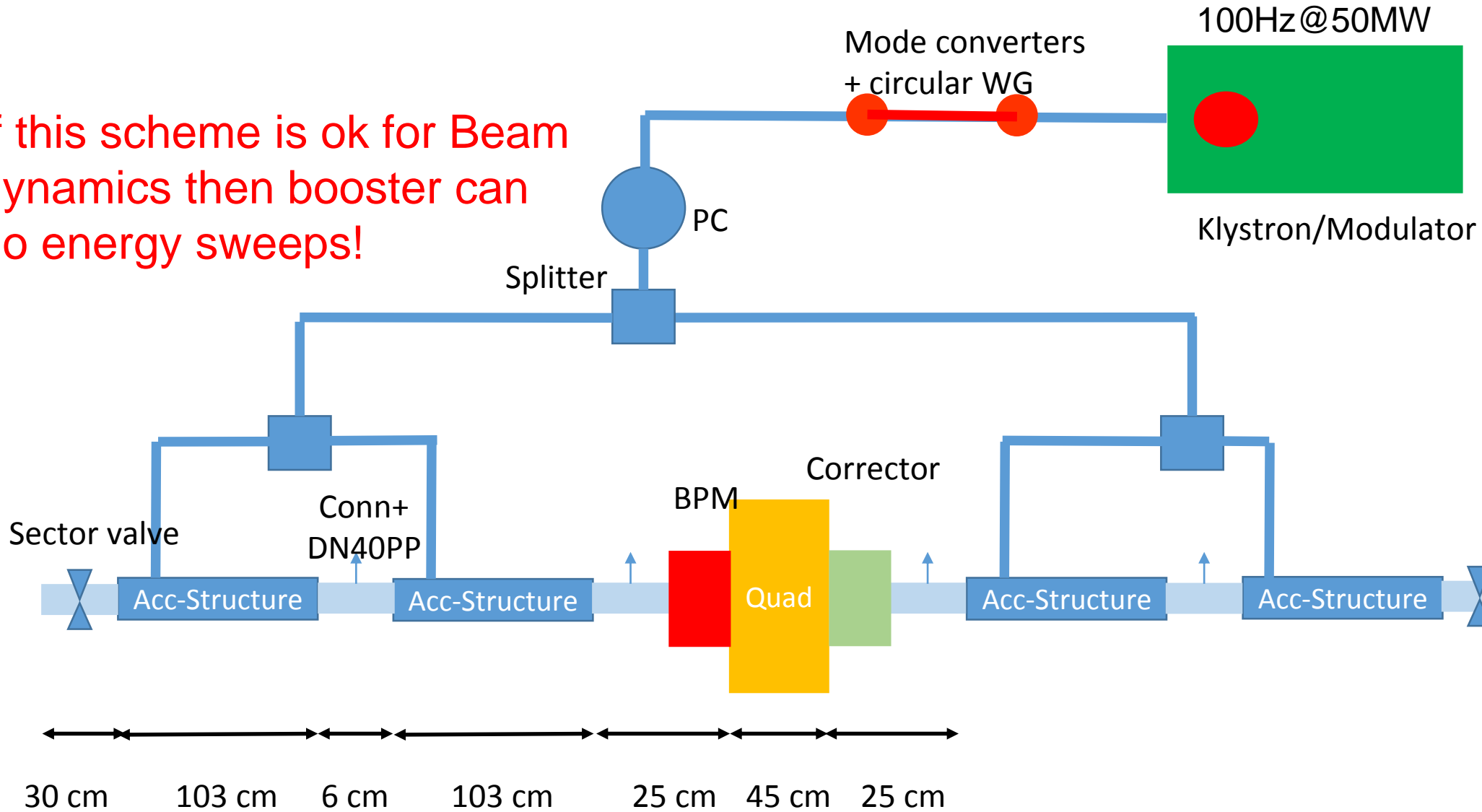


Module length: 8.52 m



# Baseline Module layout LINAC3 (up to 5.5 GeV)

If this scheme is ok for Beam dynamics then booster can do energy sweeps!



Module length: 6.74 m



## Dimension parameter list of components LINAC2

Element	active length in m	mechanical length (approx.) in m
Accelerating structure	0.90	1.03
AS-Quad connection (including corrector + PP-DN40)	0.25	0.25
Quad	0.23	0.45
Quad-AS connection (including BPM + PP-DN40)	0.25	0.25
Vacuum sector valves ?	0.30	0.30
Module length (4 times sum)		8.52

### Correctors vs Active Quads?



## Dimension parameter list of components LINAC3

Element	active length in m	mechanical length (approx.) in m
Accelerating structure	0.90	1.03
AS-AS-connection (including pumping port DN40)	0.06	0.06
Accelerating structure	0.90	1.03
AS-Quad connection (including corrector + PP-DN40)	0.25	0.25
Quad	0.23	0.45
Quad-AS connection (including BPM + PP-DN40)	0.25	0.25
Vacuum sector valves ?	0.30	0.30
Module length (2 times sum)		6.74
Should be considered:		
Quad-correctors or movers?		
how many WFM per structure?		
Vacuum sector valves (two per module?)		

### Correctors vs Active Quads?



# Systems

	Responsible
Accelerating structures	INFN-LNF
RF distribution	INFN-LNF
Pulse compressor	INFN-LNF
RF loads	INFN-LNF
Klystron/modulator	Uppsala
Magnets	HIP
Beam instrumentation	HIP
Vacuum	HIP
Alignment	HIP
Supports (girder + AS interface)	HIP
Power	HIP
Ventilation	HIP
Cooling	HIP
Radiation	HIP
Controls	HIP
Machine protection	HIP
Cost&Schedule	CERN

**Feedback? Overlap with anyone?**



# Performance parameters table of components

Element	Alignment tolerance lateral in um	Alignment resolution in um	Alignment tolerance longitudinal	Alignment resolution in um	active?
Alignment tolerances:					
Accelerating structures	100	10	1%RF	10	no
BPM	100	10	---	---	no
Quad	100	10	---	---	yes?
Correctors	100	10	---	---	attached to Quad
Other requirements to be considered for each component:					
Vacuum requirements					
Temperature stability					
Cooling water supply					
Mecahnical Stability					
Radiation					
Other Integration aspects:					
C&V					
Tunnel cross section					
other infrastructure					

**Feedback?**



## Summary

- More feedback needed on system requirements/performance of main systems
- Started work on not covered systems for accelerator
- Need for closer work with beam dynamics group



# Thank you!

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