



# ELENA KICKERS AND SEPTA

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TE/ABT



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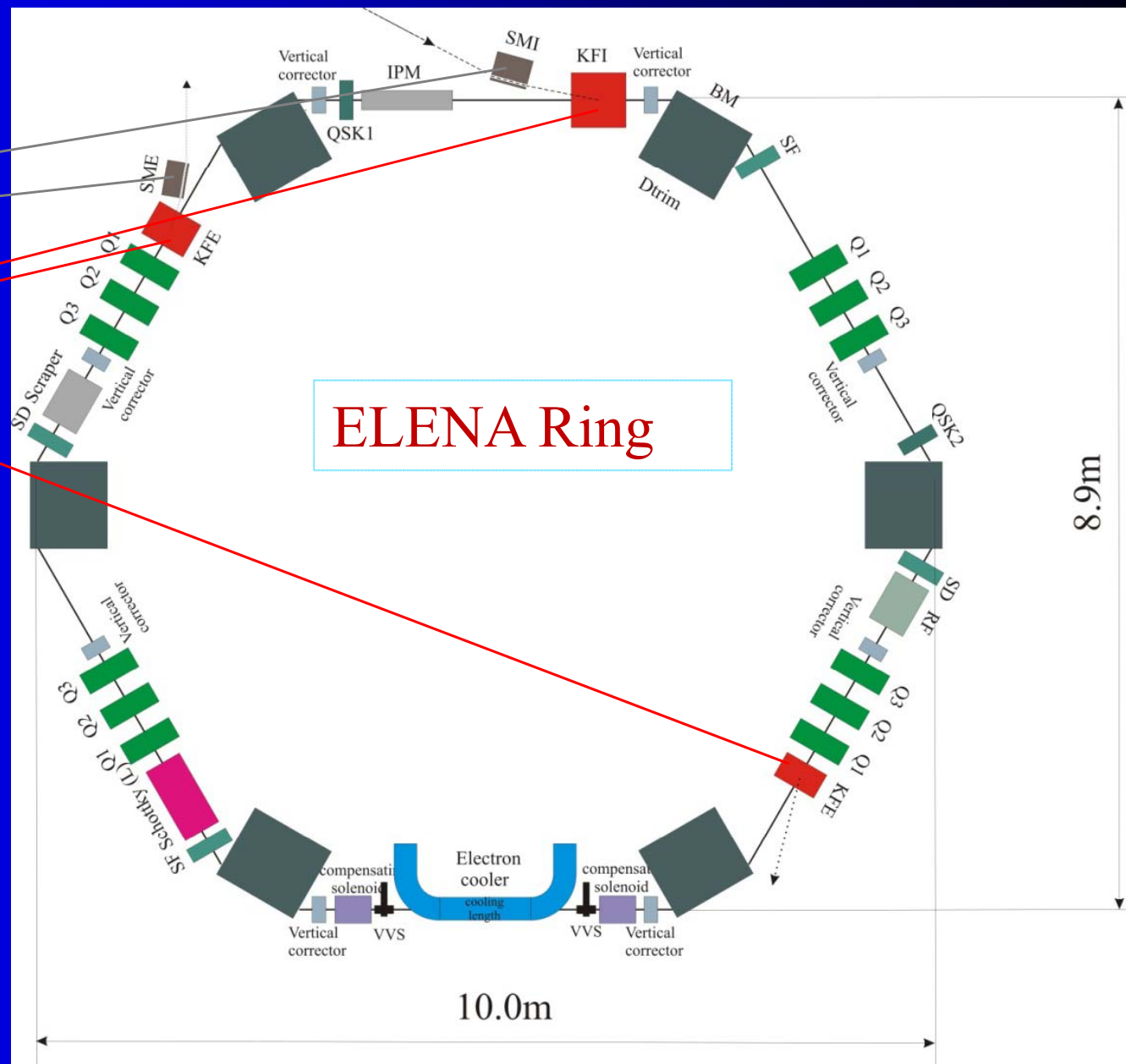
# TE/ABT equipment

ELENA (new)

- 2 septa
- 2 (+1 foreseen) kickers

AD (existing)

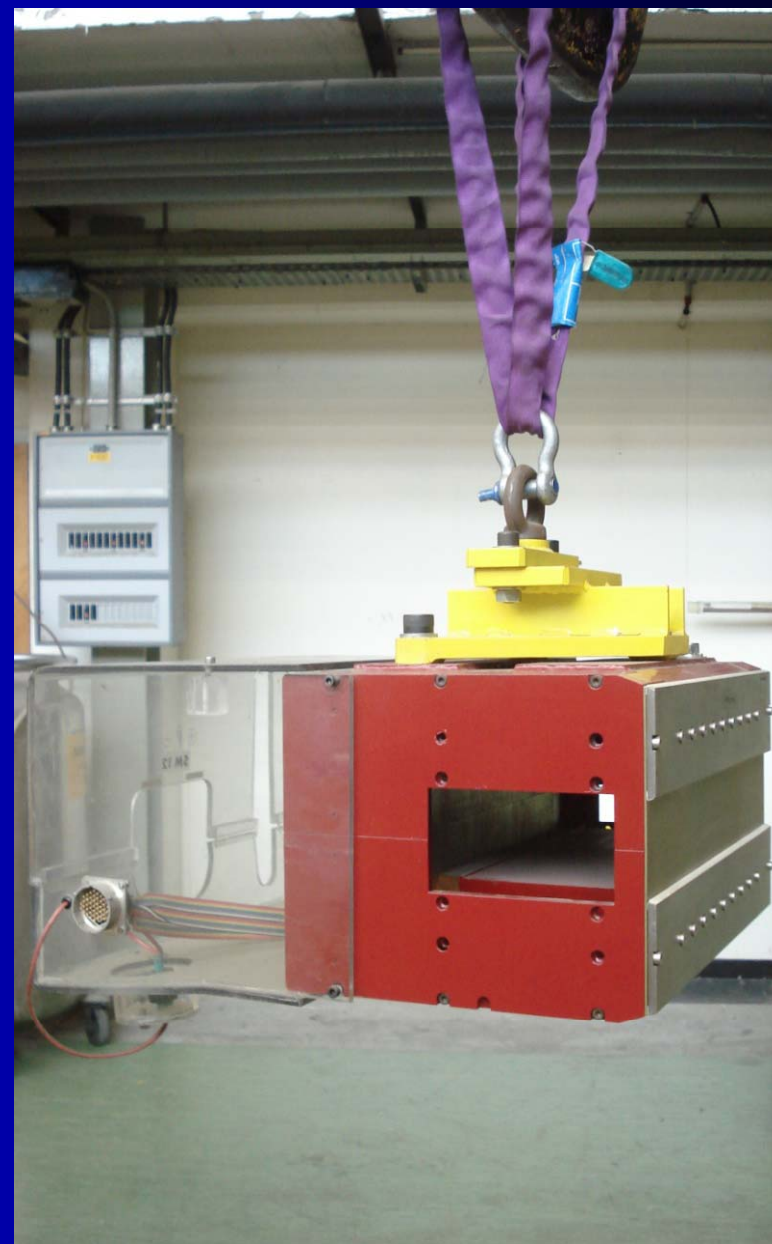
- 8 kicker systems
- 2 septa



# Septa

What's already available?

SM12		
# magnets	2	
# spare coils	0	
Gap width	134	mm
Gap height	74	mm
Septum thickness	22.8	mm
$L_{\text{physical}}$	400	mm
$L_{\text{eq}}$	300	mm
$B_0$	679	mT
$\int B \cdot dl_{\text{max}}$	204	mT.m
$I_{\text{max}}$ (DC)	2000	A



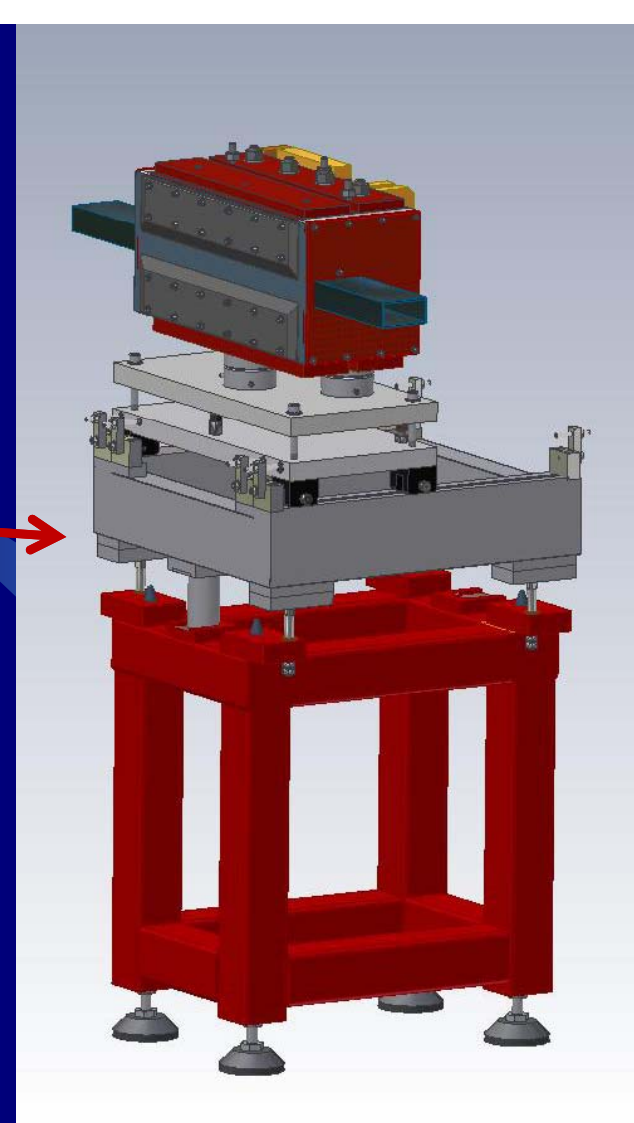
# Septa

## What's needed?

- Mechanical support
- Water cooling manifold gauges, flow meters, filters and valves
- Magnet protection interlock system

## What's needed, but not included?

- Vacuum chambers (TE/VSC?)
- Power supplies (TE/EPC?)







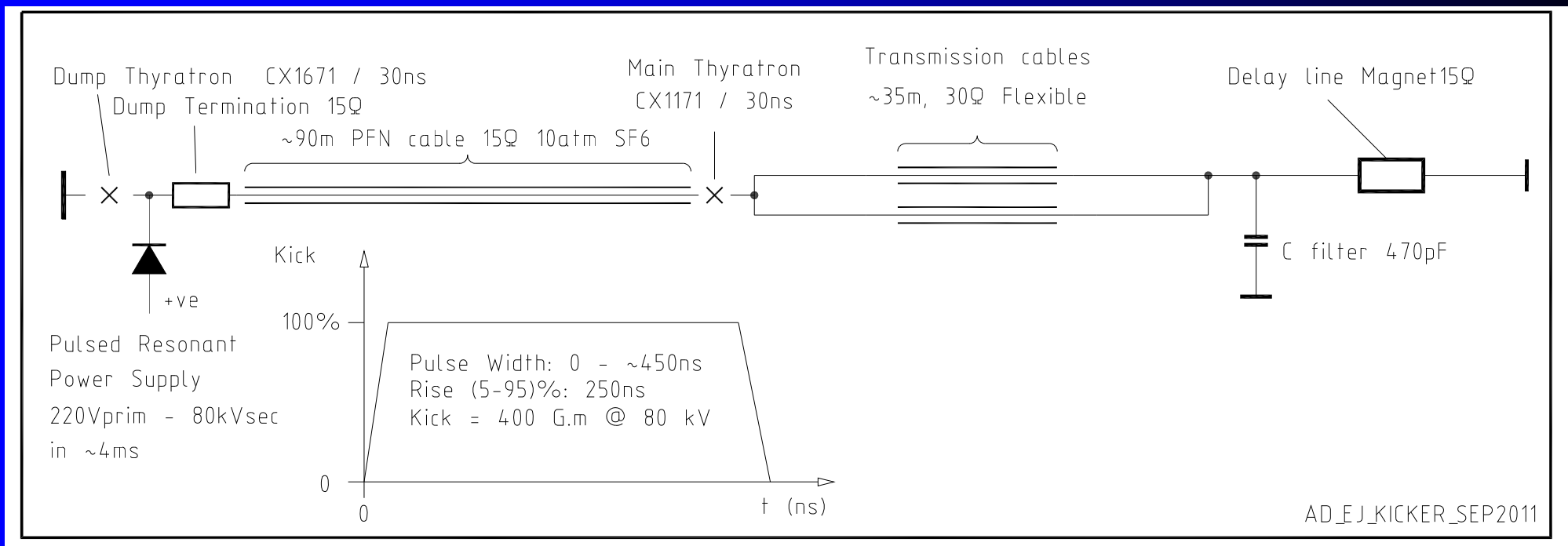
# Septa

Resource requirements and what can collaborations contribute to?

Magnetic septa	Total resource needs	
Mechanics, hydraulics	45	kCHF
Interlock system, PLC's	30	kCHF
<b>Total for both magnetic septa</b>	<b>75</b>	<b>kCHF</b>

Manpower estimate	CERN ABT staff	Collaboration contribution	Total resource estimate	
Scientific staff	0.1		0.1	m.y
Technicians	0.1	0.2	0.3	m.y
Controls technician	0.1	0.2	0.3	m.y
Mechanics	0	0.3	0.3	m.y
<b>Total manpower</b>	<b>0.3</b>	<b>0.7</b>	<b>1.0</b>	<b>m.y</b>

# Kickers



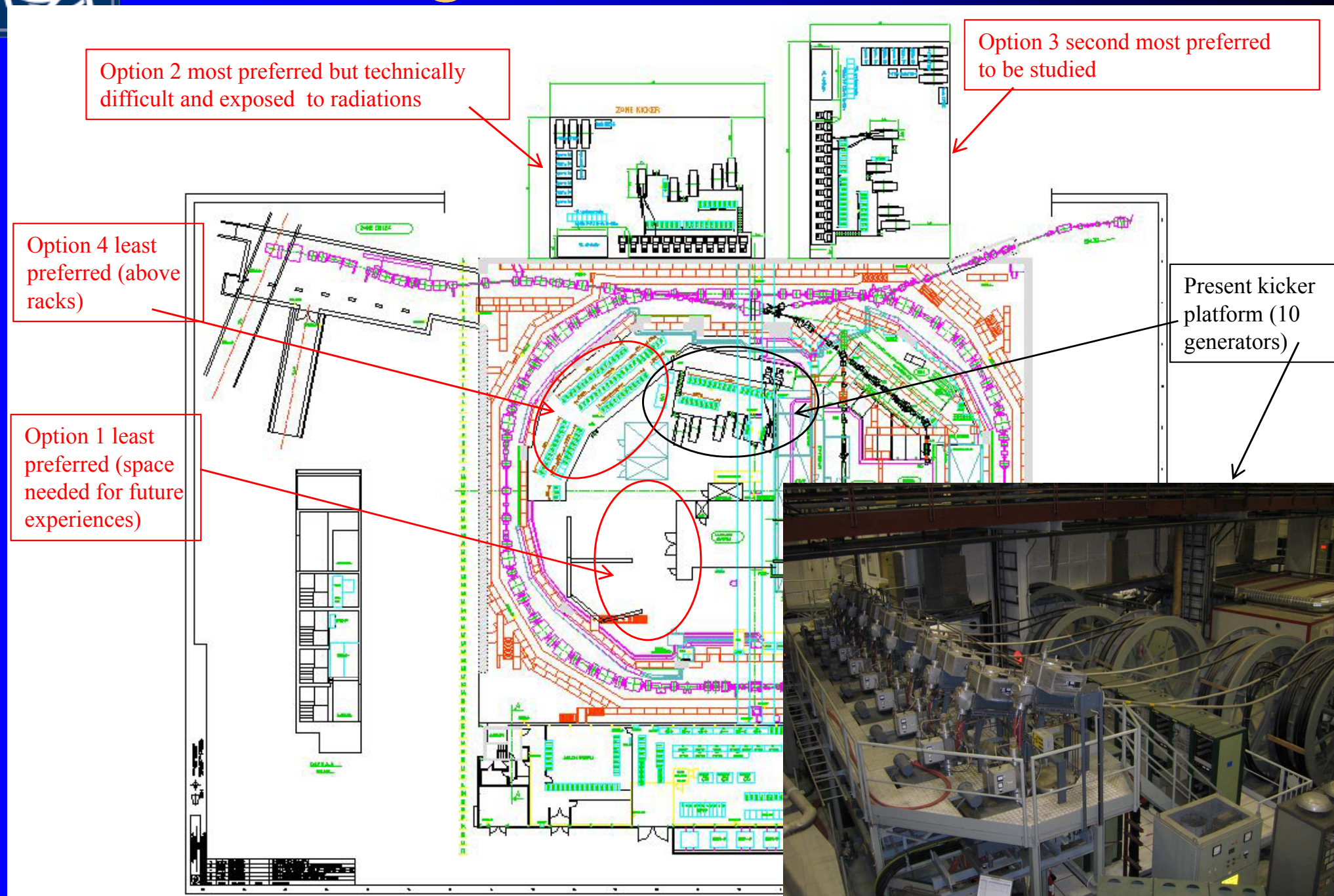
## ELENA and AD kicker system layout

- Features:
- SF<sub>6</sub> Gas filled Pulse Forming Line
  - PFL voltage up to 80 kV
  - Thyatron switches
  - use of oil for cooling and insulation

10 systems: 2 for ELENA and 8 for AD (+space for 2 new spares for future needs like second Elena extraction line)



# Kicker generators relocation





# Kicker magnets and tanks

Basic assumption: use of existing unused AC ejection or AA injection magnet modules (to be confirmed by P. Belochitskii)

- 3D models of magnets to be made with Catia software.
- Two new magnet frames made of stainless steel to be manufactured for 300 °C bake-out.(ex AC magnets only)
- Magnets to be dismounted and reassembled with new frame. (ex AC magnets only)
- Two (identical ?) 300 °C bake-able vacuum tanks and ancillaries to be designed, manufactured, equipped and tested.





# Kicker magnets and tanks

Resource requirements and what can collaborations contribute to?

<b>ELENA kickers (*)</b>	Total resource estimate	
Magnet modifications	40	kCHF
Vacuum tanks and ancillaries	276	kCHF
HV and LV cables	24	kCHF
Thyratrons	80	kCHF
HV generator upgrade	100	kCHF
Fluids	50	kCHF
<b>Total for 2 kickers</b>	<b>570</b>	<b>kCHF</b>

<b>Manpower estimate (*)</b>	CERN ABT staff	Collaboration contribution	Total resource estimate	
Scientific staff	0.5		0.5	m.y
Technical assistant	0.5		0.5	m.y
Technician	1		1	m.y
(Electro)Mechanic	0.5		0.5	m.y
Draughtsman		0.5	0.5	m.y
<b>Total manpower</b>	<b>2.5</b>	<b>0.5</b>	<b>3</b>	<b>m.y</b>

(\*) without controls





# Kicker platform displacement

Resource requirements and what can collaborations contribute to?  
(the cost and manpower for a new building are not included)

	Total resource estimate (*)	
<b>Material and general services</b>	<b>306</b>	<b>kCHF</b>

Manpower estimate (*)	CERN ABT staff	Collaboration contribution	Total resource estimate	
Scientific staff	0.1		0.1	m.y
Technical assistant	0.1		0.1	m.y
Mechanics technician	0.1		0.1	m.y
(Electro)Mechanic	0.3	0.3	0.6	m.y
Electronics technician	0.2		0.2	m.y
FSU	(0.3) →	0.3	0.3	m.y
<b>Total manpower</b>	<b>0.8</b>	<b>0.6</b>	<b>1.4</b>	<b>m.y</b>

(\*) without controls





# Kicker controls

Resource requirements and what can collaborations contribute to?

ELENA kickers	Total resource estimate	
Injection/Extraction	200	kCHF
Fluid systems	40	kCHF
Common controls	60	kCHF
<b>Total for 2 kickers</b>	<b>300</b>	<b>kCHF</b>

AD kickers displacement/rejuvenation	Total resource estimate	
Power distribution	150	kCHF
Re-cabling	100	kCHF
PXI control	100	kCHF
Common controls	180	kCHF
<b>Total for 8 kickers</b>	<b>530</b>	<b>kCHF</b>

Manpower estimate	CERN ABT staff	Collaboration staff	Total resource estimate	
Electronics engineer	0.5		0.5	m.y
Electronics technician	2.5	2	4.5	m.y
<b>Total manpower</b>	<b>3</b>	<b>2</b>	<b>5</b>	<b>m.y</b>



# Conclusion

TE/ABT related work and resource needs have been presented.

Critical points are still to be clarified:

- final choice of extraction kicker magnet
- new location of the kicker platform

Reference: **CERN-BE-2010-029 OP, November 2010**