

Task 15.4: Improvements of the test beam infrastructure at INFN-LNF

Paolo Valente on behalf of the BTF upgrade team

BTF upgrade team

BTF core team:

Paolo Valente,

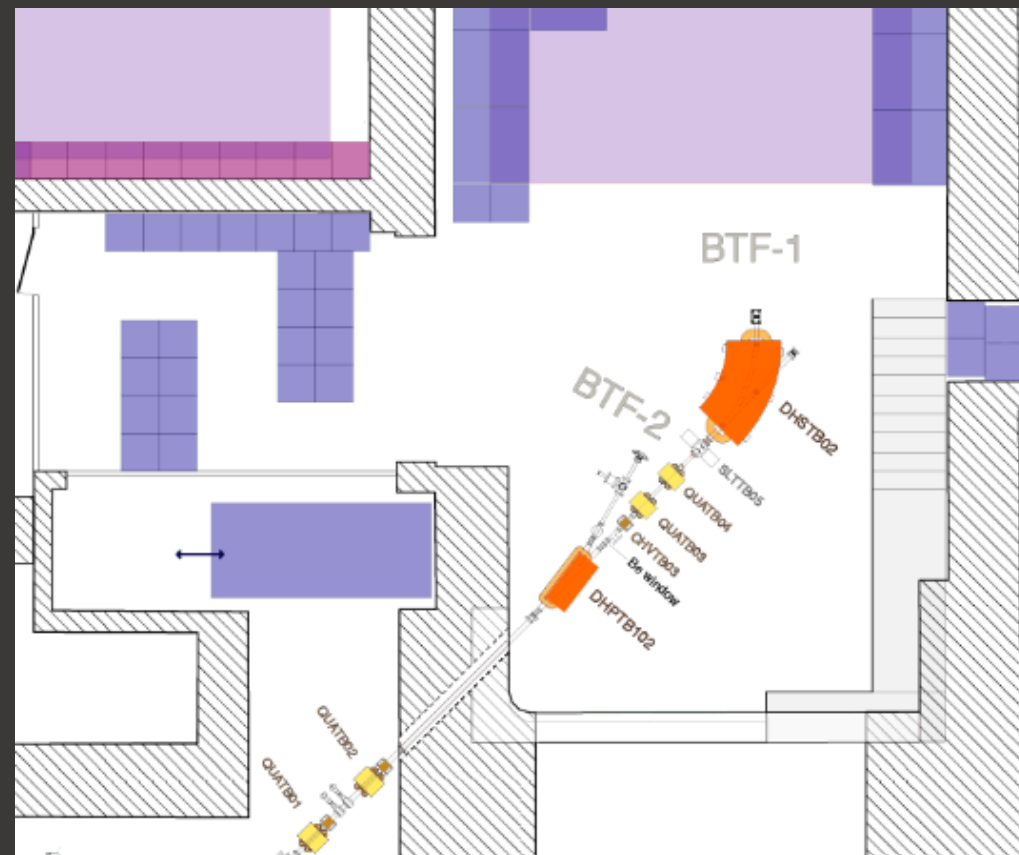
Bruno Buonomo, Claudio Di Giulio, Luca Gennaro Foggetta, Gianfranco Morello



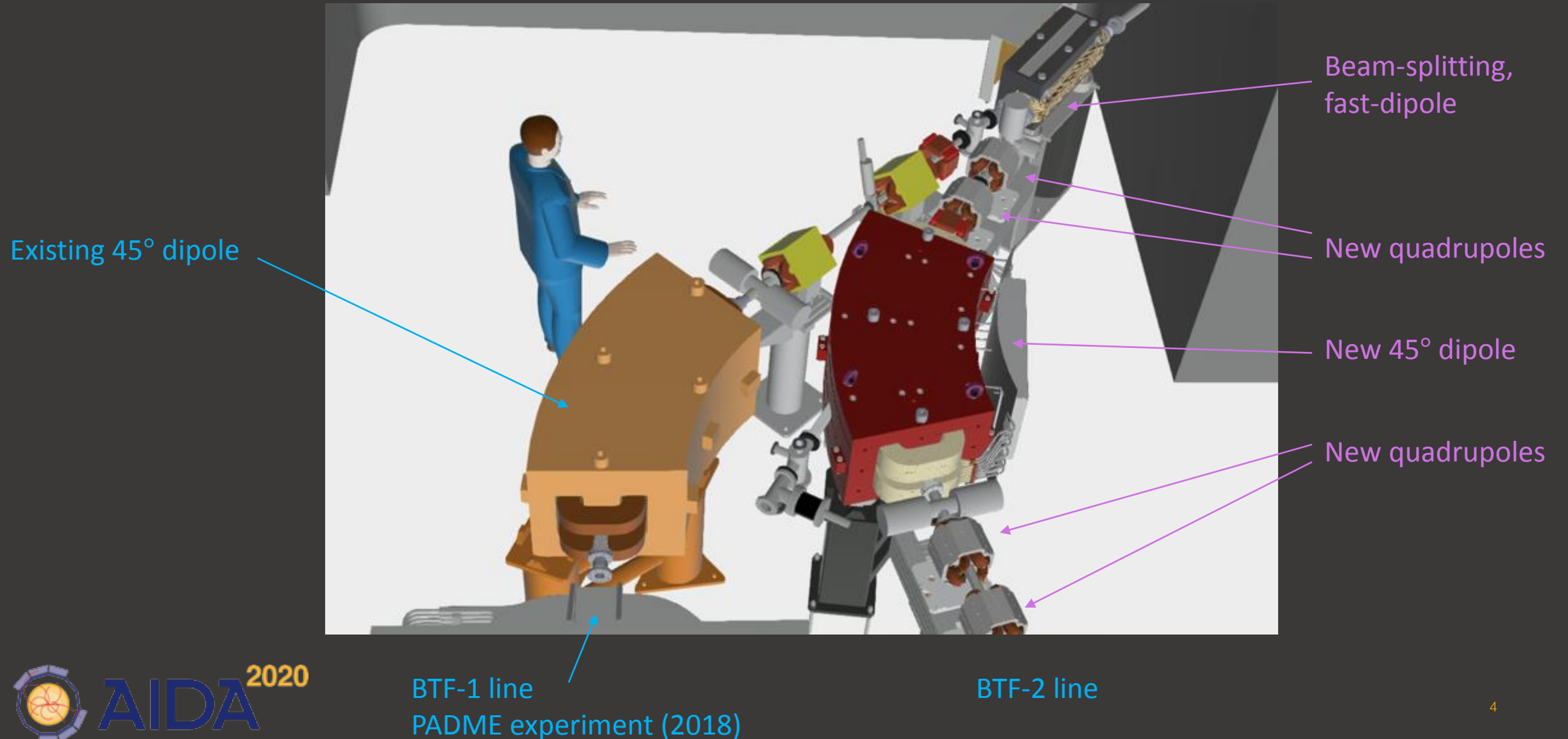
With strong support of Technical and Accelerator Departments:

Maurizio Belli, Bruno Bolli, Sergio Cantarella, Riccardo Ceccarelli, Alberto Cecchinelli, Oreste Cerafogli, Renato Clementi, Enrico Di Pasquale, Alessandro Drago, Adolfo Esposito, Oscar Frasciello, Andrea Ghigo, Simona Incremona, Franco Iungo, Stefano Lauciani, Roberto Mascio, Stefano Martelli, Graziano Piermarini, Luigi Pellegrino, Ruggero Ricci, Luis Antonio Rossi, Lucia Sabbatini, Claudio Sanelli, Franco Sardone, Giancarlo Sensolini, Serena Strabioli, Ugo Rotundo, Alessandro Stecchi, Angelo Stella, Alessandro Vannozzi, Raffaele Zarlenga

- Deliverable D15.4: New Frascati beam line
- Deliverable D15.5: Frascati photon tagging system
- (not in AIDA-2020, but connected to these activities):
 - LINAC consolidation
 - Civil engineering (building modifications, new control room, old experimental hall refurbishing)
 - New bunker
 - Upgrade of cooling, power and conditioning plants



New beam-lines





Bologna, April 2018

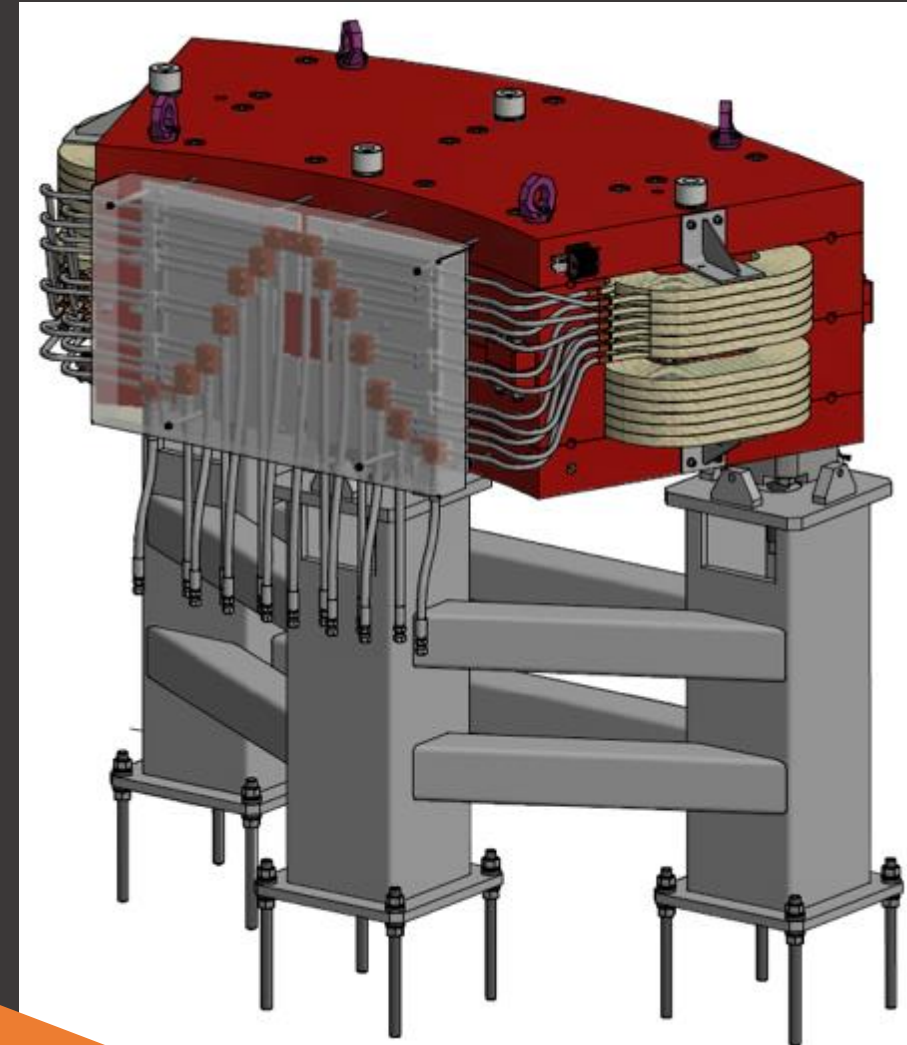
Old line dismantling



Bologna, April 2018



New magnets design and construction



Bologna, April 2018

Bologna, April 2018

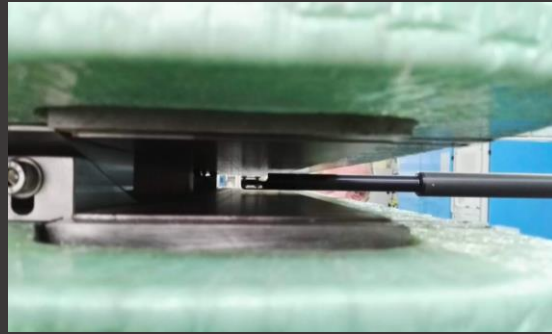
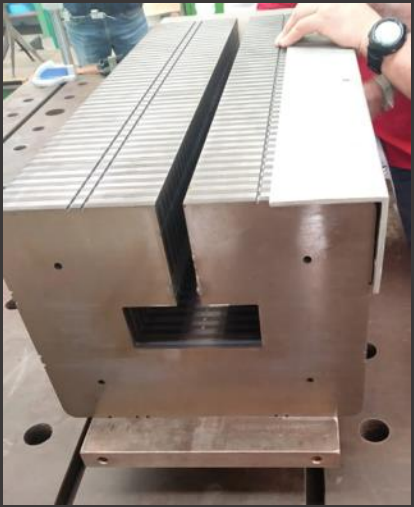
- The BTF upgrade is a complex project and a huge effort
 - Schedule and delays influenced by:
 - Funding timing
 - Administrative overhead
 - Interference of infrastructural work with accelerator complex operations
- The main uncertainty comes from the construction of the new magnets
 - All projects started and almost all productions on-going
- Civil engineering on track
- Upgrade of cooling, power, services also proceeding
- Updated schedule for new beam-lines
 - BTF-1 expected restart: **June 2018**
 - BTF-2 installation and commissioning: **first months of 2019**
 - **Move D15.4** (New Frascati beam line) **to M50**
- Photon tagging ready, need to be installed on new line
 - **Move D15.5** (Photon tagging) **to M52**



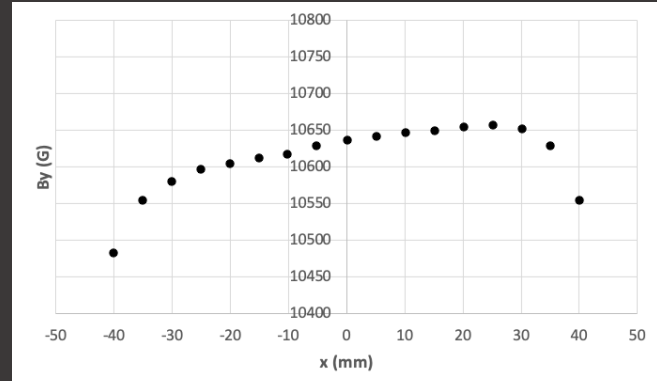
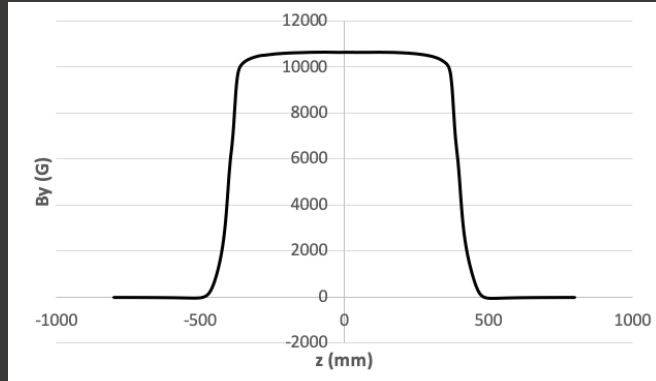
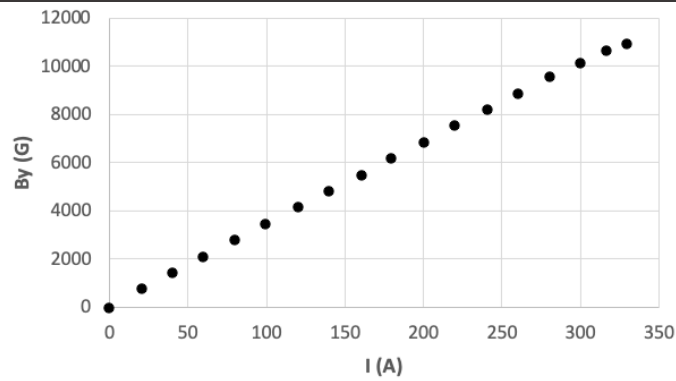
Completed Jun. 2018



New pulsed dipole



- Produced, delivered and field mapped



Vacuum components

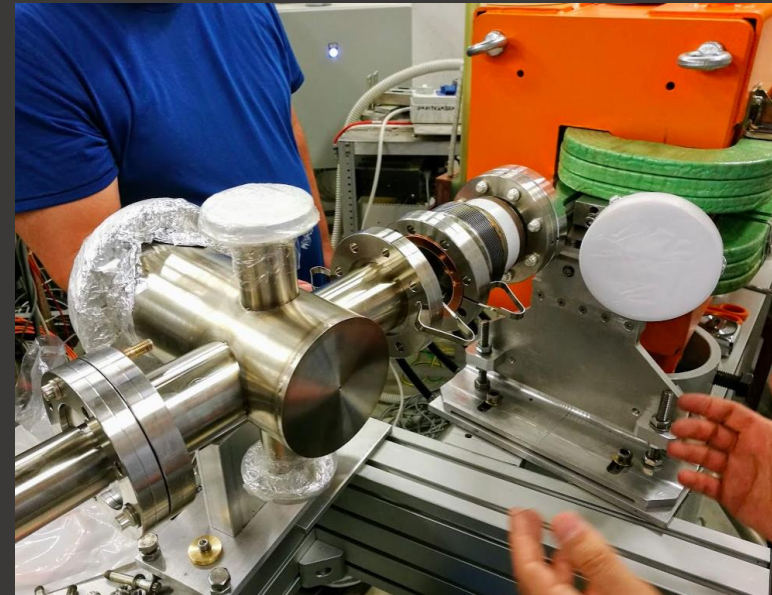


Two-way thin vacuum chamber (Aluminium):
25 mm gap

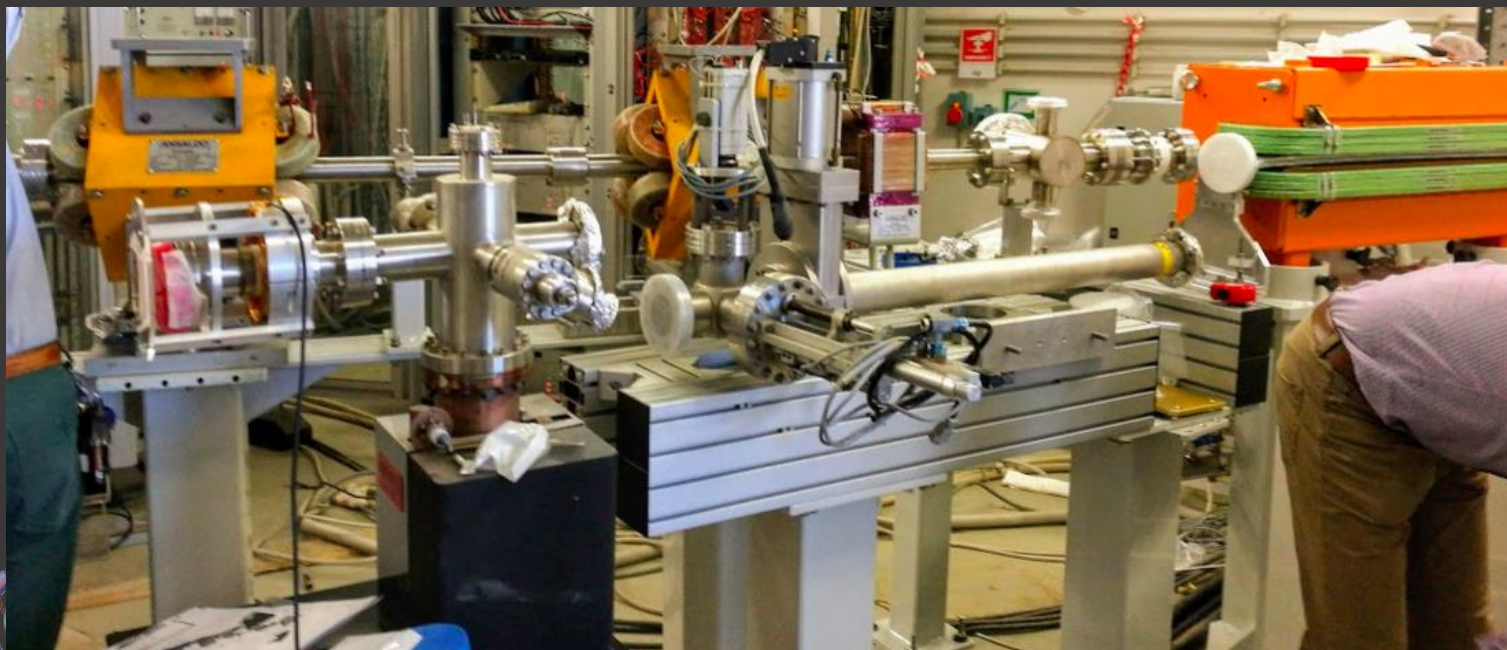
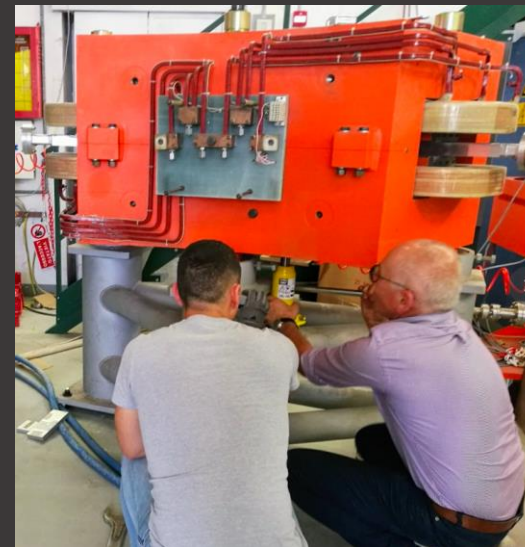


0.25 Beryllium window,
separating with LINAC vacuum

Pumping, gauges,
interlock, valves



New lines installation



MS34: components installed

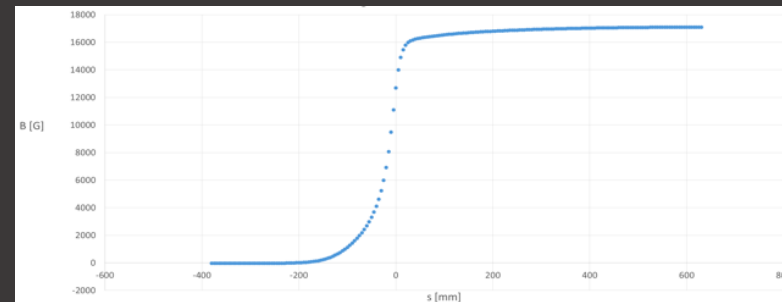
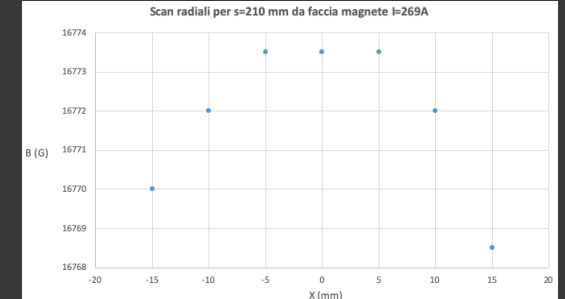
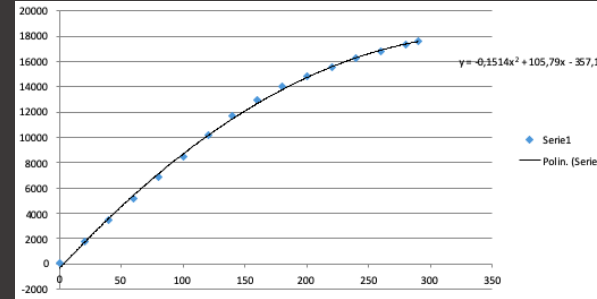
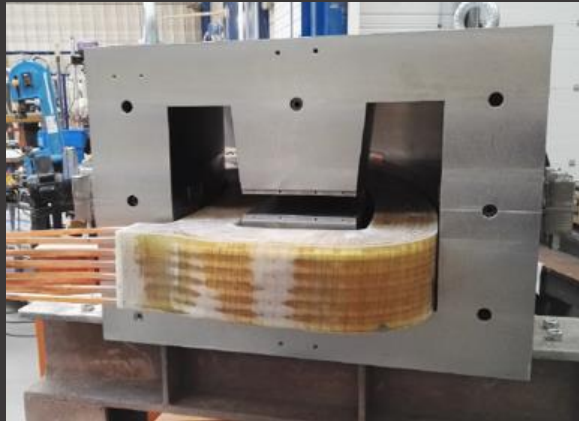
- Old beam-line dismantling
- Cables re-routing
- BTF-1 and BTF-2 branches installation
- Cooling, power, controls connection

Sep. 2018



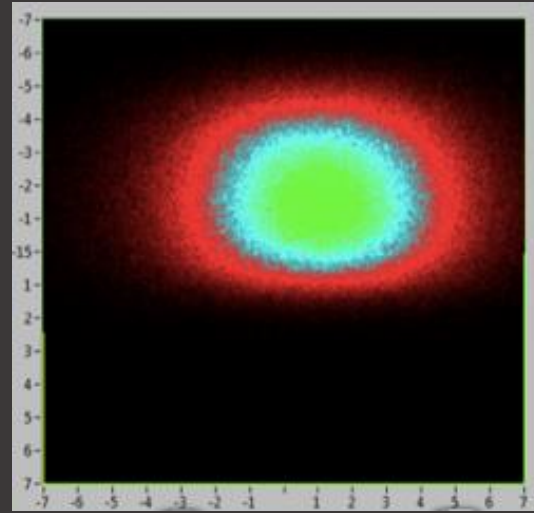
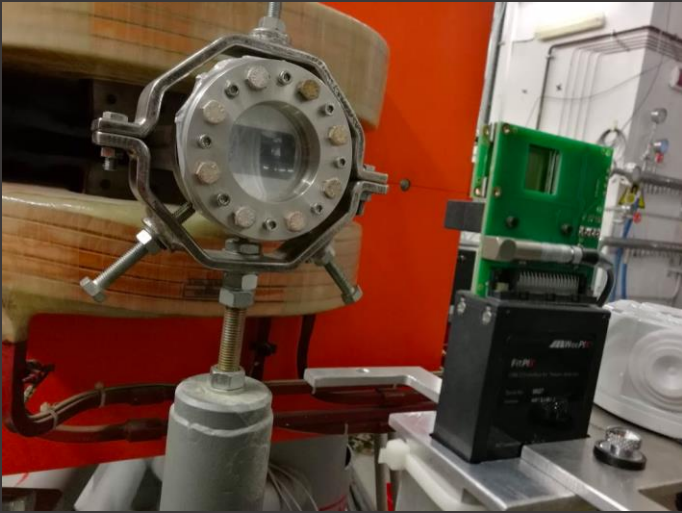
New dipoles

- Produced, delivered and field mapped



Feb. 2019

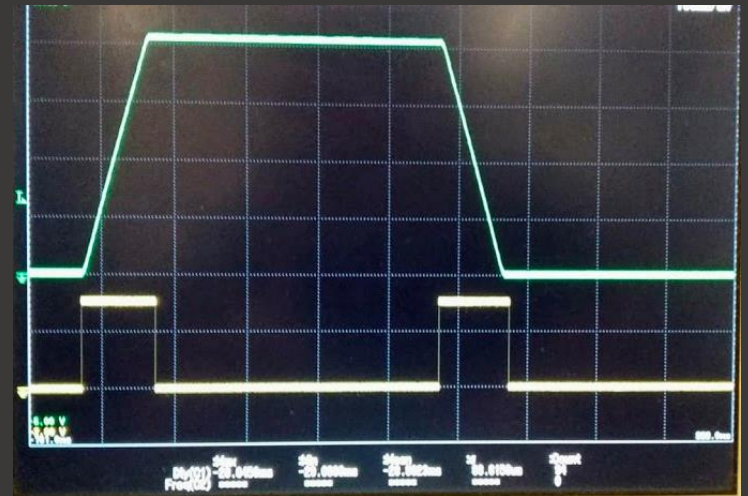
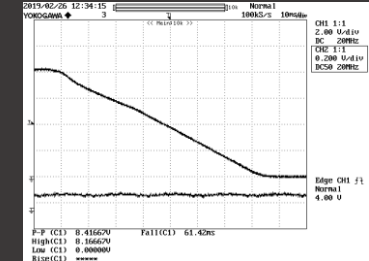
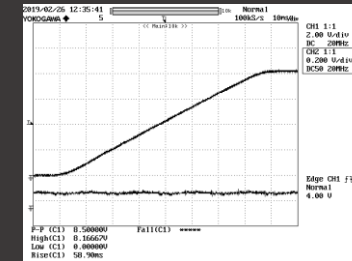
BTF-1 new line beam commissioning



- Commissioning with secondary electron beam (450 MeV): July 2018
- Commissioning with secondary positron beam (545 MeV): Sep. 2018
- First user on new BTF-1 line, PADME (dark photon searches) experiment: Oct. 2018 - Feb. 2019

New power supplies

- All PS of new magnets delivered
 - SAT performed
- Pulsed dipole tested with trigger + machine timing
- Commissioning with beam (DC) successful



New bunker

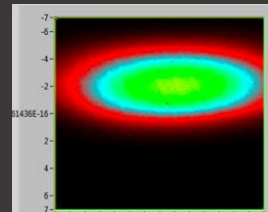
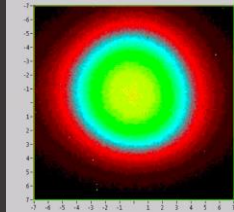


Completed Feb. 2019

BTF-2 new line beam commissioning

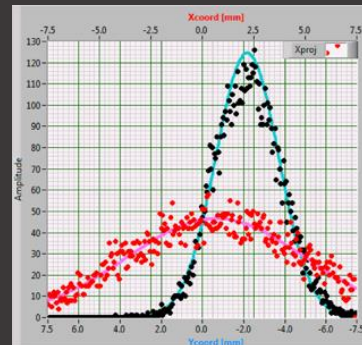


3x3 mm² RMS



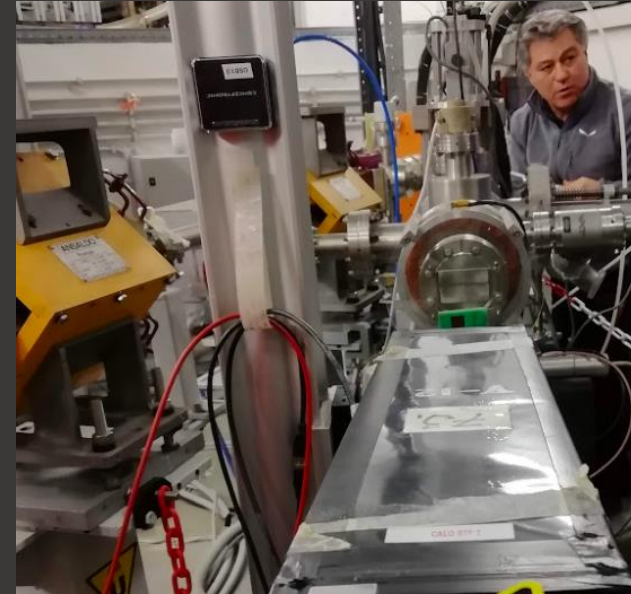
- 490 MeV primary positron beam
- Same upstream optics, no optimization

4x1.5 mm² RMS



26 Feb. - 1 Mar. 2019

BTF-2 new line beam commissioning



- Temporary location of pulsed dipole power supply (waiting for final cooling system)
- Second set of beam diagnostics (Silicon pixel, calorimeter) available

New cooling and conditioning



Ready



Ready



Still missing:

- Installation of new conditioning machines

Still missing:

- Final connection to cooling tower



Apr. 2019

Conclusions

- BTF-1 routinely operational since Sep. 2018
- Waiting for authorization of bunker n. 2 (still pending at the Ministry, hopefully last step)
- Beam delivered also on the new BTF-2 line, operating the beam switching dipole
- D15.4 can be considered achieved
- Users test-beam call opened

- Mar. - Apr. 2019: LINAC long maintenance (refurbishing of modulators' PFN charging power supplies)
- May 2019: First users on BTF-2 line foreseen

- Magnets, supports, etc. for transporting the beam in the second bunker are available
- If authorization will come before summer, installation of last part of BTF-2 branch will be in Sep. 2019
- Operation of photon tagging, D15.5, on one of the three dipoles

