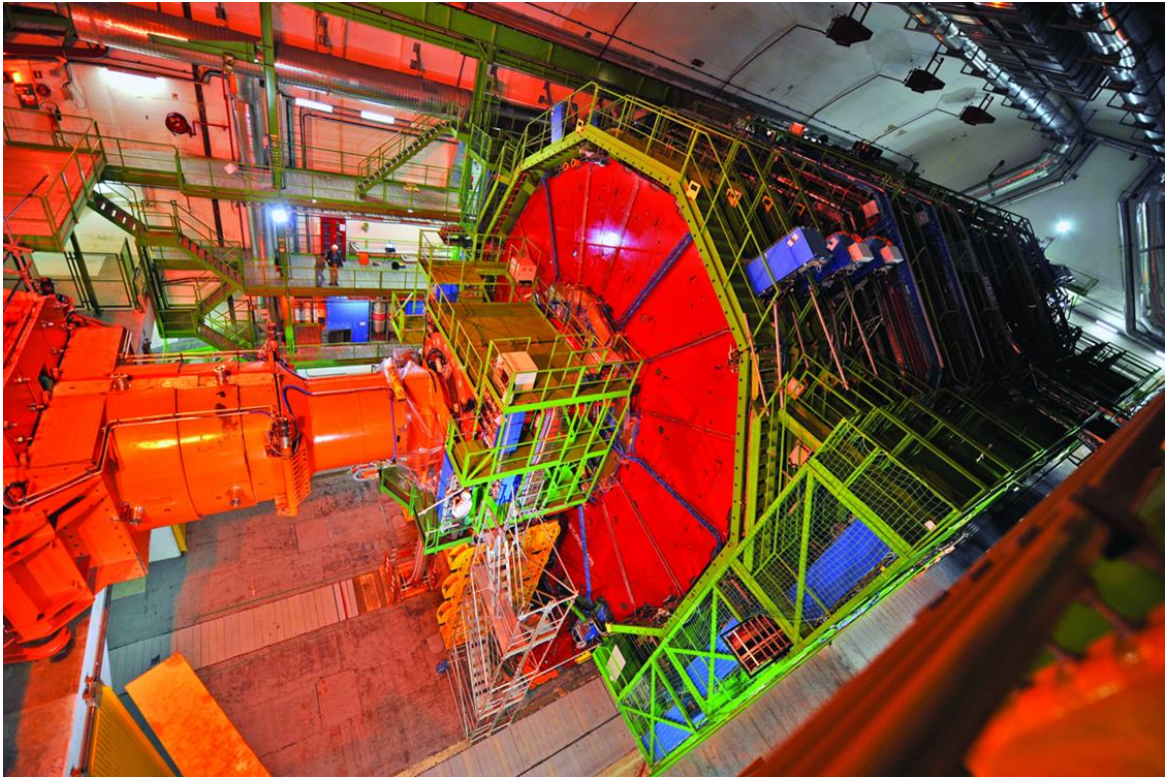


Longevity Issues

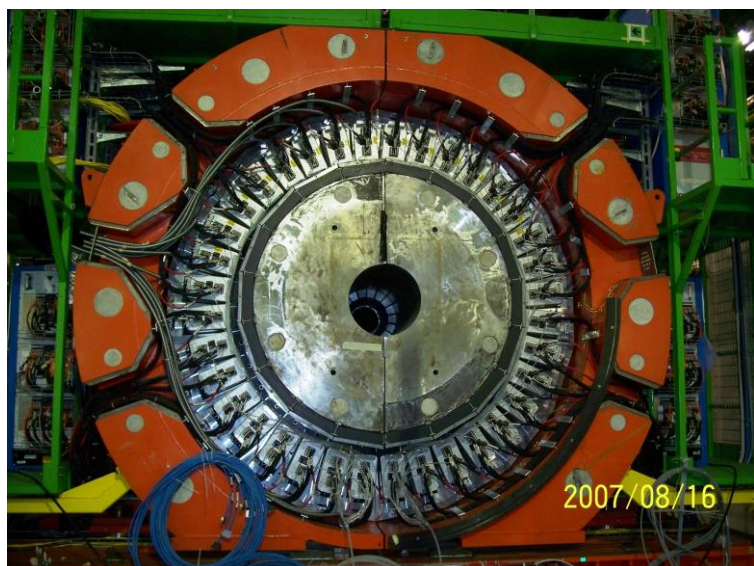
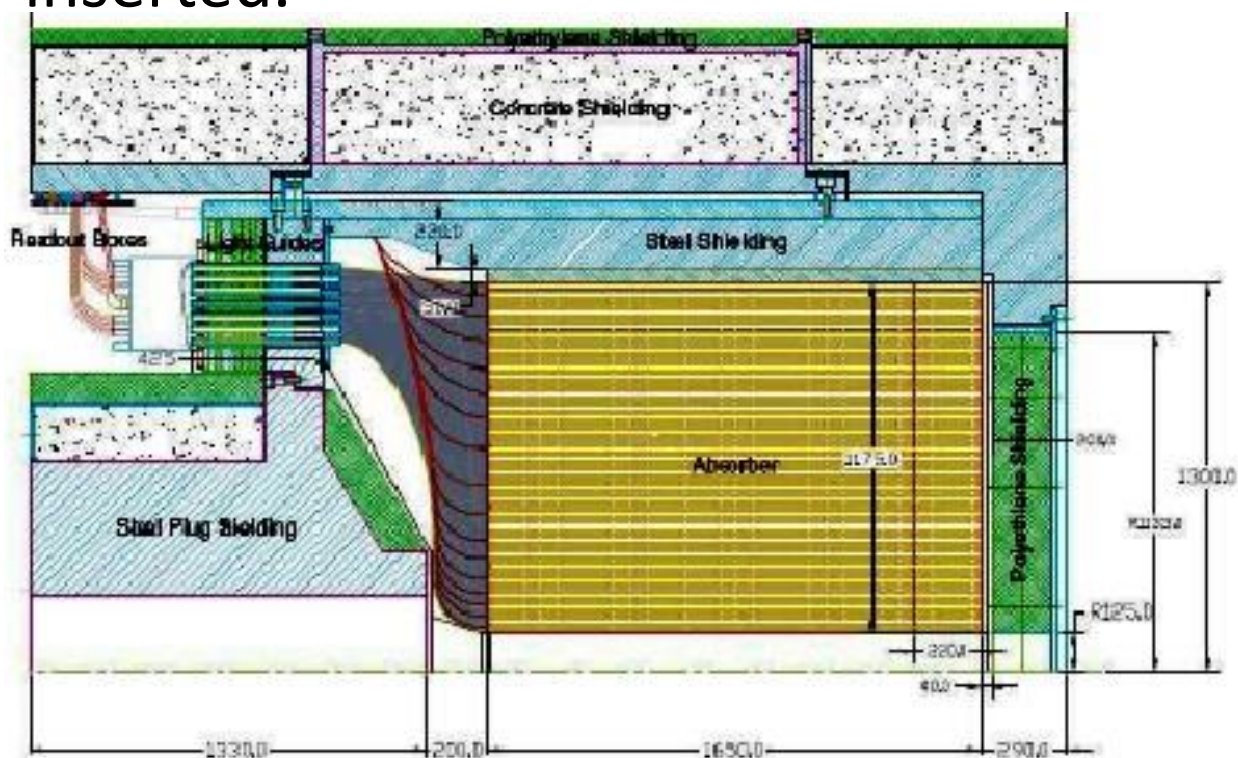
CMS's forward hadronic calorimeters (HF) covers the region immediately close to the LHC beam, 0.6 degrees to 6 degrees from the beam line.



Particle flow from the LHC interaction is so intense there that the major constraint on the technology adopted for the detector is the ability of materials to resist radiation damage. Quartz (fused silica) is one of these rare materials.

A. Penzo, 12 April 2024

The HF calorimeters consist of two barrels positioned at 11m on either side of the collision point. Each barrel, around 2m in diameter, is composed of 18 wedges. Each wedge consists of steel absorber plates with 12'500 quartz fibres (0.9 mm in diameter) inserted.



CERN Bulletin

Issue No. 09/2004 - Monday 23 February 2004

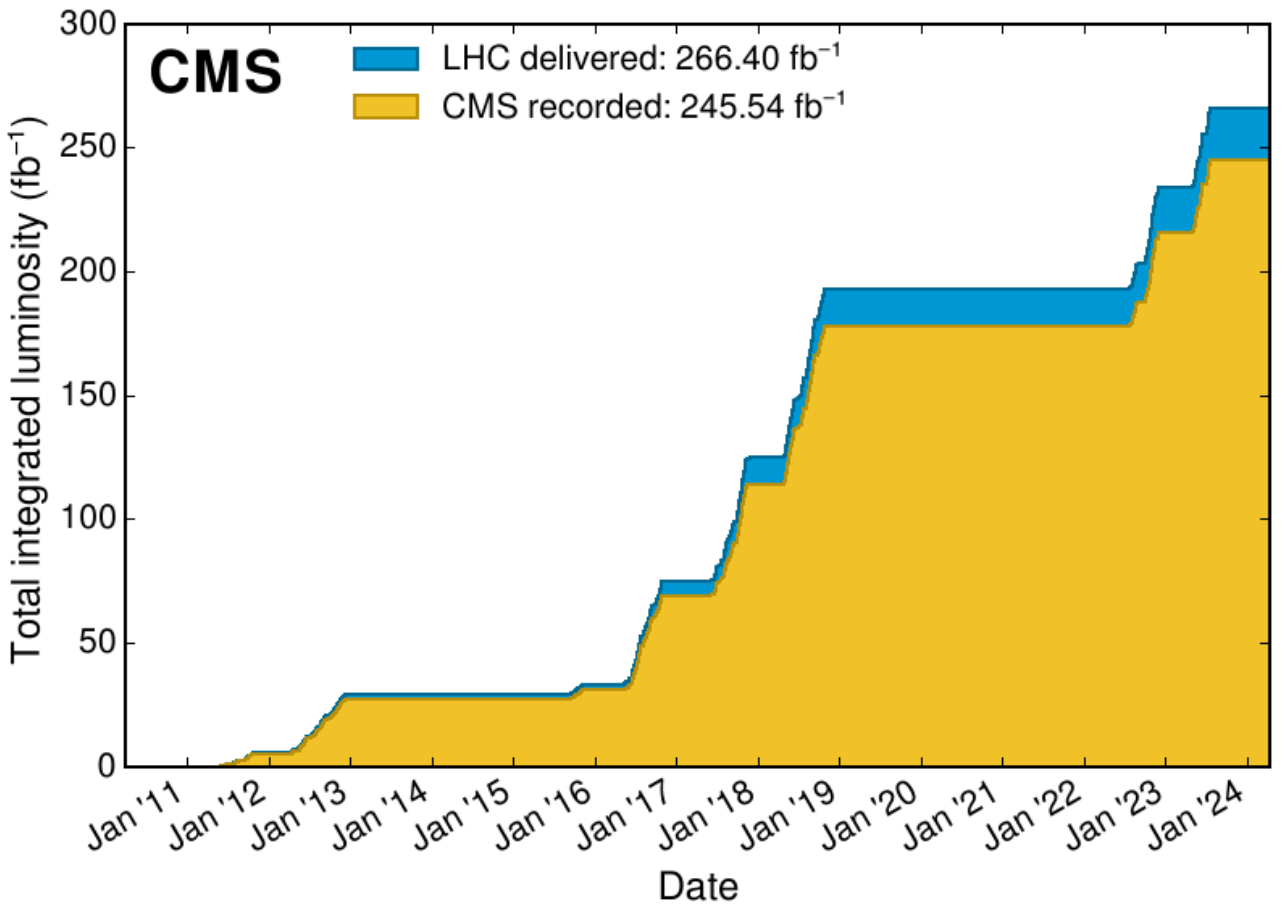
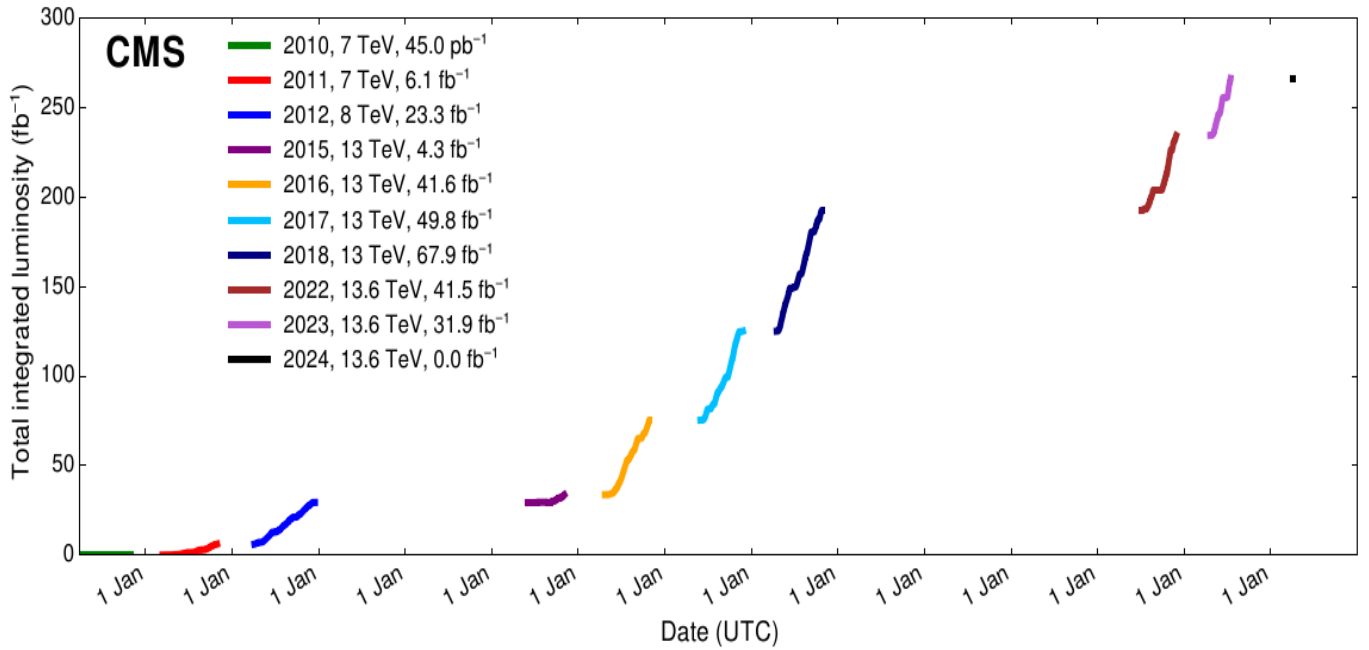
LAST FIBRE FOR THE CMS FORWARD HADRONIC CALORIMETER

On February 6th, 2004, an important milestone was passed by the CMS's forward hadronic calorimeter project: the last of 450000 quartz fibres was inserted and the wedge preparation phase has been completed.

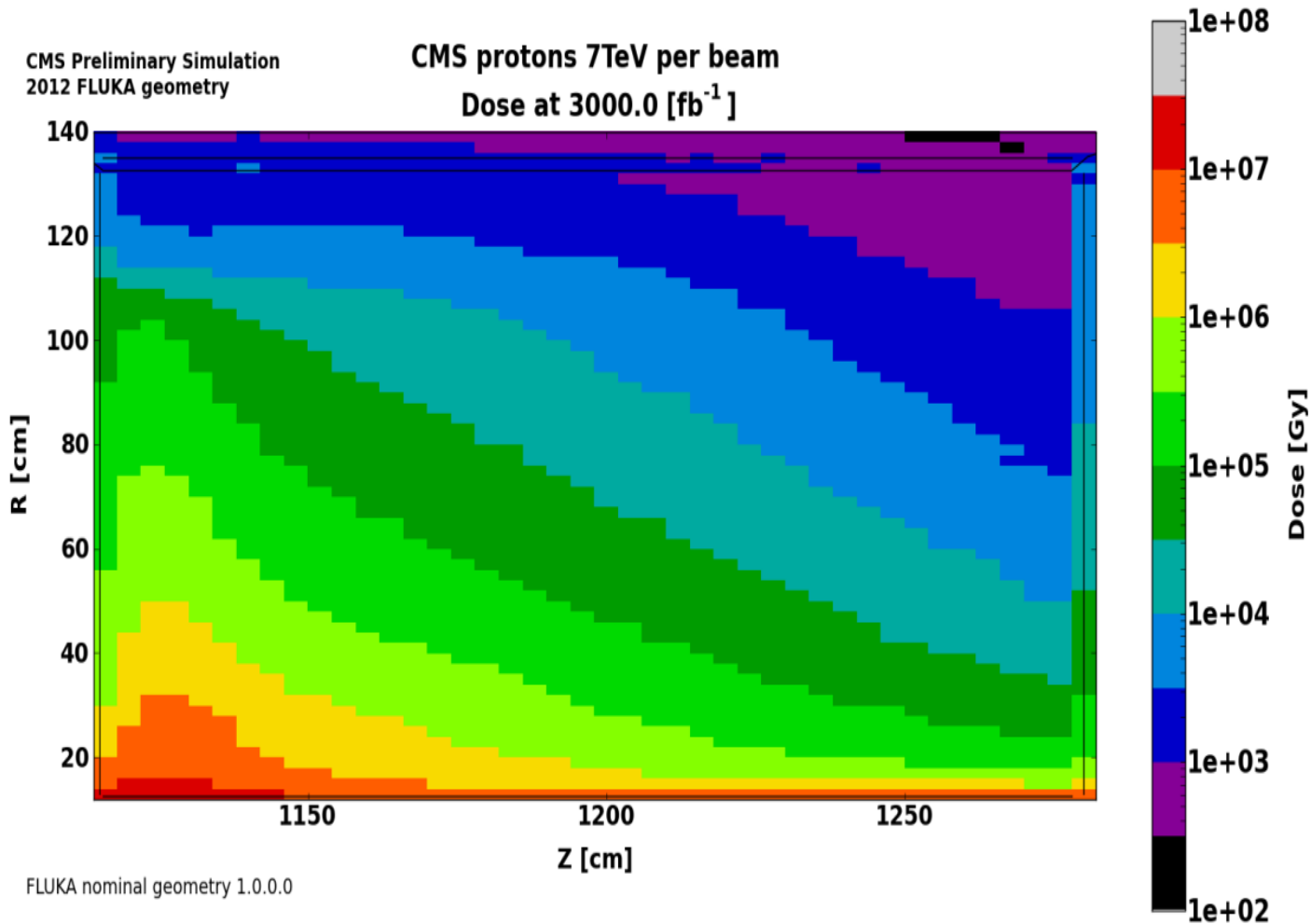


Rita Fodor, 19, working on one wedge of the CMS forward hadronic calorimeter in building 186. She and her four colleagues inserted the 450 000 fibres between November 2002 and February 2004.

LHC Luminosity Radiation in CMS



DOSE at HF

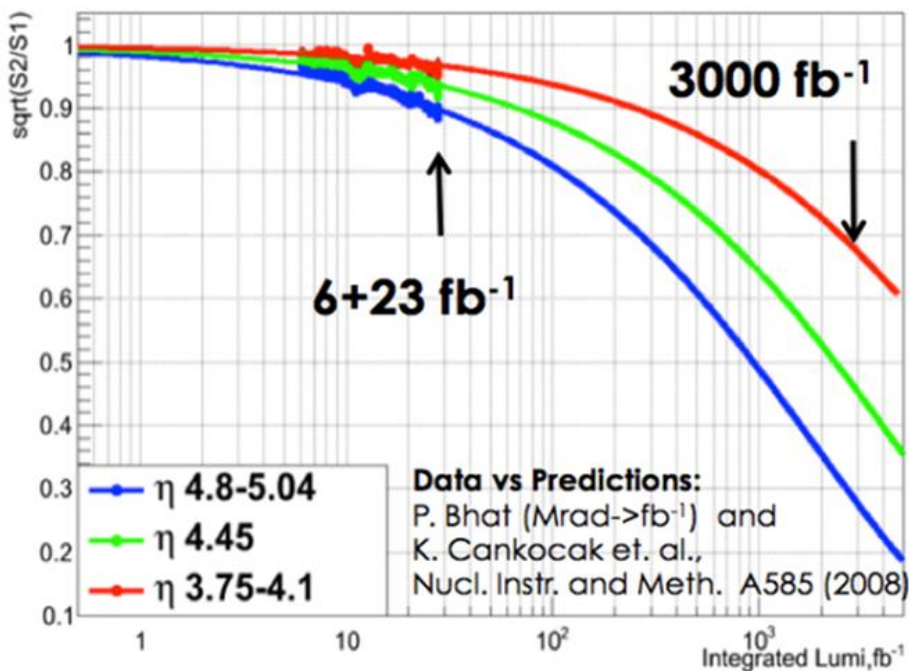
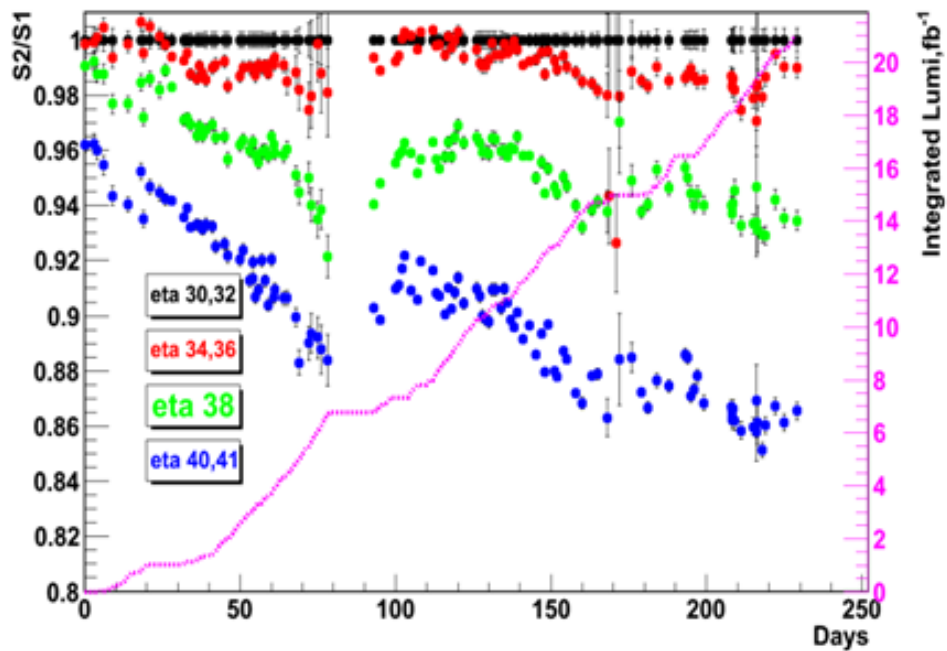


CMS FLUKA estimation of “absorbed dose” :

- p-p collisions with energy 7TeV/beam
- Inelastic collision cross section 80 mb
- Shown the HF detector region for an integrated luminosity of 3000 fb^{-1} .
- HF modeled as an average material with density of 7.51 g/cm^3 , composed of: 97% Fe, 1% Si, 1% O, 0.2% Cu, 0.1% C.

RADDAM

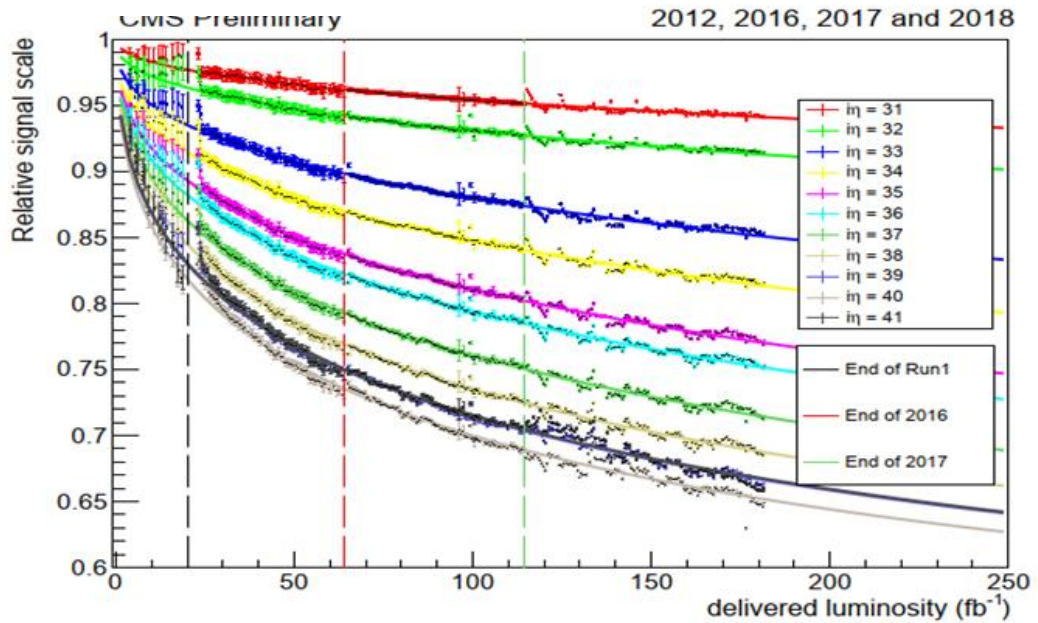
Laser measurements



(CMS DP -2013/025: Measurement of Radiation Damage in HF and HE observed in 2011 and 2012 data - 30 September 2013)

Pawel de Barbaro, Vladimir Epshteyn, Dmitry Elumakhov, Dmitry Vishnevskiy, Alexei Volkov.

Collision data



A. Stepennov: (CMS DN -2020/044
21 October 2020;v2, 07 December 2020);
Measurement of signal decrease in Forward
Calorimeter due to radiation damage in Run 2.

