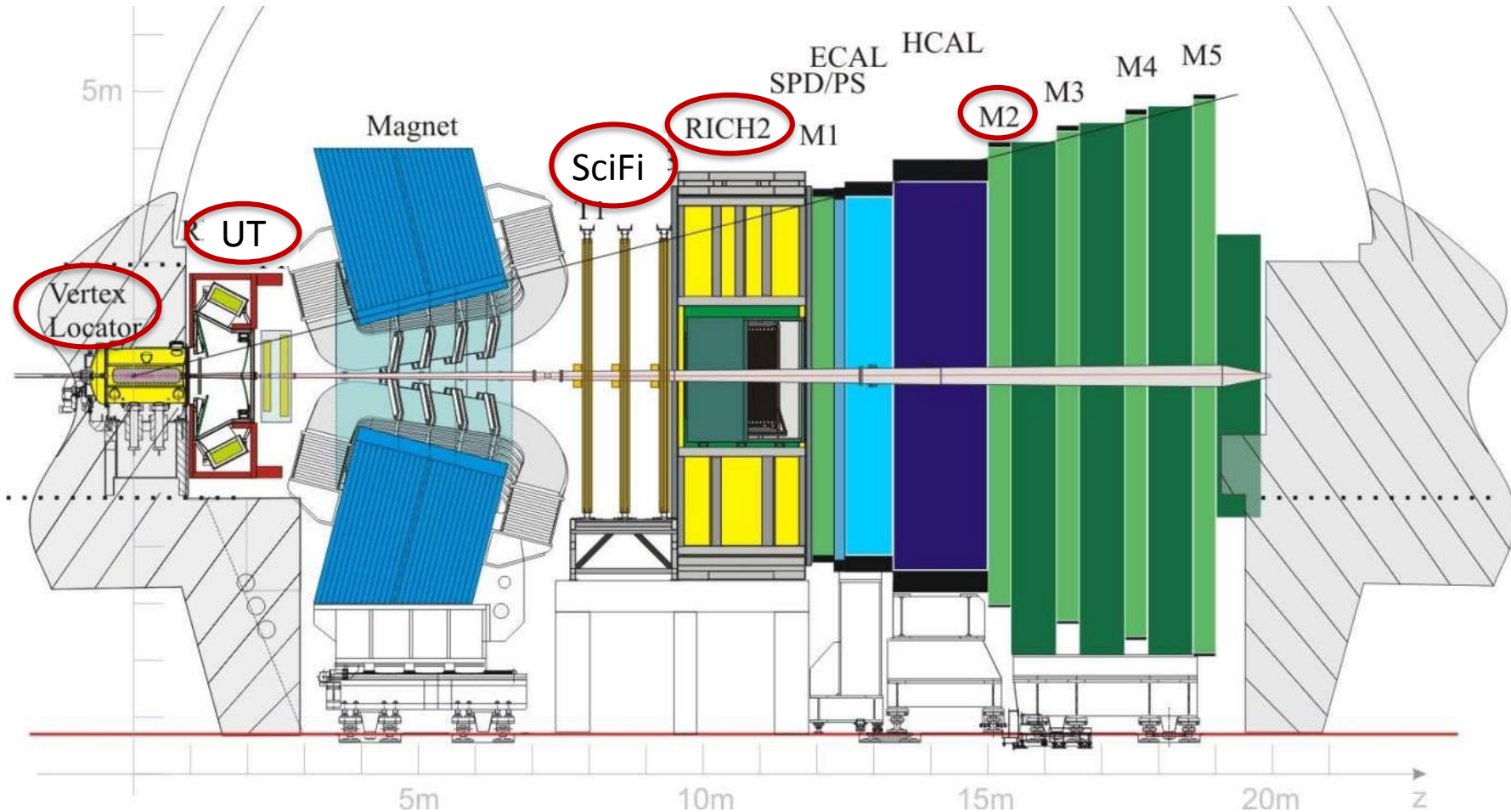


DT contribution to LHCb



- The involvement in a large number of projects has grown historically, partially with the evolution of the group.

DT contribution to LHCb

- Colleagues working on LHCb :



TS

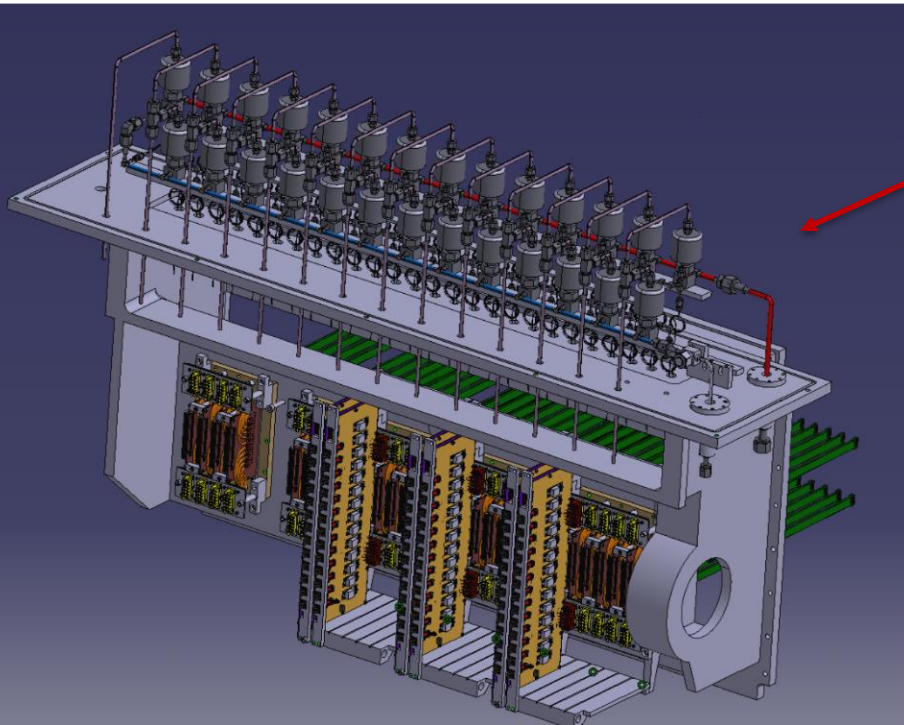
- Total DT contribution: **7.5 FTE** → **6.6 FTE**
- Details in WP **EDMS 1735466**



Fellow

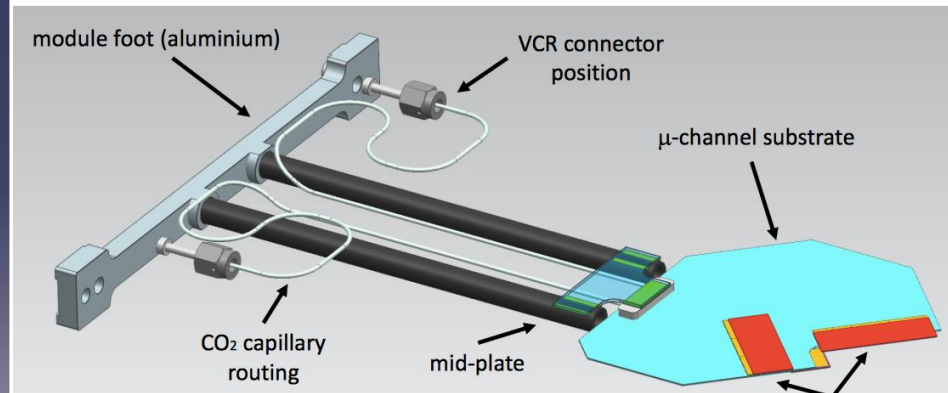
Contribution to the VELO upgrade

- VELO upgrade detector is made of planar silicon sensors with pixels of $55 \times 55 \mu\text{m}^2$,
- In total 26 x 2 stations with detector modules
- DT provides engineering support and advice for the design of the mechanics and the evaporative microchannel CO₂ cooling
- **Resources:** R. Dumps (0.7 FTE) in close collaboration with LHCb colleagues



VELO 'hood' with safety valves
for the CO₂ cooling system

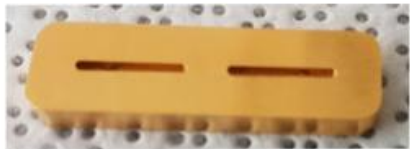
VELO module



VELO upgrade: μ -channel cooling

- DT provides support in define and optimize the soldering of the connector to the cooling substrate, which needs to be done under special conditions (cleaning with formic acid, soldering under vacuum)
- Work done in close collaboration with A. Mapelli (contacts with supplier for micro-channel substrate), LHCb fellows O. Augusto, W. Byczynski and J. Buytaert (EP-ESE)

Metallized connector



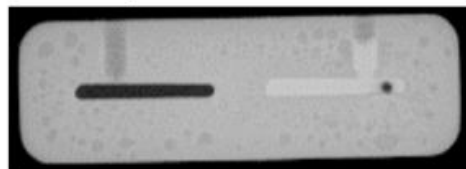
Solder foil (SnPb)



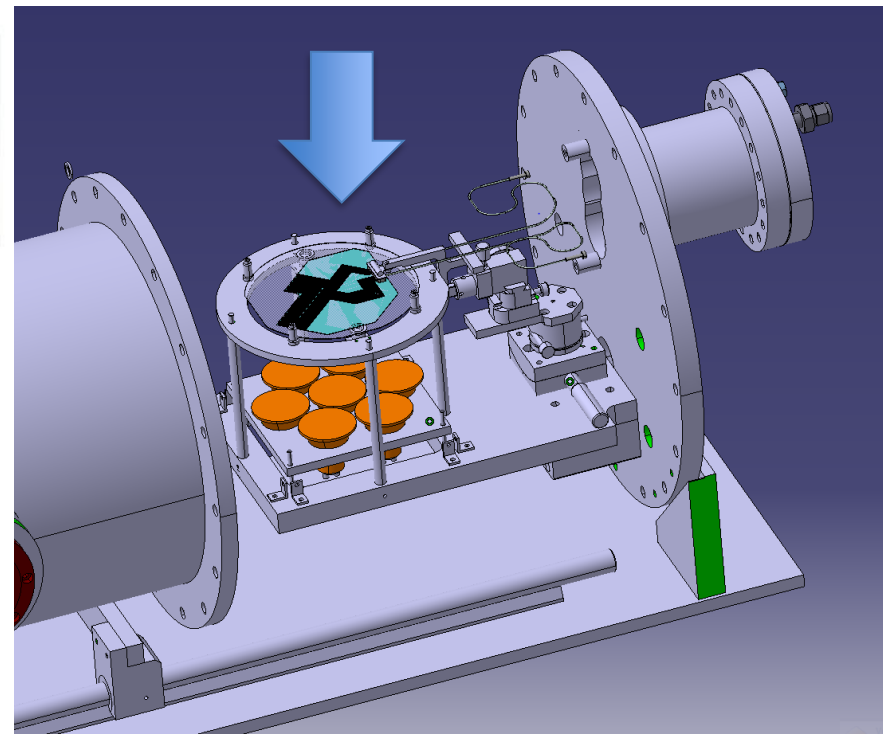
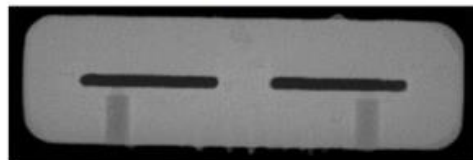
Metallized Silicon



Example of a bad result

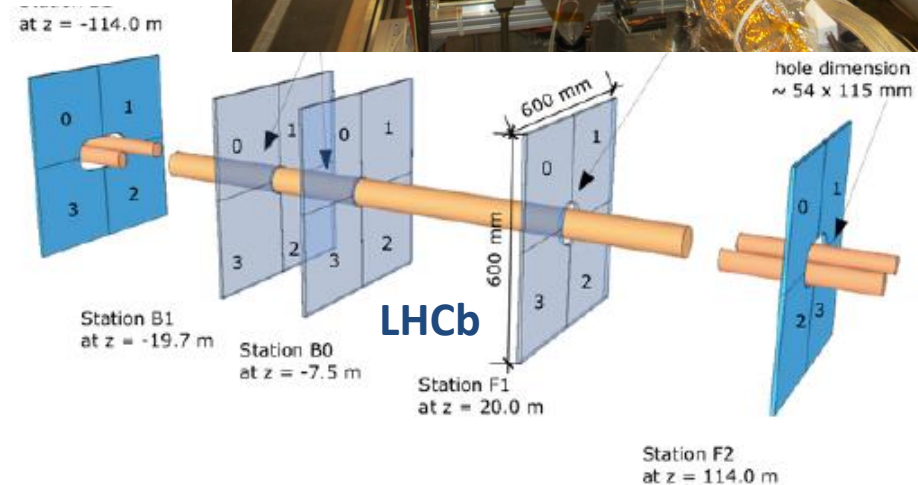
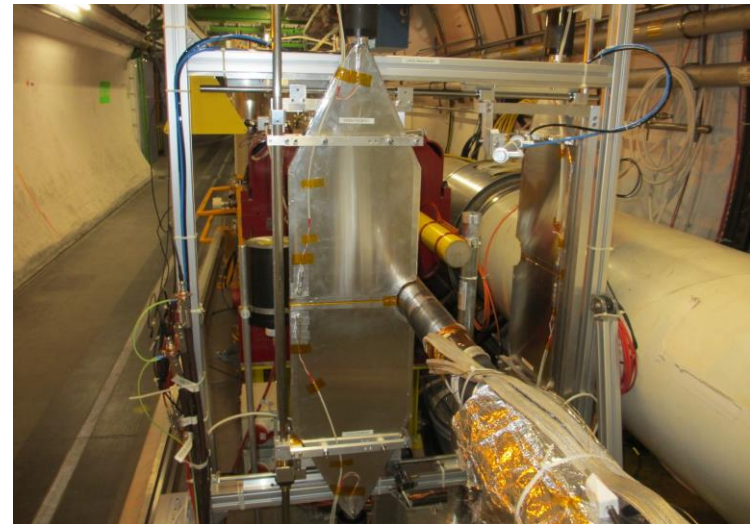
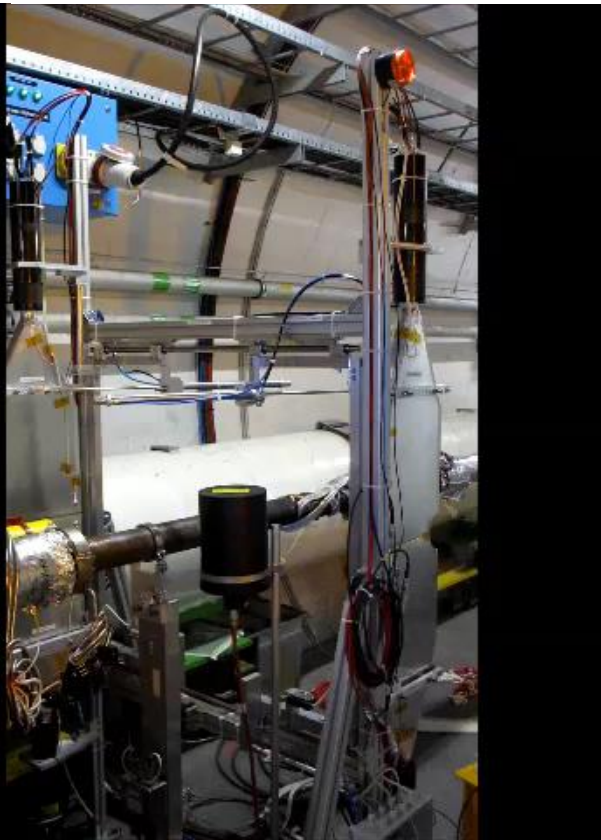


Good and reproducible results



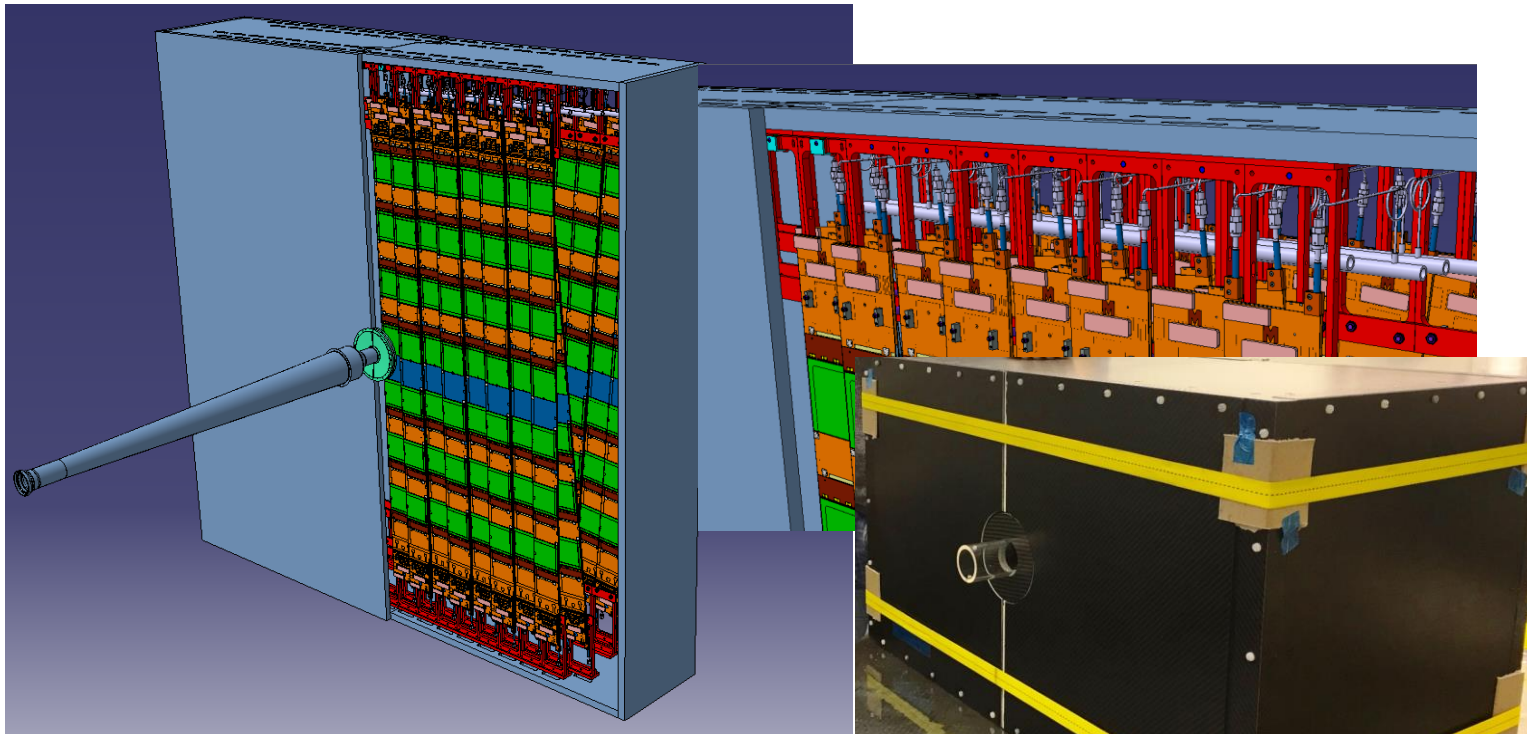
Contribution to FSC HERSCHEL

- Construction and maintenance of 5 scintillator stations, incl. moving system
- Replacement of 20 scintillators and light guides was needed in EYETS 2016/2017
- **Resources:** R, Dumps (0.2FTE), S. Granik (technician from PNPI)



Contribution to the Upstream Tracker

- LHCb Upstream Tracker (UT) is made of $\sim 8\text{m}^2$ of Silicon Strip Sensors
- DT is in charge of the detector box, the beam-pipe interface, the frames for stave mounting, and all integration aspects
- **Resources:** J. Batista (0.2 FTE), B. Schmidt (0.2 FTE), P. Gorbounov (1 FTE), M. Galka (1 FTE, LHCb TS), soon a fellow (M. Brodski)

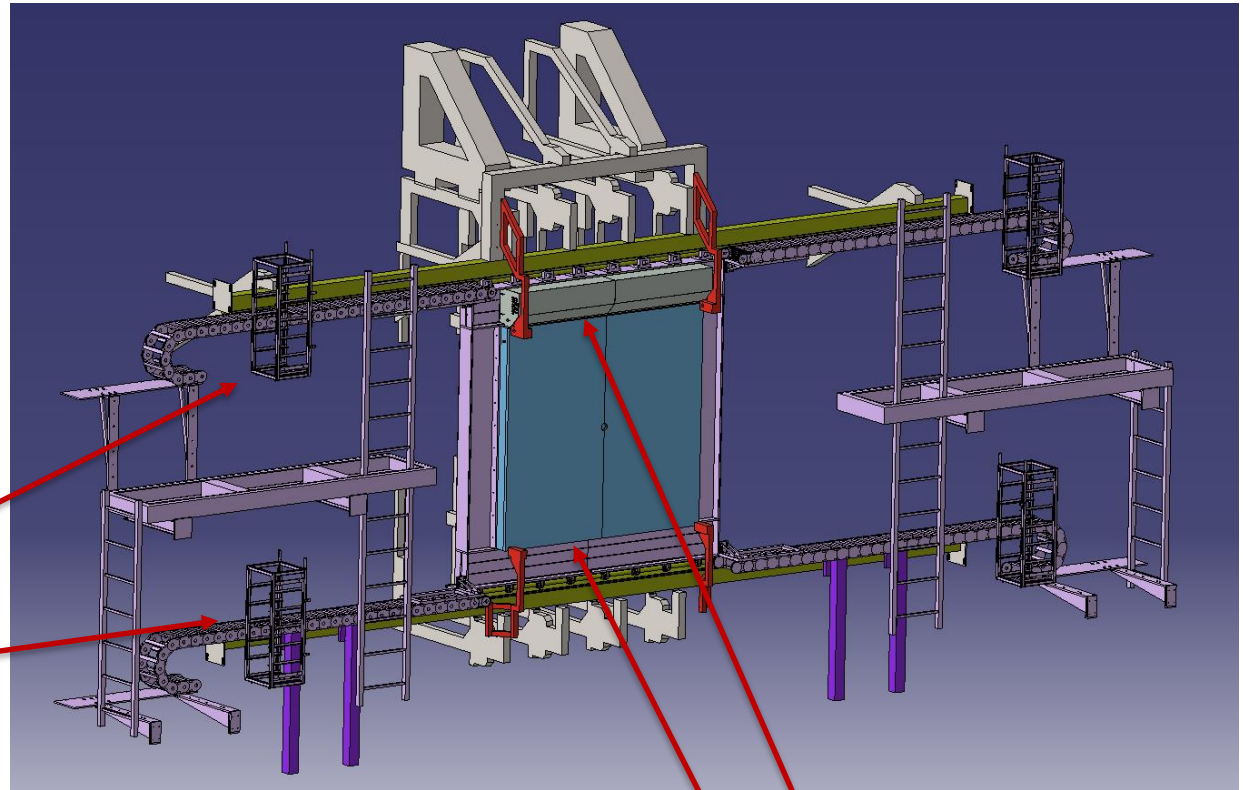


Zoom

Prototype
Box

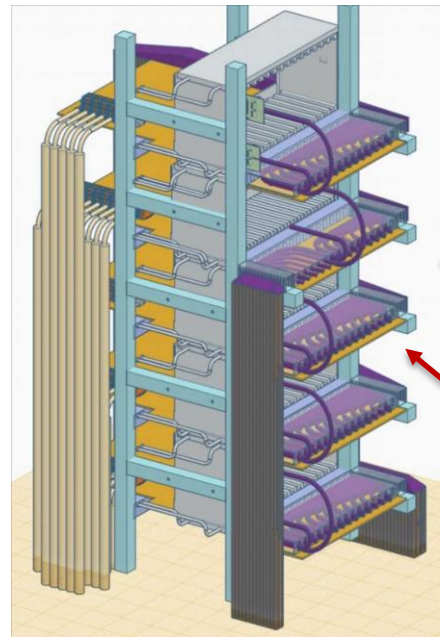
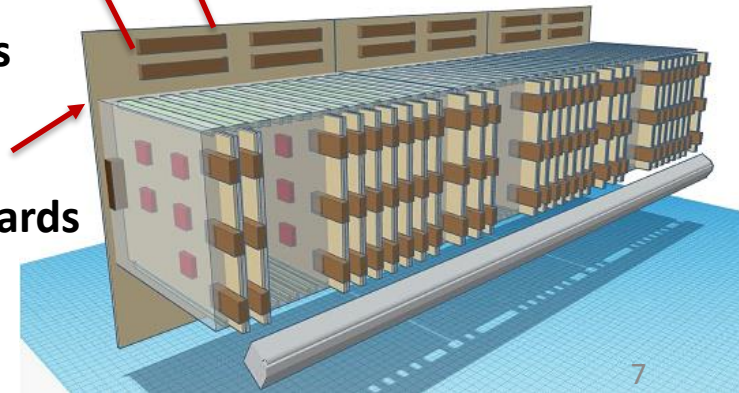
Integration of the UT in LHCb

Work mainly done
by P. Gorbounov



Service Bay Rack with LV regulators
(mechanics, cooling, cabling)

Chassis with Data Concentrator Boards
(mechanics, cooling, cabling)





Mechanics by Francois Garnier and Pierre Ange Guidici

Large area Scintillating Fibre Tracker (340 m²), replacing present tracker

Current DT role

- Fibre refinement (aka bump shrinking)
 - Fibre quality assurance and logistics
 - Project management
 - Fibre R&D for future SciFi trackers
- } 11'000 km

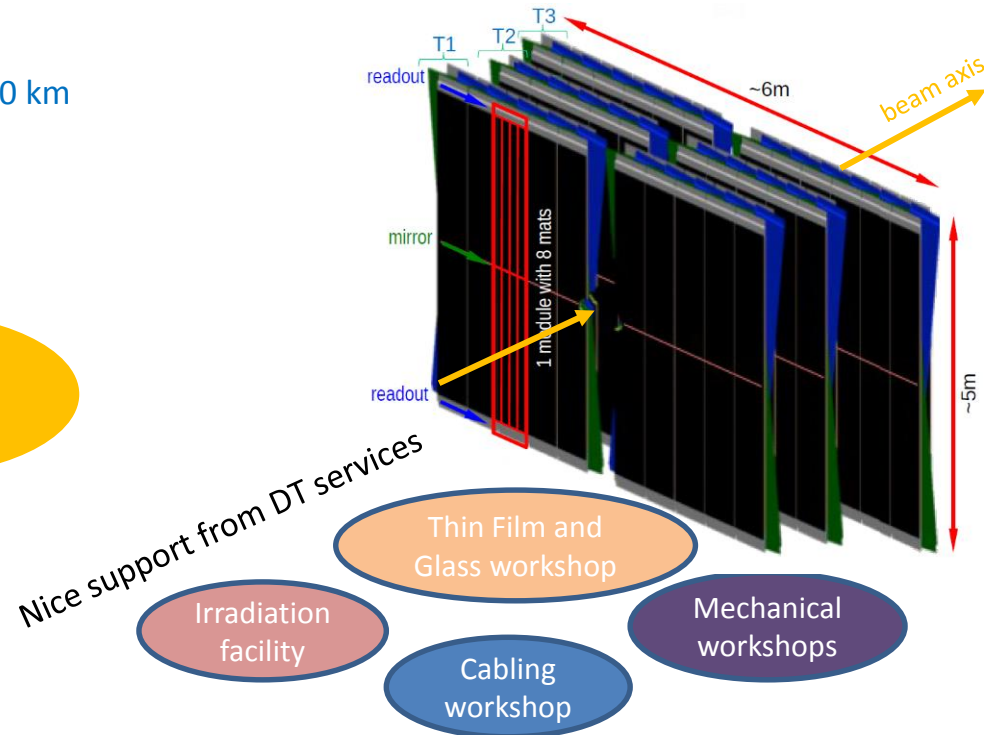
➤ DT resources

- Christian Joram (0.9 FTE)
- Robert Kristic (0.4 FTE)
- Thomas Schneider (0.2FTE)

Labs in
304-1-004 and
304-1-070

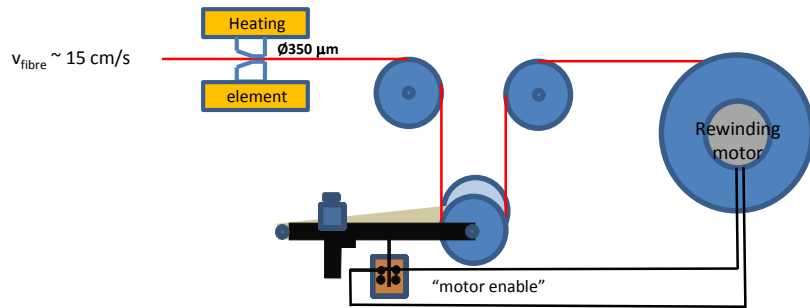
CERN / LHCb resources

- Lukas Gruber (LHCb fellow)
- Laura Gavardi (PhD student, U-Dortmund)
- Biplab Dey (Postdoc from China, 0.5FTE)

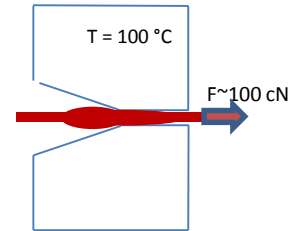


Contribution to SciFi

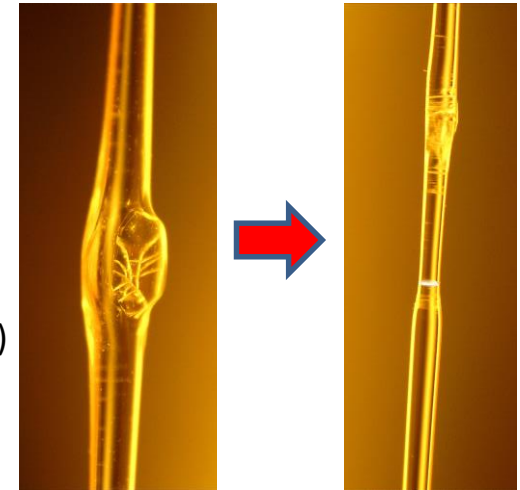
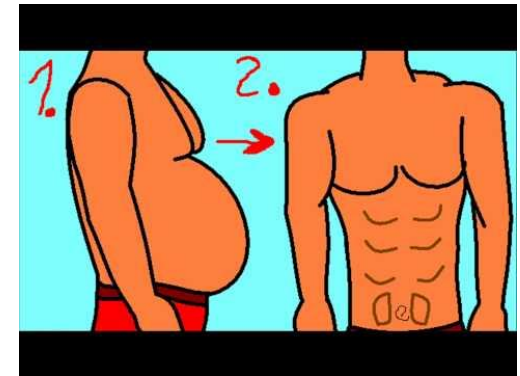
Bump shrinking – fully automated!



Fibre softens and is then pulled through a "hot hole" $\varnothing 350 \mu\text{m}$



The miracle of bump shrinking



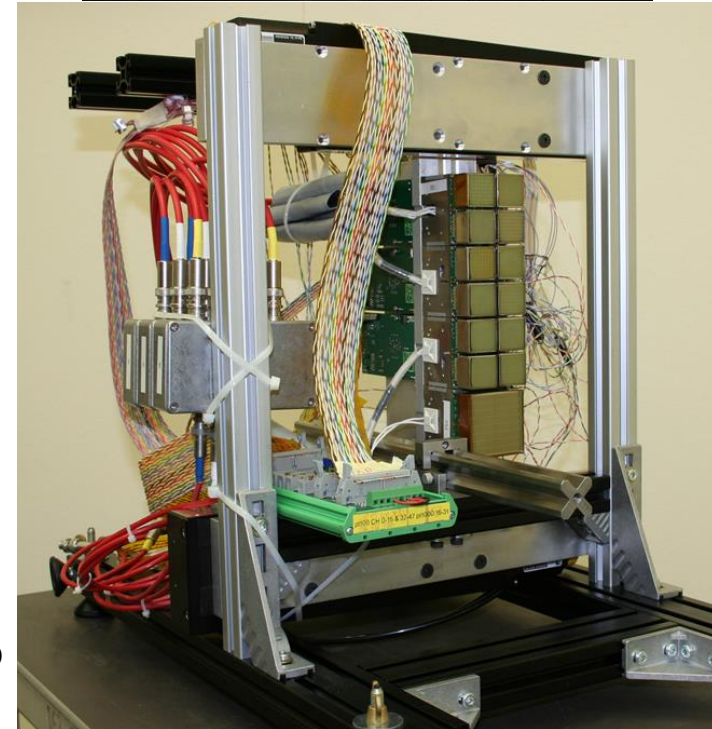
Fibre QA and bump shrinking: Some numbers

- 7000 km ($\sim 2/3$) of fibres received and tested
- 4000 km shipped to winding centres
- ≈ 800 samples analysed (att. length, light yield, spectra, radiation hardness)
- ≈ 4400 bumps shrunk
- ≈ 500 glue joints (if bumps are too large)

We will continue until end of 2017.

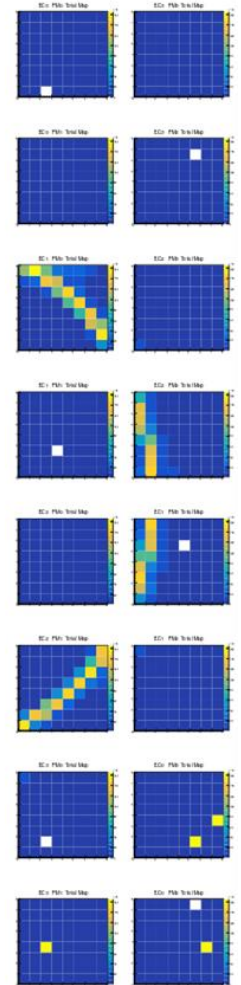
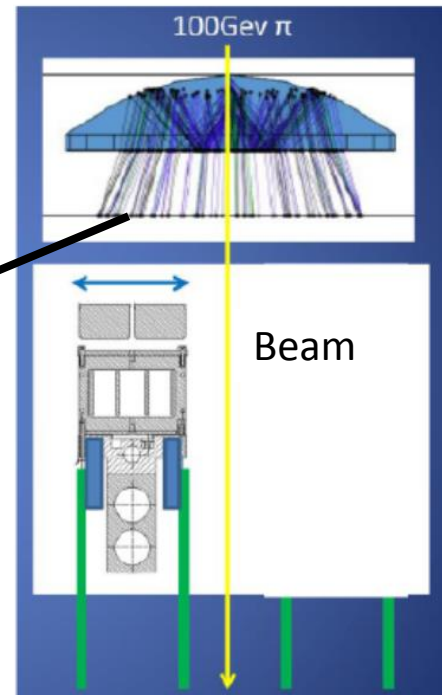
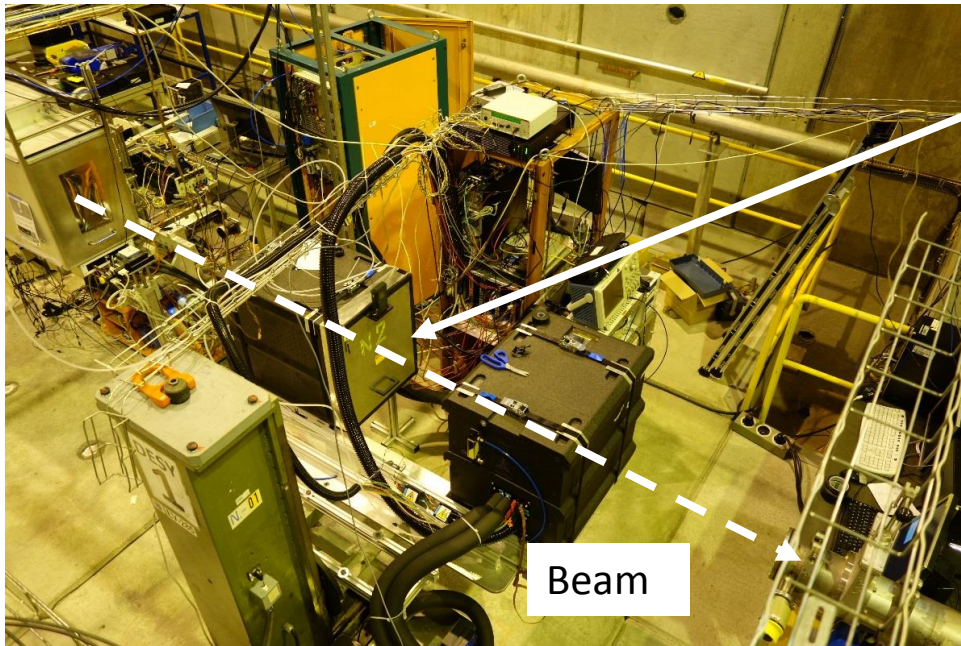
Contribution to the RICH Detector

- **Current LHCb-RICH maintenance and operation**
 - Follow-up of **HPD** reprocessing
 - Replacement of vacuum-degraded HPDs when needed
 - Punctual interventions (e.g. HV, L0, LV, cooling)
 - **LHCb-RICH upgrade**
 - Support for and follow-up of laboratory activities:
 - Test benches (e.g. **MaPMT** test vessel)
 - Dedicated test support (e.g. high rate laser tests with LHCb mini-DAQ)
 - Optical benches (e.g. QE measurements, RICH1 mirror prototypes)
 - Overall infrastructure
 - Support of beam test activities
- **Resources:** Thierry Gys (0.9 FTE) and D. Piedigrossi (0.9 FTE)
Work done in close collaboration with Ch. Frei & C. D'Ambrosio



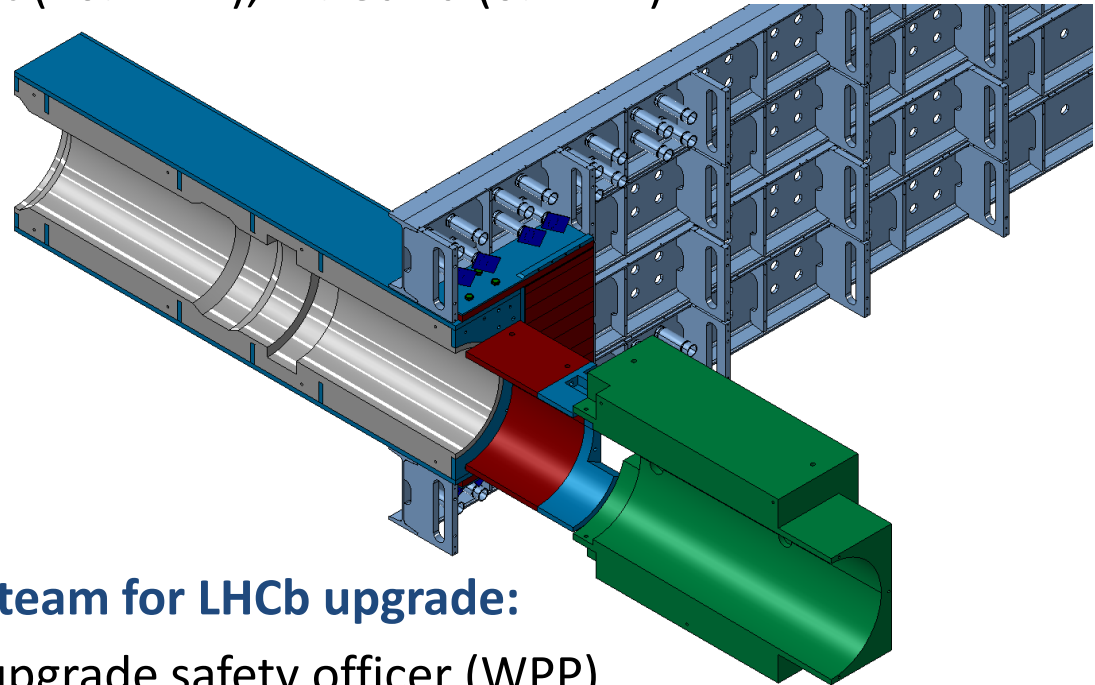
DT support for LHCb-RICH upgrade

- Test beam activities (SPS H8)
 - Overall test setup (with LHCb mini-DAQ)
 - Installation and alignment
 - Infrastructure and logistics



Contribution to Muon System and TC

- Improved shielding made of lead and tungsten to reduce the particle flux by about 60% in front of the first Muon Station after the calorimeter
- Resources: B. Schmidt (<0.1 FTE), M. Galka (0.1 FTE)



Support to the LHCb TC team for LHCb upgrade:

- M. Hatch (0.8 FTE): upgrade safety officer (WPP)
- O. Jamet (1 FTE): CAD manager, LHCb integration
- J. Batista (0.2 FTE): Project engineer, providing advice in reviews etc.