Superconductivity and other new Developments in Gantry Design for Particle Therapy

REMARKS ON GANTRIES:

The motivations for SC gantry REMAIN:

Weight,

New beam optics → new (better!) irradiation procedures

Try to achieve as well: smallersize

lower price

easy operaton/service

What is the best Sc-material ? NbTi, Nb3Sn, MgB2, YBaCuO ?

What are the implications of this choice have on the design of the magnet (coil)?

Upstream <-> downstream

			Beam Size/Shape	Beam Position	SAD	Field Size	Energy (Time)	Energy (Bandwidth)	Size (length)	Size (Width)	Cost	Maintenance	
Proton													
	Downstream Scanning												
		Superconducting			?								
			3	3	0	3	-1	3	3	0	0	2	*16*
			3	3	2	3	-1	3	3	2	2	1	*21*
		Normal Temp			?								
			3	3	0	3	2	2	2	0	0	3	*18*
			3	3	2	3	1	1	1	2	2	3	*21*
	Upstream Scanning												
		Superconducting			?								
			-1	-1	0	-1	-1	3	2	0	-1	2	*2*
			-1	-1	2	-1	-1	3	1	2	-1	1	*4*
		Normal Temp			?								
			2	2	0	2	2	2	2	0	-1	3	*14*
			1	1	2	1	1	1	1	2	-1	3	*12*

Colors based upon 'natural' results or reflecting the potentially hard work to get a useful value

Ion To Be Done ...

Upstream Scanning

Advantages

?Larger SAD?
?Smaller Radius?
?Nozzle IC pos = ISO pos"

Disadvantages

Beam size dependence
Non linear position
Magnet mismatch (timing/settling)

Worse with superconducting field?
Field size

Superconductivity

Advantages

?Smaller dipole radius?
?reduced power?
Larger momentum bandwidth

Disadvantages

Overall size not changed (depending on upstream or downstream scanning)
"Increased?" system power
Slower momentum change
Large aperture complexity
Maintenance (time)
?Noise?

WORKSHOP EVALUATION:

Good interaction with firms?

Focus on a specific gantry theme should be kept.

possible gantry themes: integration with imaging,
efficient QA

This workshop is held in the framework of EuCARD2:

- Next workshop in 1.5 - 2 yr. EuCard2? Where?
- Program will end in April 2017 → EuCard3?
- Possible topics for a follow-up program?
  - Support of inter-institutional communication (workshop)
  - Specific work package (PhD position)

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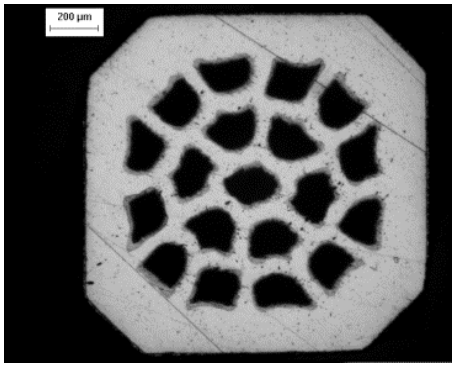
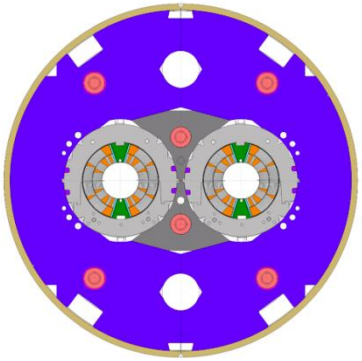
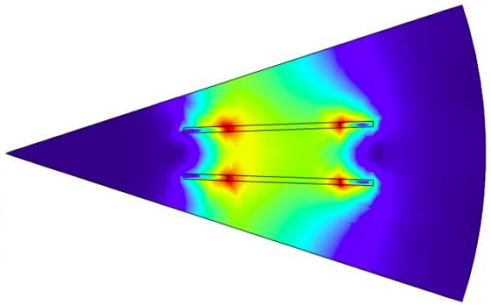
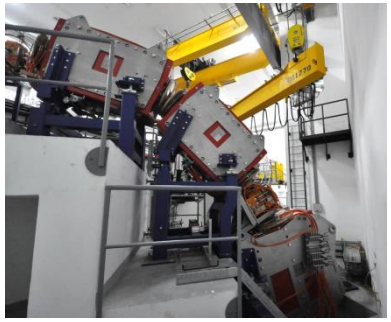
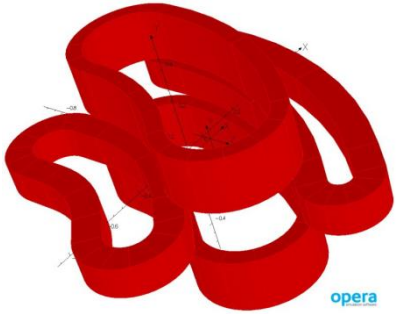


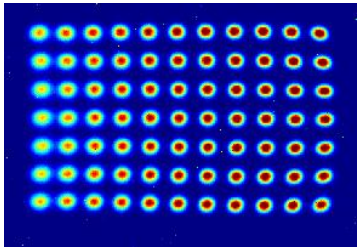


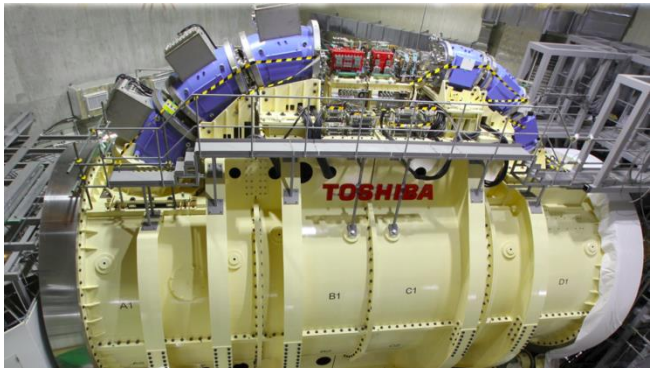




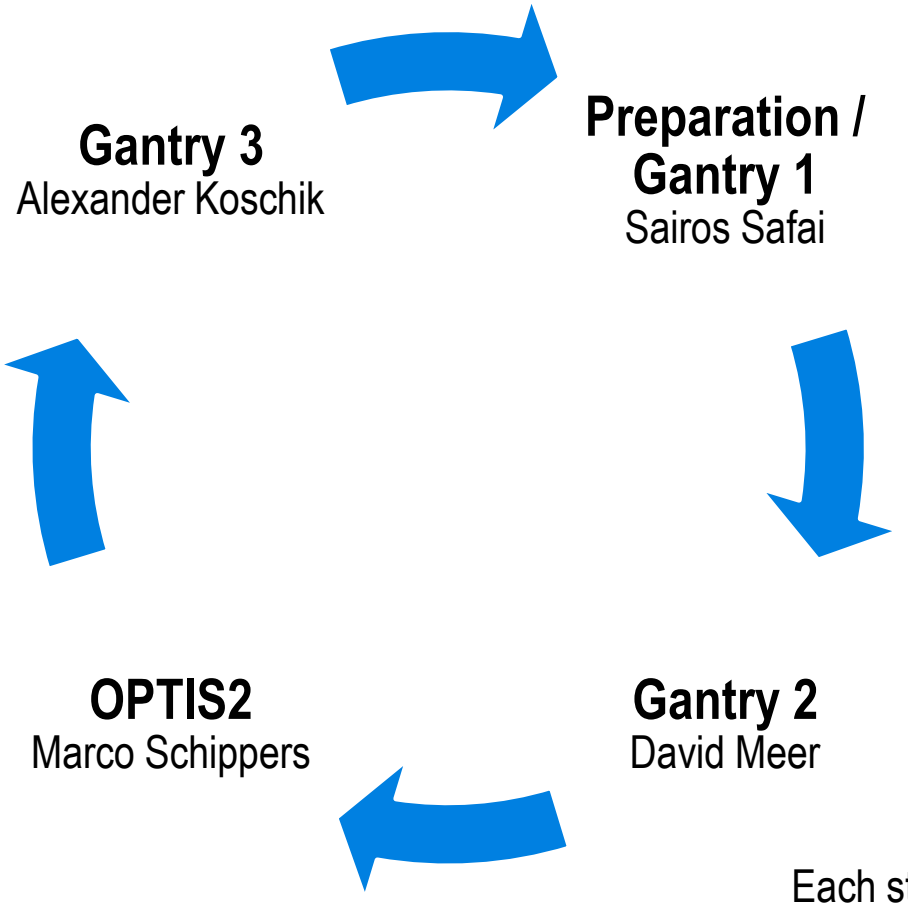
Many thanks to all speakers and attendees for making this workshop a big success!







Visiting tour Center for Proton Theray



Tour guide

- **Oxana Actis**, starts at Preparation / Gantry 1
- **Alexander Gerbershagen**, starts at Gantry 2
- **Serena Psoroulas**, starts at OPTIS2
- **Stéphane Sanfilippo,** starts at Gantry 3

Each station 20 minutes