Protontherapy in Santander (..and Spain)

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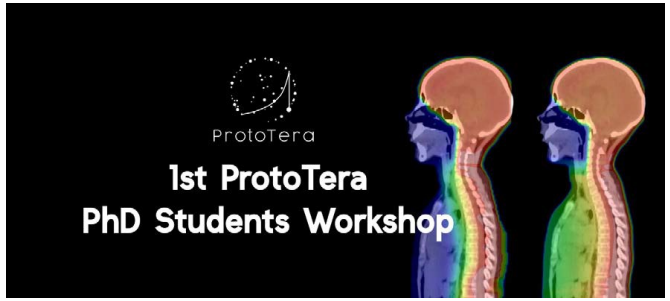

OUTLINE

- Forthcoming protontherapy projects in Santander and Spain:
  - Extent of the Project: **How many** facilities?
  - Source of funding: **Who** pays for it?
  - **What** kind of machines?
  - Location of the PT machines in Spain: **Where**?
  - Plan Milestones: **When** will it be operative?
  - Training
  - Intrumentation and Particle Physics Group

Extent of the Project: How many facilities?

- **2** existing machines installed in private hospitals at the moment:
  - Quirón Salud
  - Clínica Universidad de Navarra
- **+1** to be installed in at Hospital Universitario Marqués de Valdecilla (HUMV), in Santander.
- **+10** centers funded by **Foundation Amancio Ortega** (founder of Zara):
  - Basque Country
  - Catalonia (2)
  - Galicia
  - Andalucia (2)
  - Valencia
  - Canary Islands
  - Madrid (2)

TOTAL=13

BOLETÍN OFICIAL DEL ESTADO

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III. OTRAS DISPOSICIONES

MINISTERIO DE SANIDAD

18259 *Resolución de 26 de octubre de 2021, de la Secretaría de Estado de Sanidad, por la que se publica Convenio con las Comunidades Autónomas del País Vasco, Cataluña, Galicia, Andalucía, Valenciana, Canarias y Madrid, y la Fundación Amancio Ortega Gaona, para la colaboración en la implantación de la protonterapia en el Sistema Nacional de Salud.*

Source of funding: Who pays for it?

- Funded by the **Recovery assistance for cohesion and the territories of Europe (REACT-EU)**

- Legal entities in charge:
  - Public Health Care Systems at CCAA: Barcelona Centers, Santander, Sevilla, La Coruña, Madrid (La Paz).
  - Hostital Complex: Centro de Valencia (La Fe), Madrid (Fuenlabrada).
  - Unknown: Centro de San Sebastián, Gran Canaria.

Documento de Pliegos
Número de Expediente PA SCS 2022/3
Publicado en la Plataforma de Contratación del Sector Público el 27-03-2022 a las 16:55 horas.

Plataforma de Contratación del Sector Público

Suministro de un equipo de protonterapia para el Hospital Universitario Marqués de Valdecilla (HUMV)

Contrato Sujeto a regulación armonizada Si

- Directiva de aplicación Directiva 2014/24/EU - sobre Contratación Pública
- Valor estimado del contrato 22.727.272,73 EUR.
- Importe 27.500.000 EUR.
- Importe (sin impuestos) 22.727.272,73 EUR.
- Plazo de Ejecución
  - Del 01/07/2022 durante 36 Mes(es)
  - Observaciones: Ver PCAP
- Clasificación CPV
  - 33151200 - Aparatos de radioterapia.
  - 33151400 - Material para radioterapia.
- Tipo de Contrato Suministros
- Subtipo Adquisición
- Lugar de ejecución ES13 Cantabria HUMV

What kind of machines?

- HUMV in Santander: **+1** ProBeam® 360° de *Varian Medical Systems Iberica SL.*
- In Spain: **+10** Proteus®One de *Ion Beam Applications S.A.*
- **Expandibles:** La Coruña, Madrid (La Paz)
- **Not expandable:** Santander, Sevilla, Málaga, Madrid (Fuenlabrada), San Sebastián, Valencia, Gran Canaria
- Twin system: Barcelona

Technical challenges for FLASH proton therapy, 2020, S. Jolly et al.

Accelerator Type	Isochronous Cyclotron		Synchrocyclotron		Synchrotron	Linear Accelerator
Vendor	IBA	Varian	IBA	Mevion	Hitachi	AVO
System	C230	PROBEAM	S2C2	S250	ProBeam	LIGHT
Maximum Energy (MeV)	230	250	250	250	250	250
Minimum Energy (MeV)	70	70	70	70	70	37.5
Peak Current(μA)	0.3	0.8	~ 18	~ 7	4.8×10^{-3}	~ 40
Max Ave. Current (nA)	300	800	~ 130	~ 32	4.8	32
Accel. Frequency (MHz)	106.1	72.8	87.6–63.2	133–90	1.3–10	3,000
Repetition rate	CW	CW	1 kHz	500–750 Hz	CW	200 Hz
Treatment Pulse Length	>400 μs	>400 μs	7 μs	6 μs	0.5–5 s	4 μs
Bunch Length	~ 2 ns	~ 2 ns	~ 2 ns	~ 2 ns	~ 25–200 ns	~ 0.5 ns
Max Part. per Bunch/Pulse	100,000	70,000	8×10^{8}	4×10^{8}	1.5×10^{11}	10^{10}
Electric/Central Field	1.7 T	2.4 T	5.75 T	9 T	1.7 T	25 MV/m
References	[18,19]	[20,21]	[22]	[23–25]	[26–28]	[29,30]

FAO+Quirón Santander Universidad de Navarra

Where? Location of the PT machines in Spain

Santander (Marqués de Valdecilla)

San Sebastián (Instituto Oncológico)

La Coruña (Hospital Clínico Universitario de Santiago)

Barcelona

Sevilla

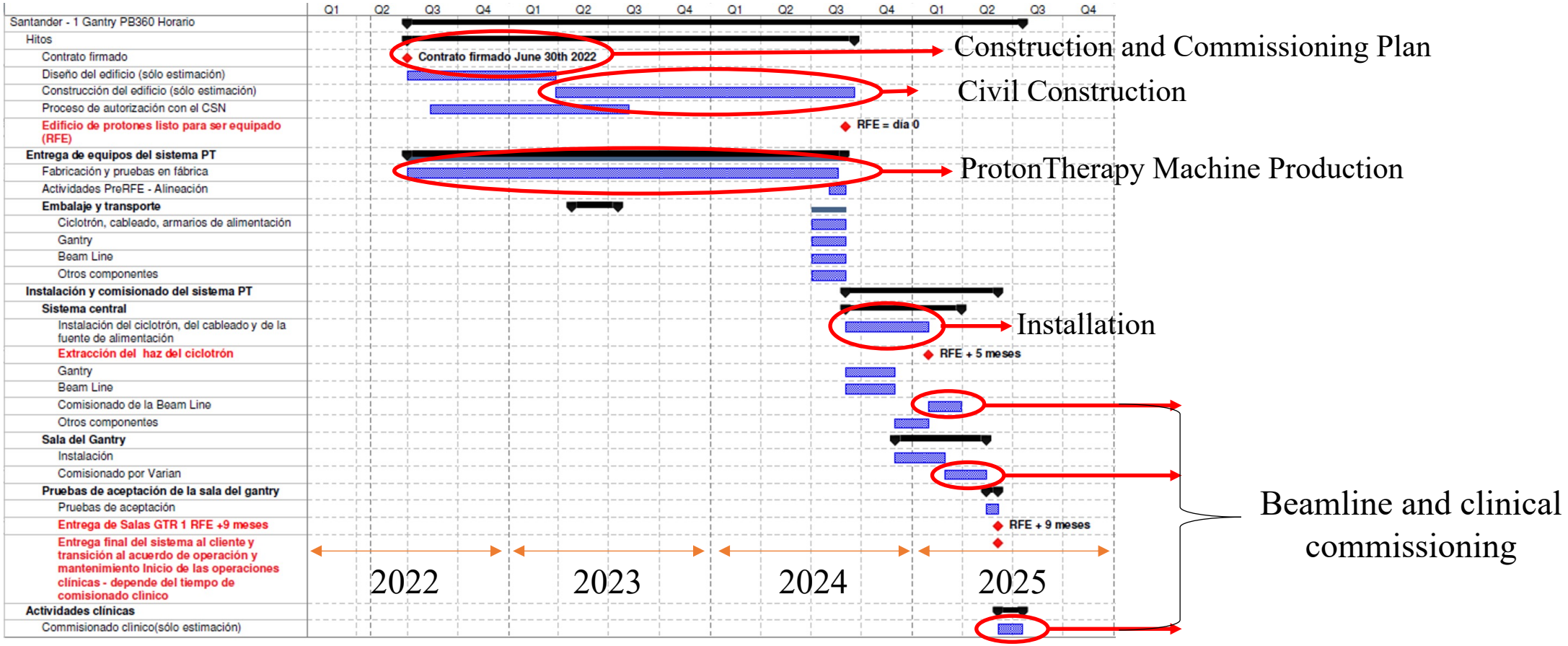
Madrid (La Paz; Fuenlabrada)

Málaga

Valencia (La Fe)

Las Palmas de Gran Canaria (Dr. Negrín)

Plan Milestones: When will it be operative?



Training

- Dedicated training courses included in the contract with VARIAN:
  - For radiooncologists, medical phycisists and radiotherapy and dosimetry technicians (TSRD)
  - Typically in similar facilitues and also in the final installation.
  - >40 weeks (6 months/1 year prior the installation is complete).
  - Objective: to get familiar with the physics, clinical practive, TPS, OIS, SGRT systems etc..

Instrumentation and Particle Physics Group

- Strong background on silicon detectors for high energy physics:
  - Extremely radiation hard pixel detectors for high-luminosity upgrade of the CMS experiment.
  - Low-Gain avalanche detector for the timing detectors of the High-Luminosity upgrade of the CMS experiment.
  - Electro-optic instrumentation diagnostics for the High-Luminosity LHC.
- Limited experience in medical physics:
  - Collaboration with Valdecilla has recently been started to develop dedicated SiC-based diodes for brachytherapy.
  - Geant4 simulation activities for Radio protection.
- Long-term collaboration with direct access to FLASH beamtime for the development of high-rate microdosimetry detectors.

Hoping it is the first of many…

Thanks for your attention!

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