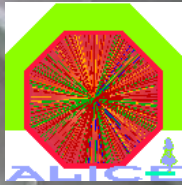


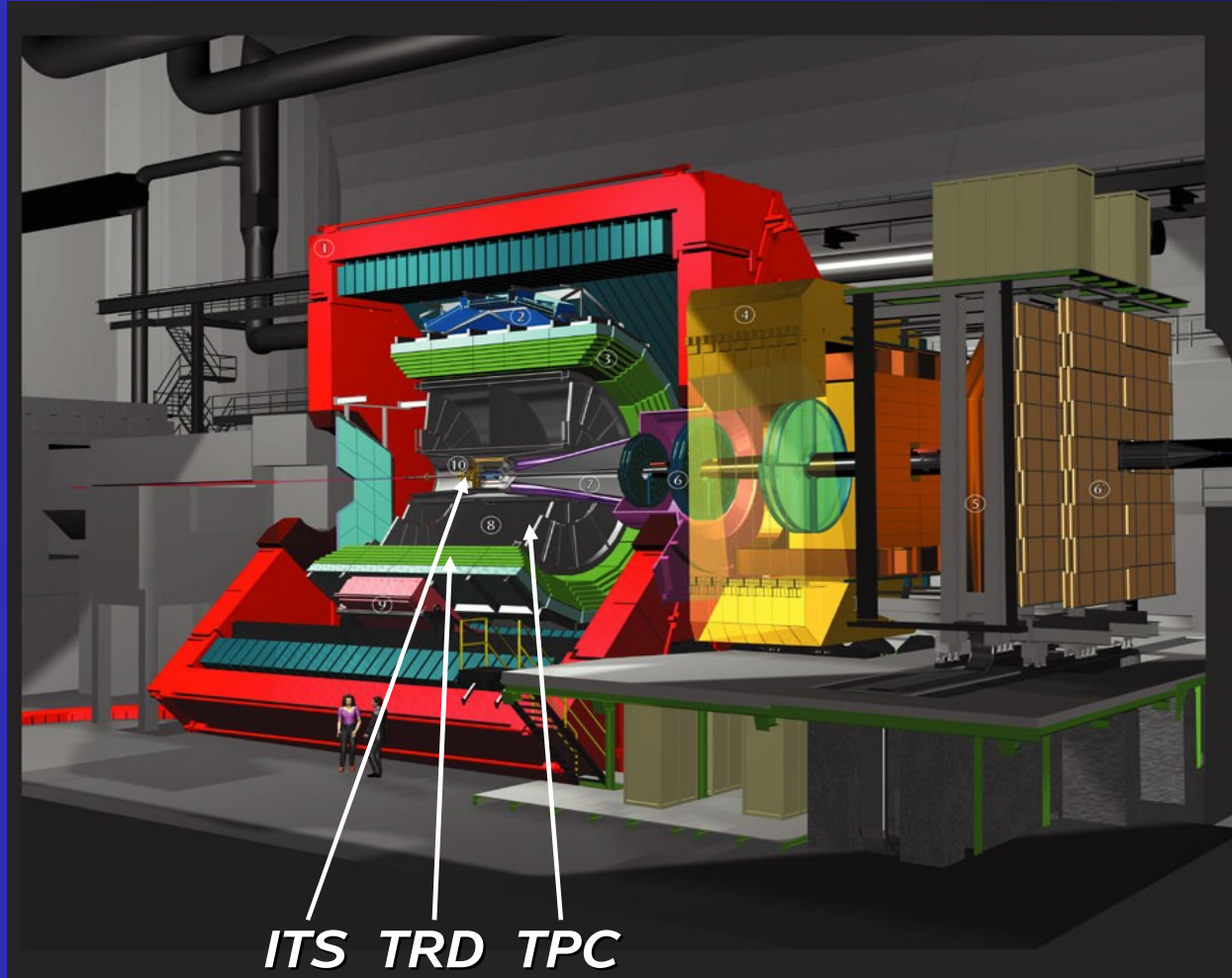
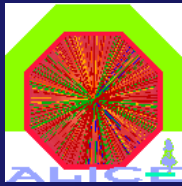
# Installation of the first TRD Supermodule at CERN in 2006

David Emschermann  
Physikalisches Institut  
Universität Heidelberg



# First a few words on physics

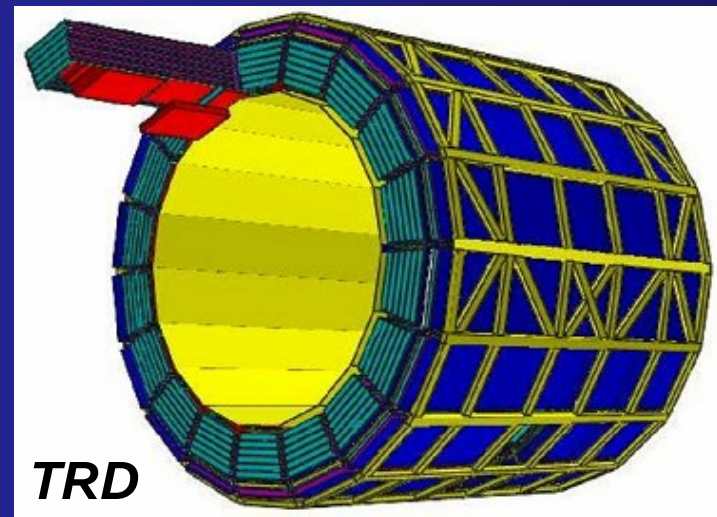
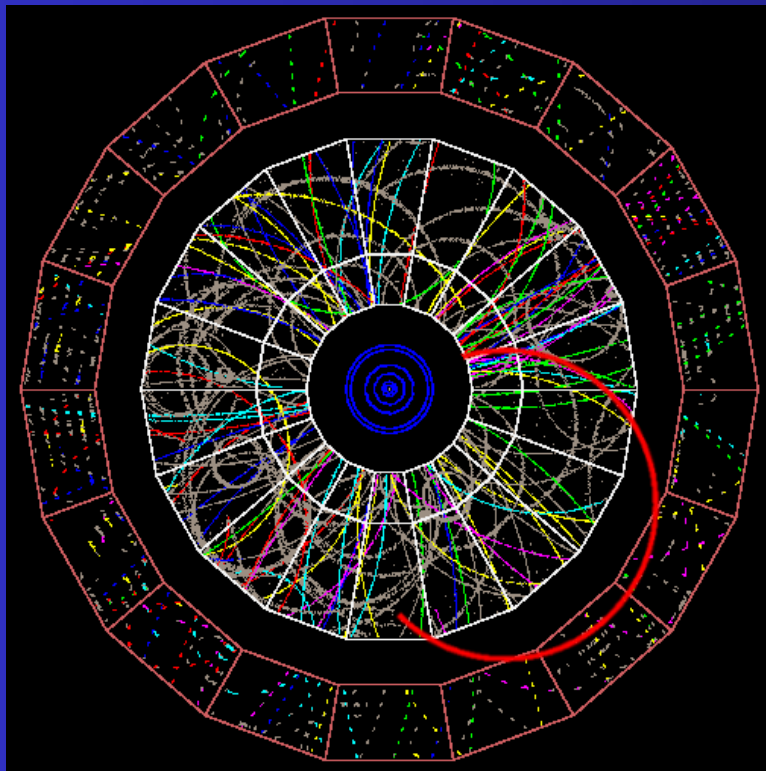
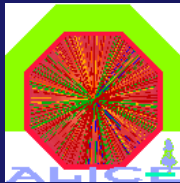
# ALICE overview



- 1• L3 MAGNET
- 2• HMPID
- 3• TOF
- 4• DIPOLE MAGNET
- 5• MUON FILTER
- 6• TRACKING CHAMBERS
- 6• TRIGGER CHAMBERS
- 7• ABSORBER
- 8• TPC
- 9• PHOS
- 10• ITS



# TRD overview

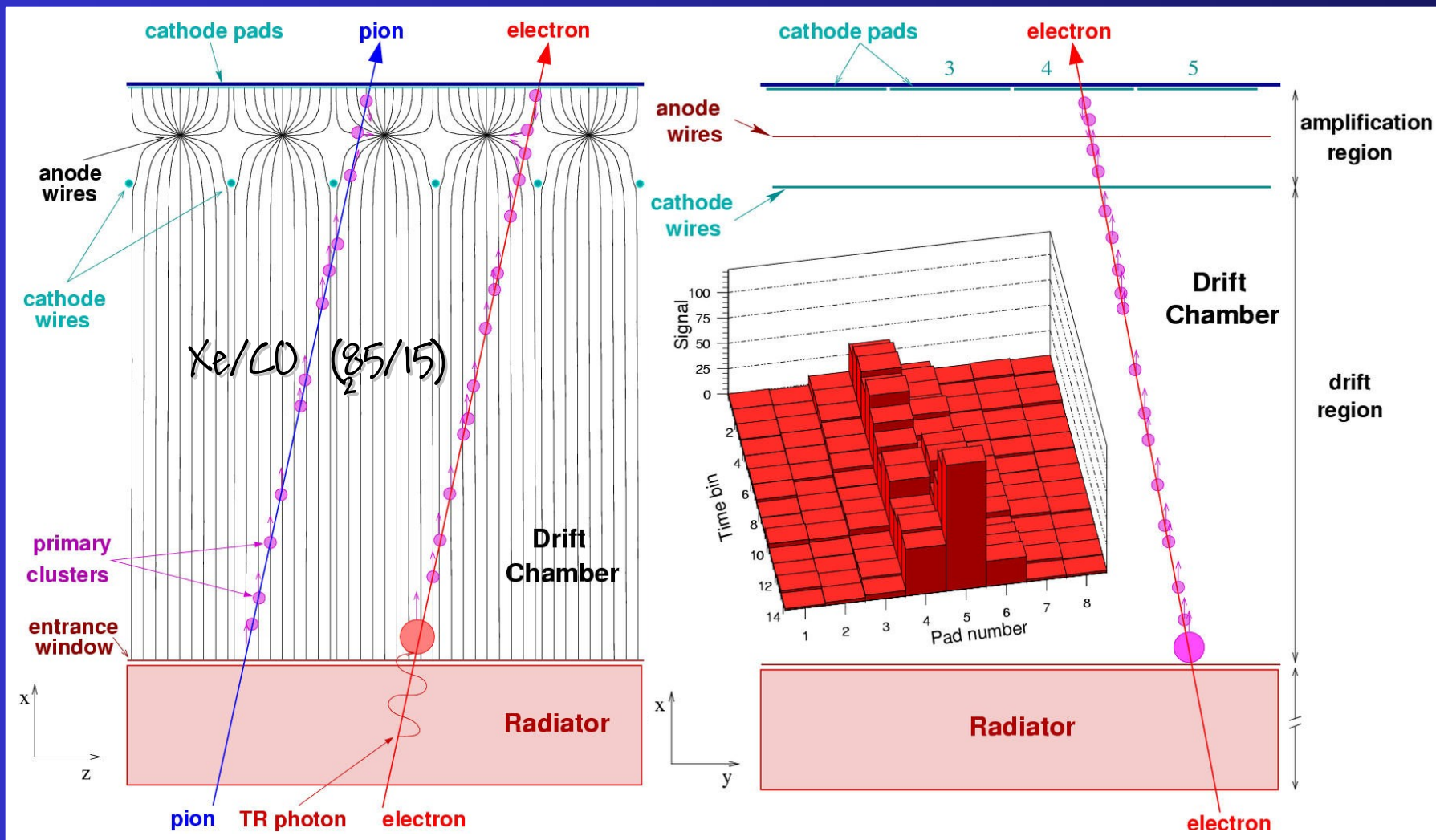
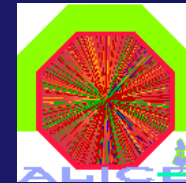


ALICE studies the characteristics of the quark matter produced in the Pb+Pb collisions at  $\sqrt{s_{NN}} = 5.5$  TeV.

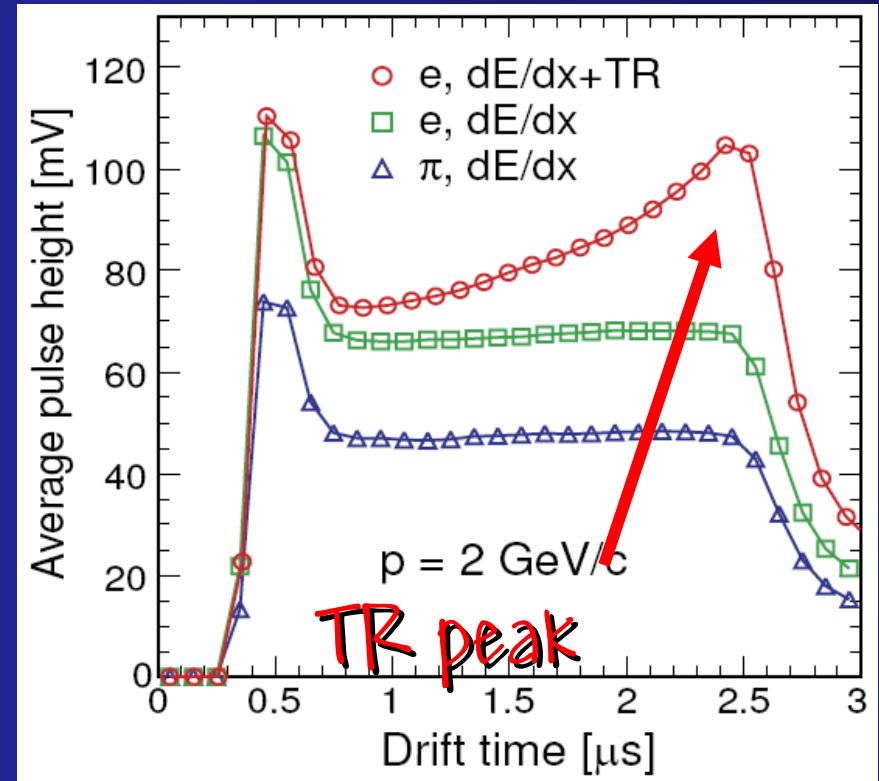
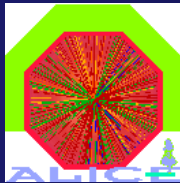
Expected  $dN/d\eta = 1500 \sim 3000$ .

TRD provides electron ID and trigger.

# The TRD operation principle

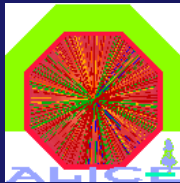


# TRD signal shape



- Charged particles at  $\gamma > 1000$  give T.R. photons.
- Thin ( $< 0.25 X_0$ ) detector with low power  
( $\sim 60 \text{ kW}$  for 1.2 M channels) readout electronics

# Purpose of the TRD



Purpose :

Electron ID at  $p > 1 \text{ GeV}/c$ .

Fast ( $6 \mu\text{s}$ ) trigger for high- $p_T$  + PID.

Improved momentum resolution.

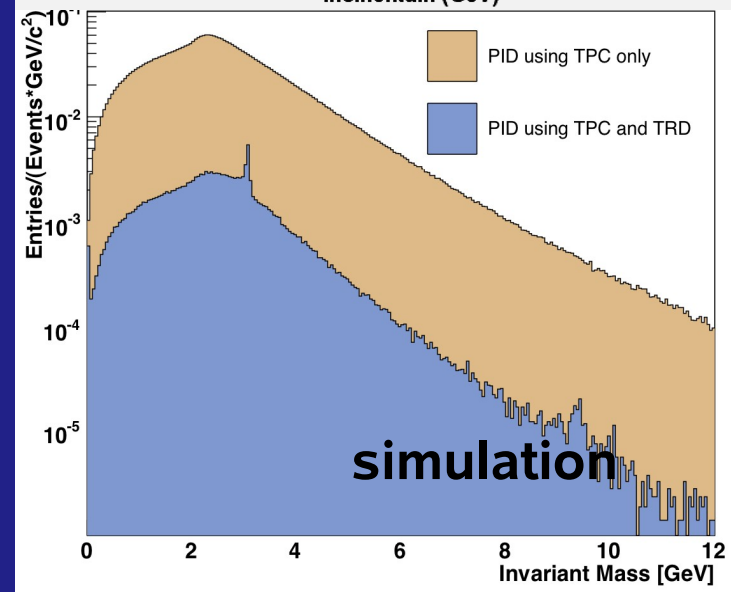
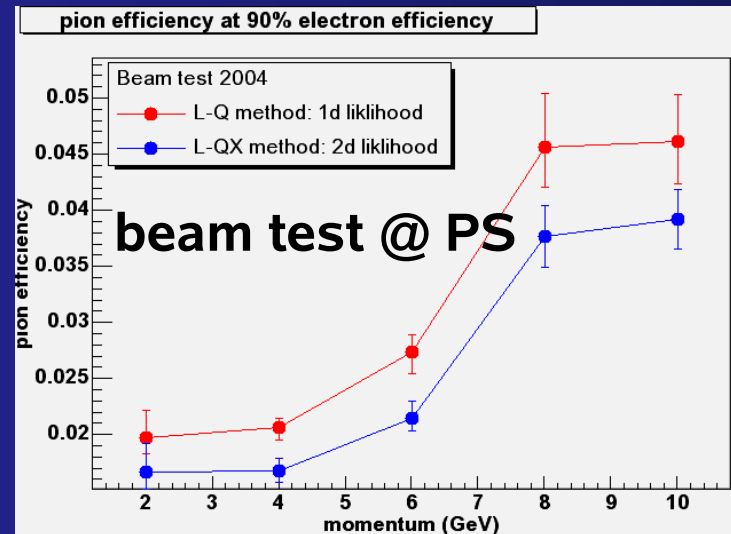
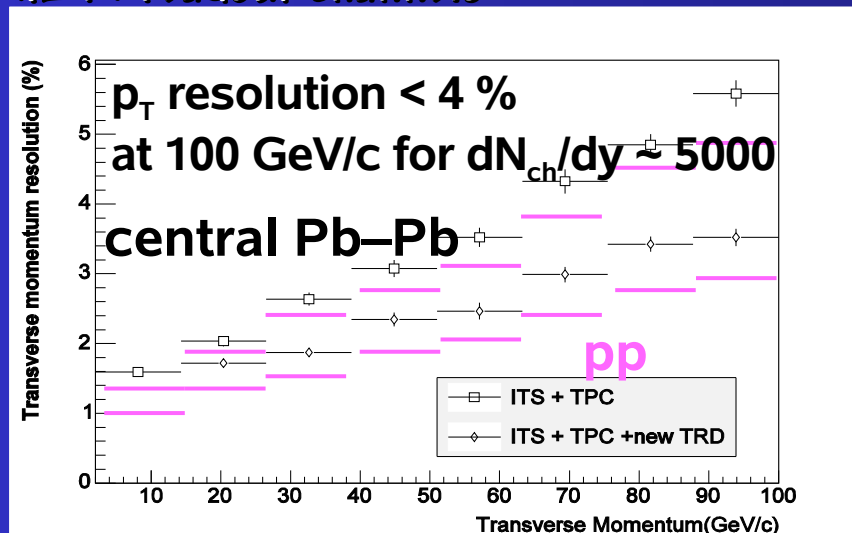
Parameters :

$|\eta| < 0.9, \quad 0 < \varphi < 2\pi$

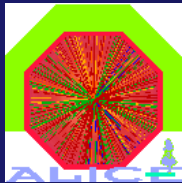
540 modules (18 super-modules)

$28 \text{ m}^3 \text{ Xe}/\text{CO}_2$  (85:15)

1.2 M readout channels



# TRD lab in Heidelberg

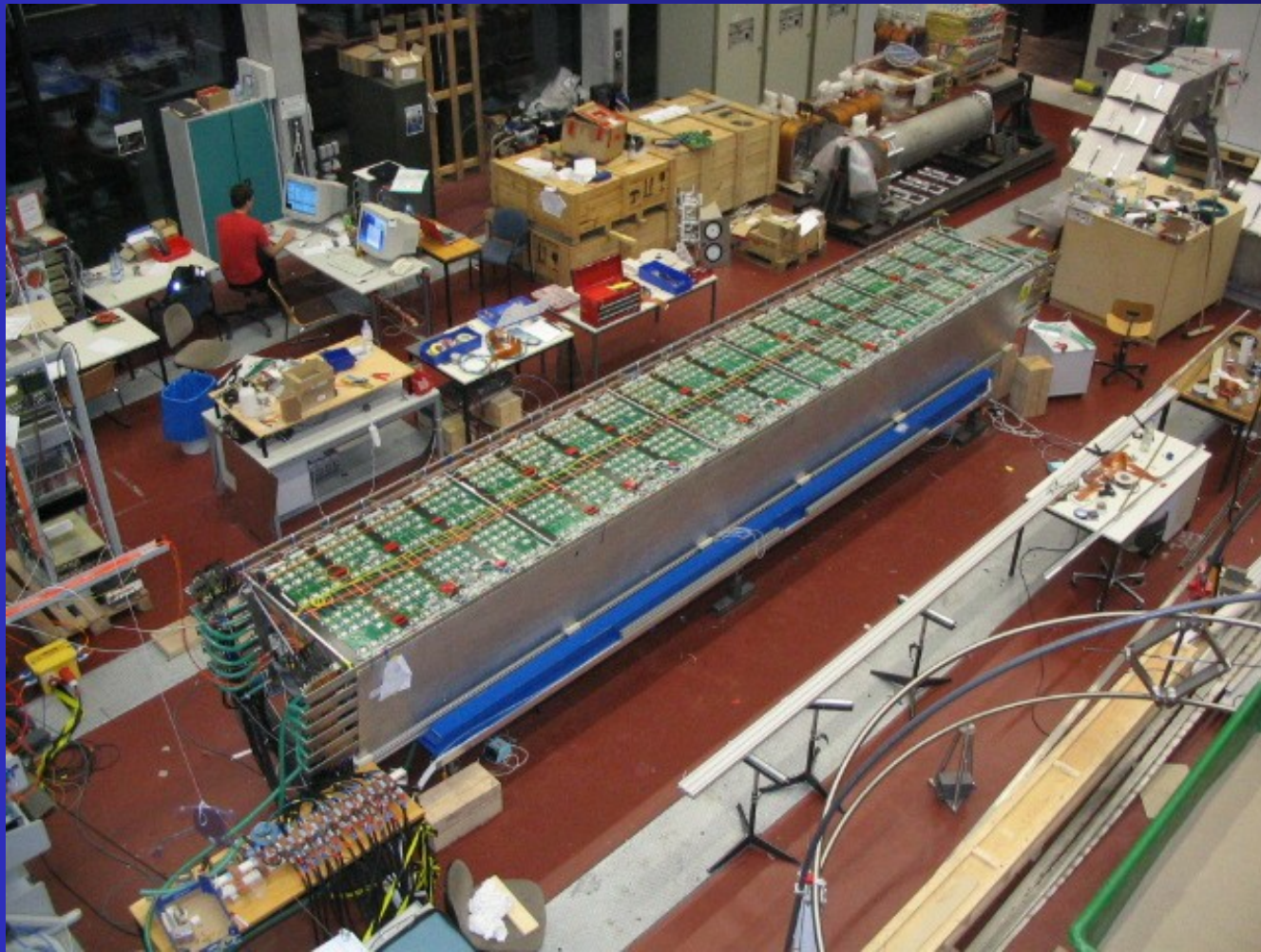
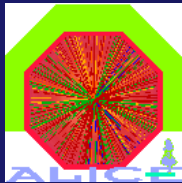


The story begins here at KIP



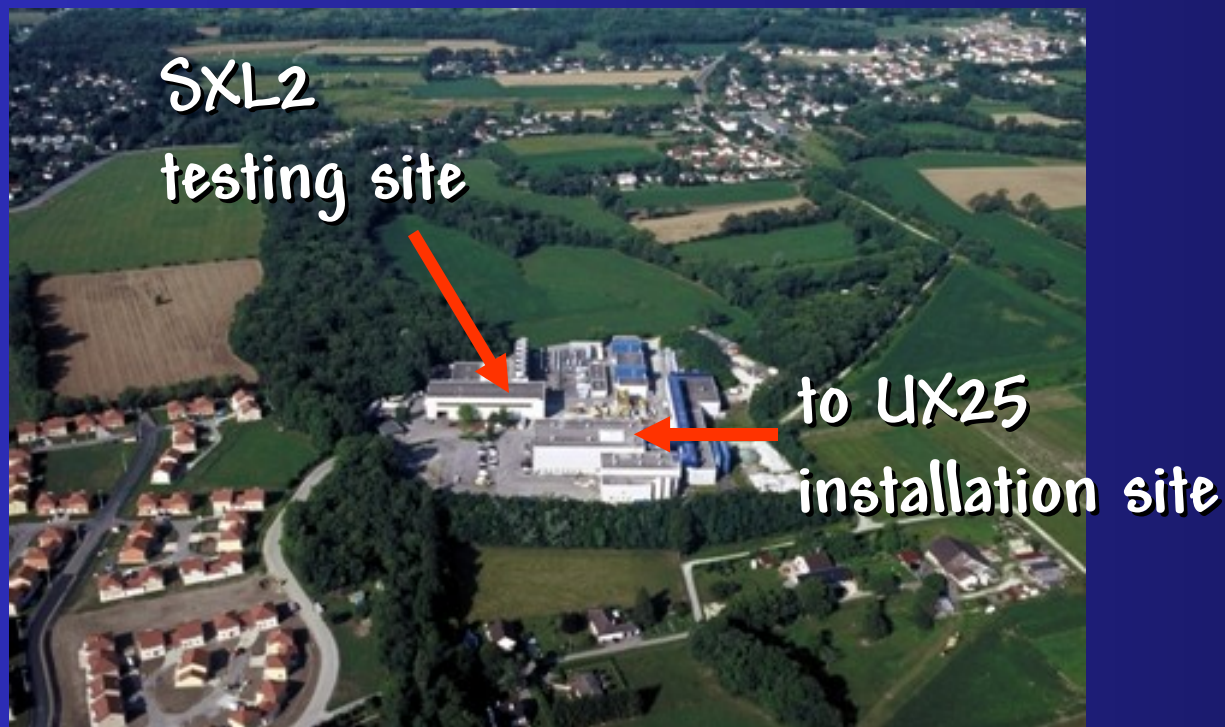
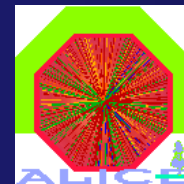


# The 1<sup>st</sup> TRD SM in Heidelberg

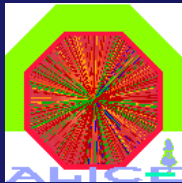


End of September 2006 in Heidelberg

# ALICE at Point 2

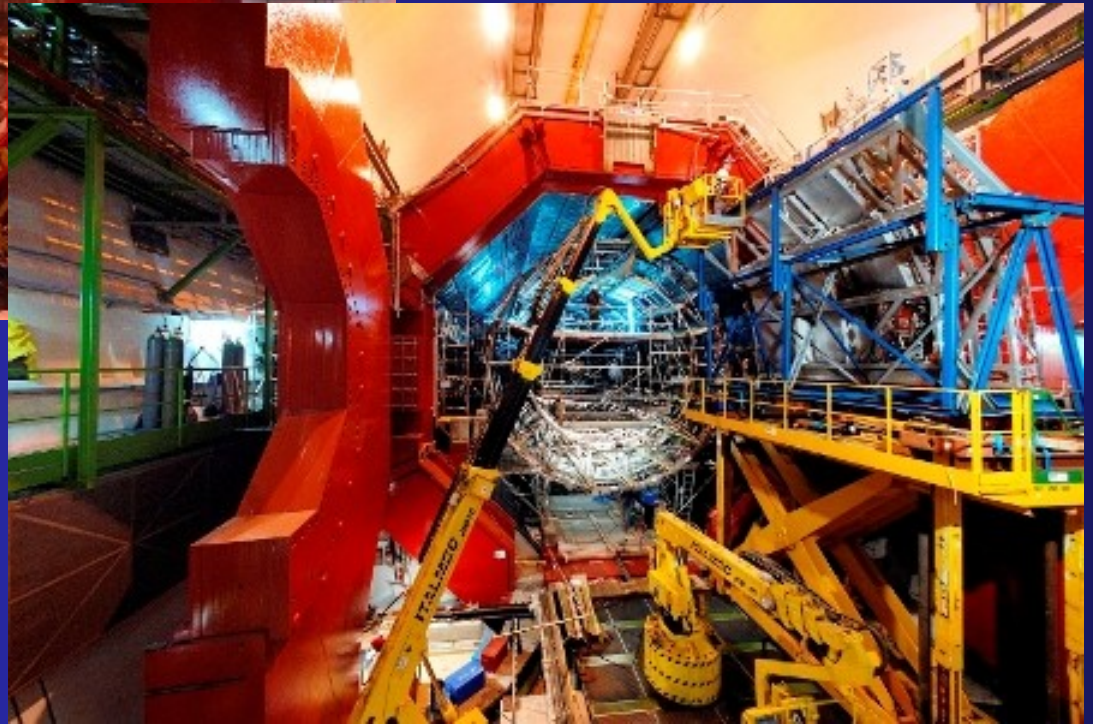


# The ALICE magnet underground

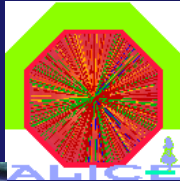


we are not  
alone installing  
detectors

installation into  
sector 08

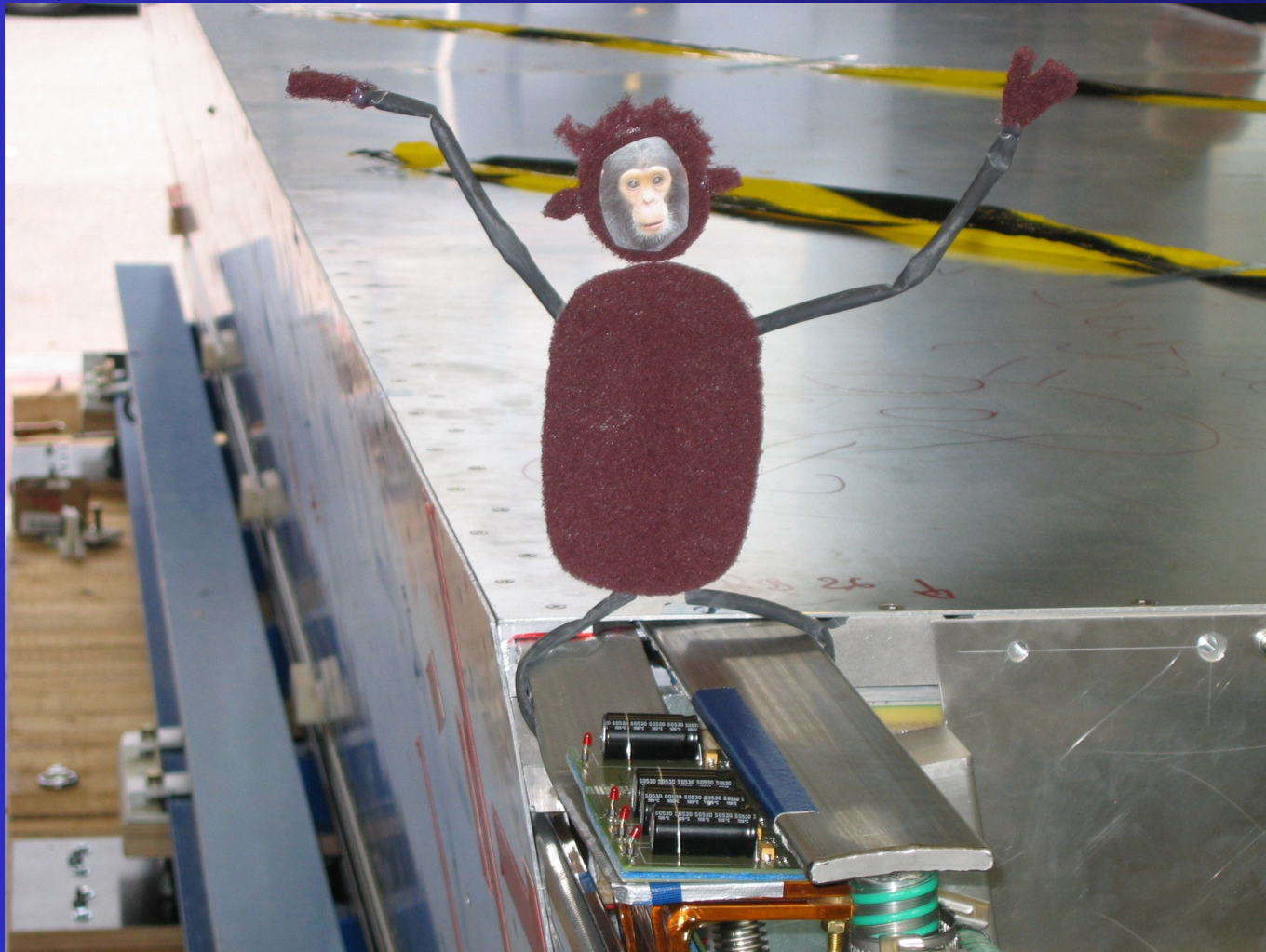
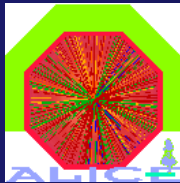


# TRD departure from HD



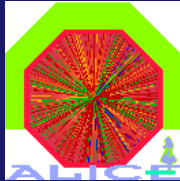
**weight 2200 kg**

# Monkey mountain

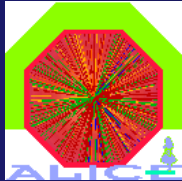


the monkey is always around - find it

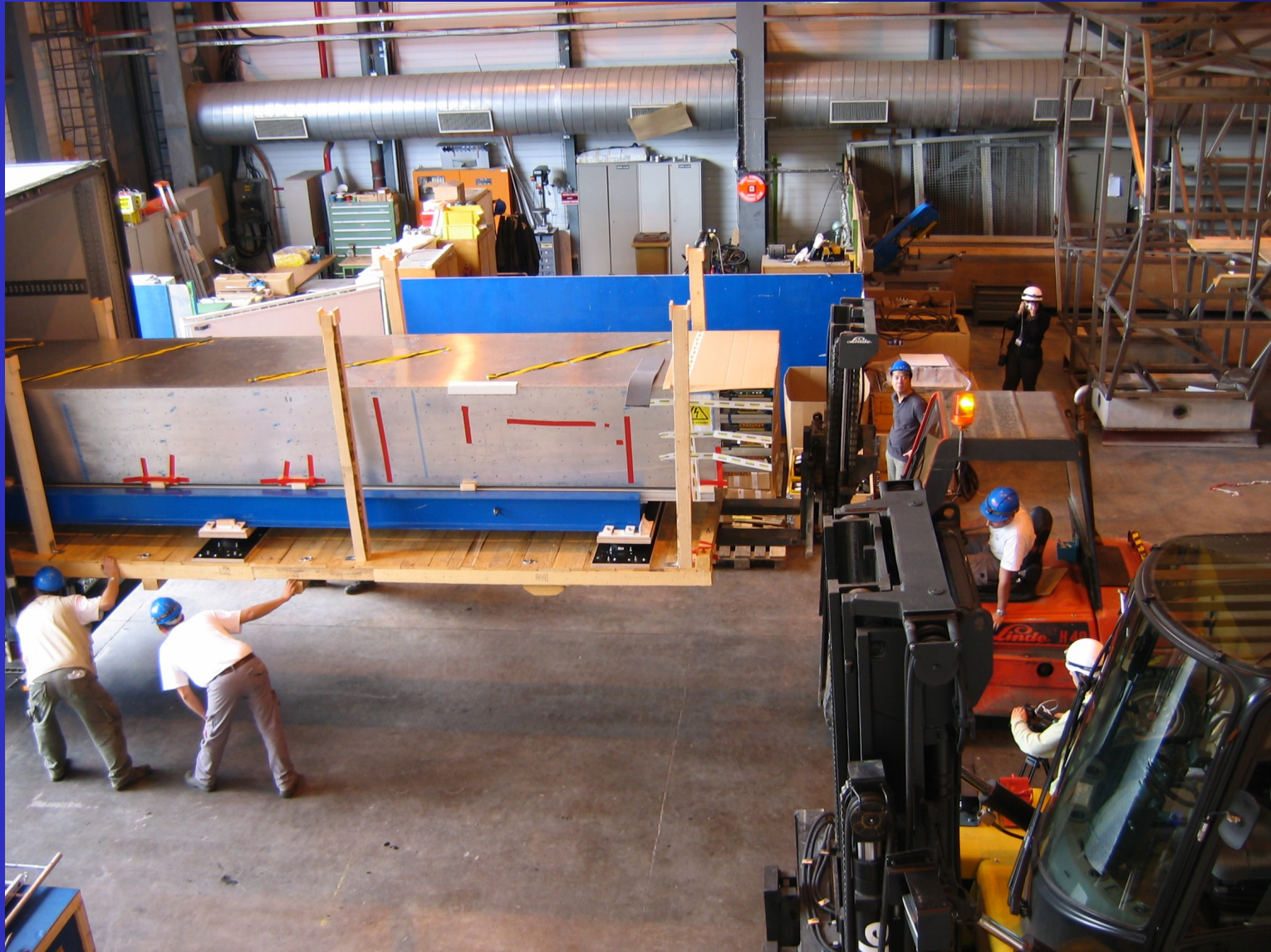
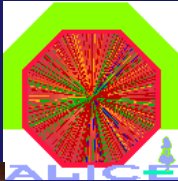
# TRD loading into truck



# TRD almost in

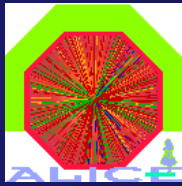


# TRD arrival at Point 2





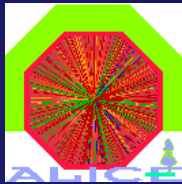
# TRD unloading at CERN



Arrival of first TRD supermodule  
from Heidelberg at CERN  
on September 28, 2006



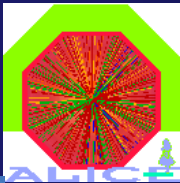
# TRD insertion into the rotator



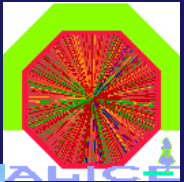
Insertion of first TRD supermodule into rotating installation tool



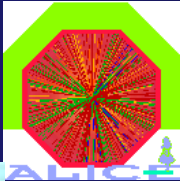
# TRD arrival at SXL2 hall



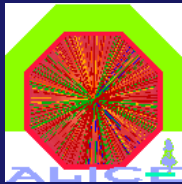
# TRD on the crane



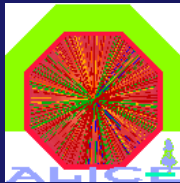
# TRD testing in SXL2



# Working hard on the TRD

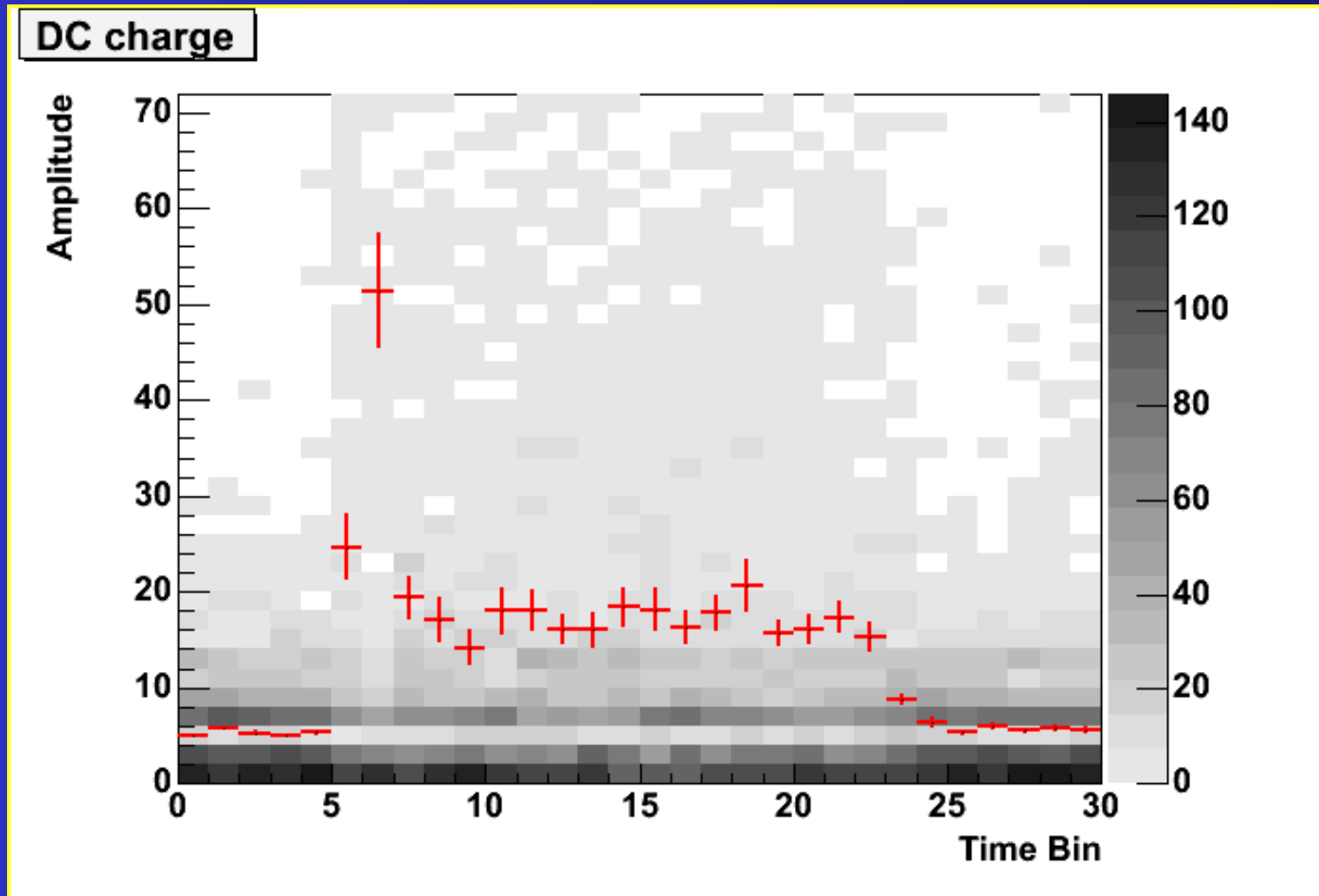
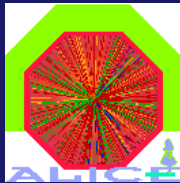


# First Summary



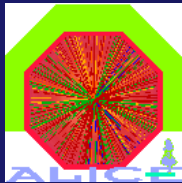
- TRD super module successfully transported from HD to CERN
- no damage during this module transport to CERN
- setup of testing infrastructure ready after only 2 days
- 10 days of cosmic data taking

# Average pulse height

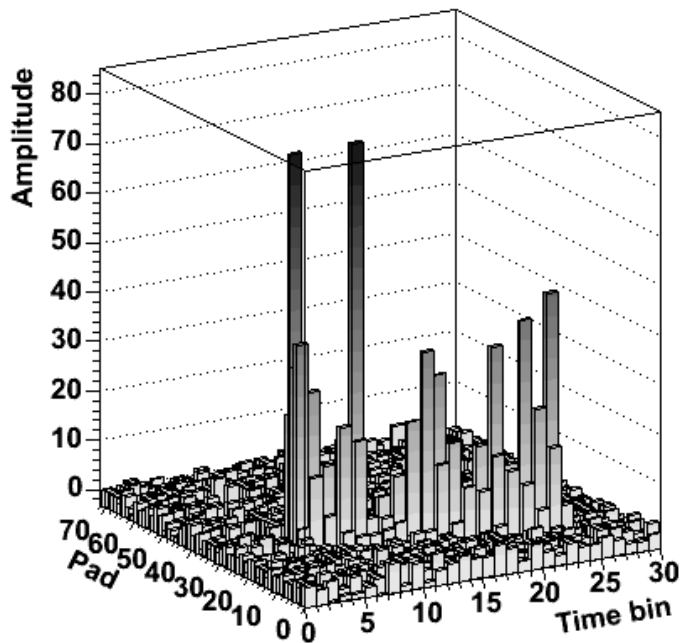




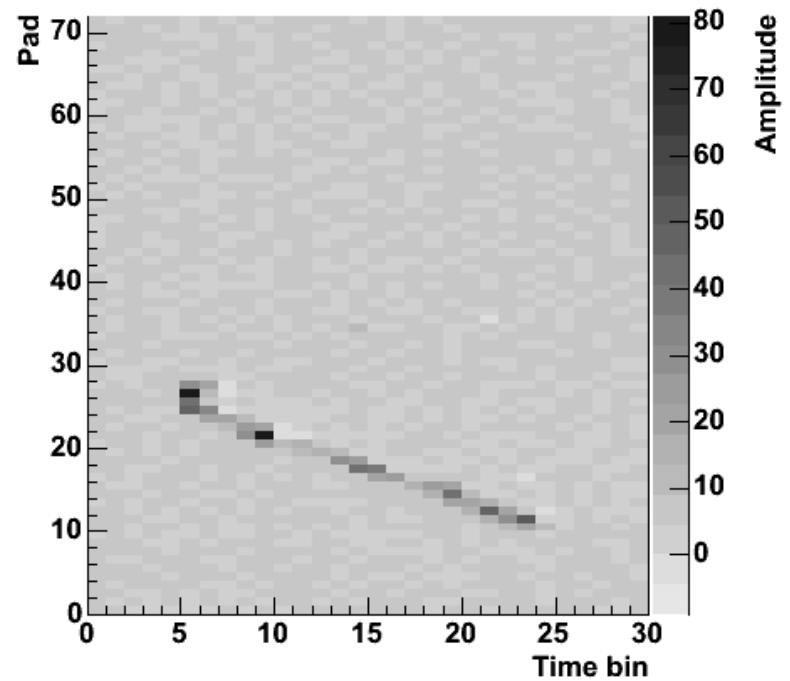
# Single cosmic event in the TRD



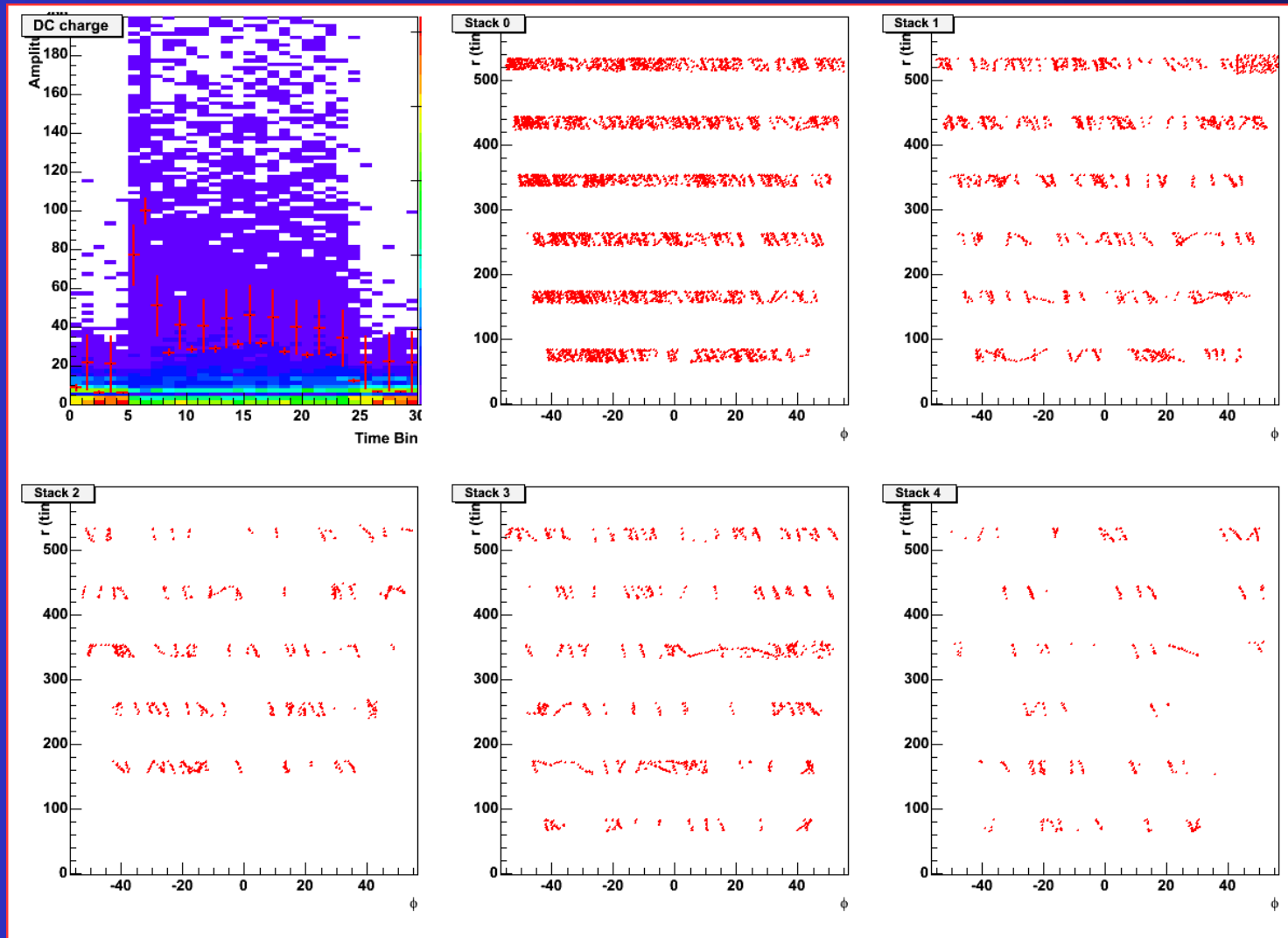
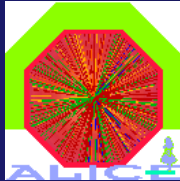
SM1, L1S3, ROB 3, MCMs 12-15



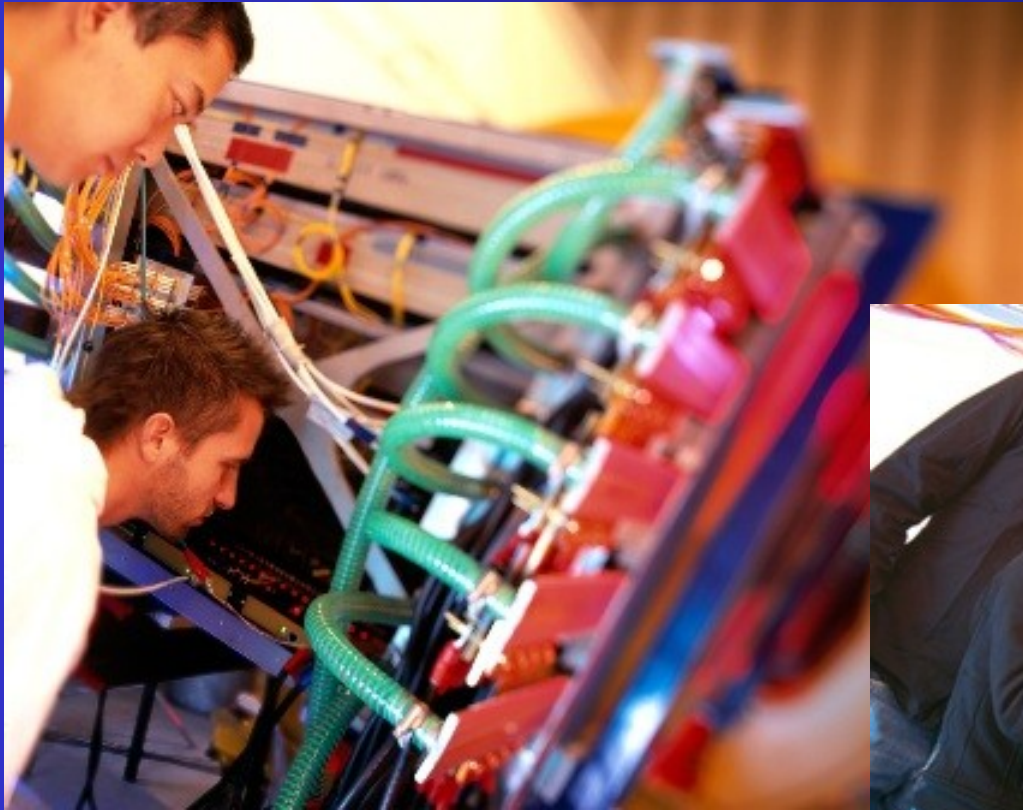
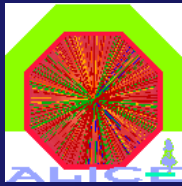
SM1, L1S3, ROB 3, MCMs 12-15



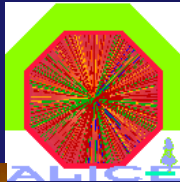
# Cosmic shower in the TRD



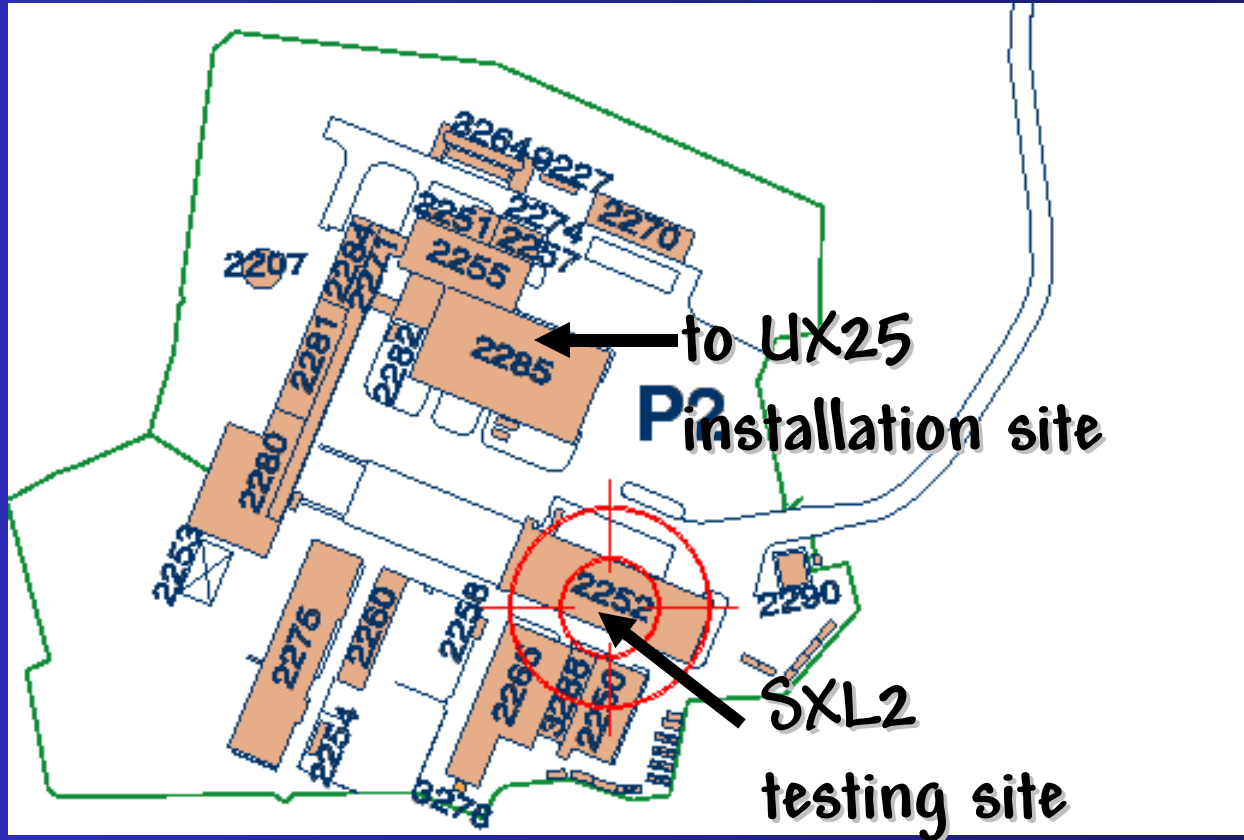
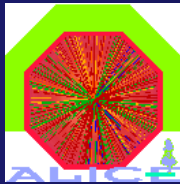
# TRD photo shooting



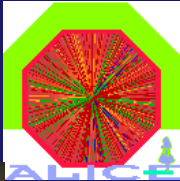
# TRD getting out of SXL2



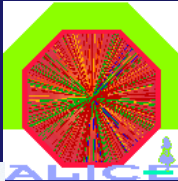
# SXL2 at Point 2 sketch



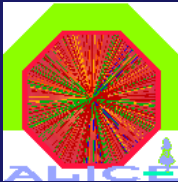
# TRD transport



# TRD transport

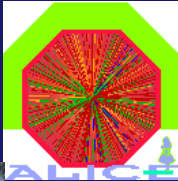


# TRD on the truck

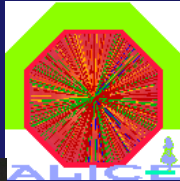




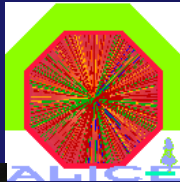
# TRD heading into SX2



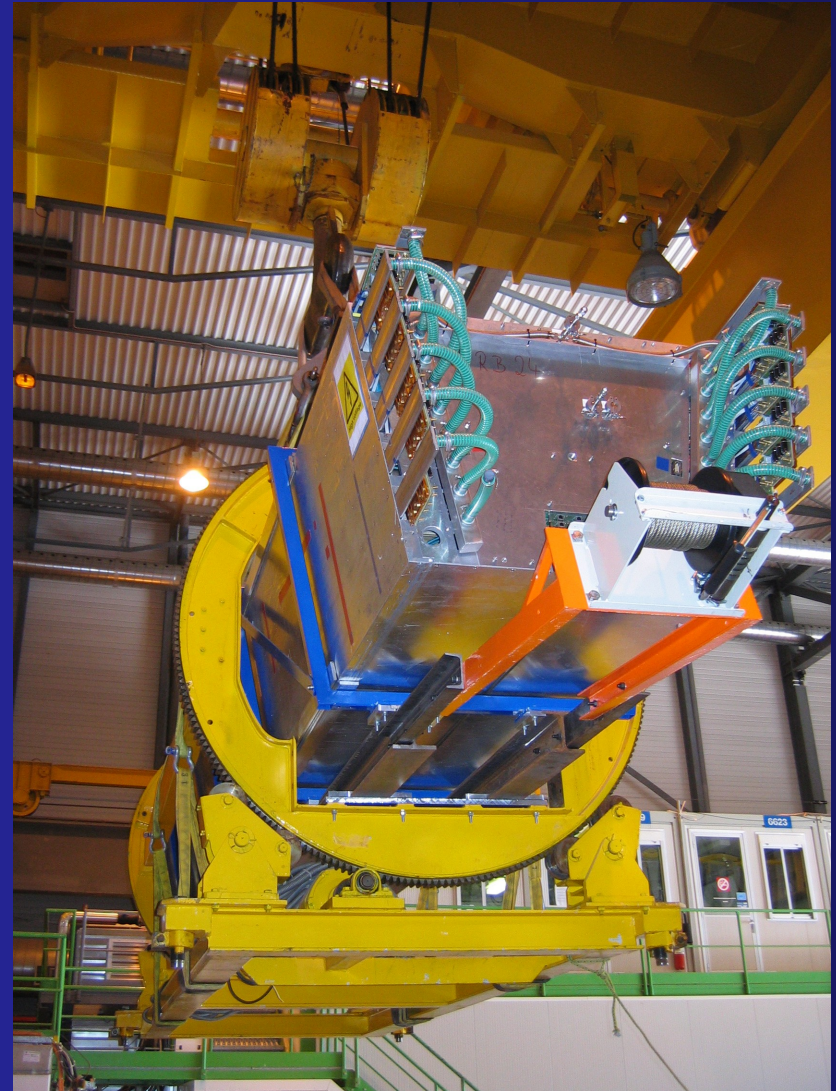
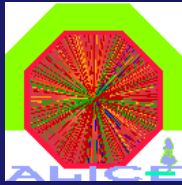
# Last sunlight for TRD



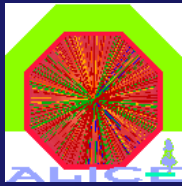
# TRD lifting off the truck



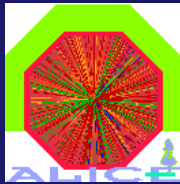
# TRD in the air



# TRD above the shaft



# TRD lowering down to UX25

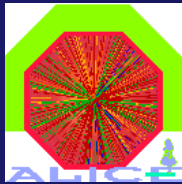


TRD supermodule is  
lowered into pit  
on October 9, 2006

60 meters down  
in 30 minutes

5 tons with  
the rotator

# The TRD group at CERN



last group photo prior to insertion

# Getting into position

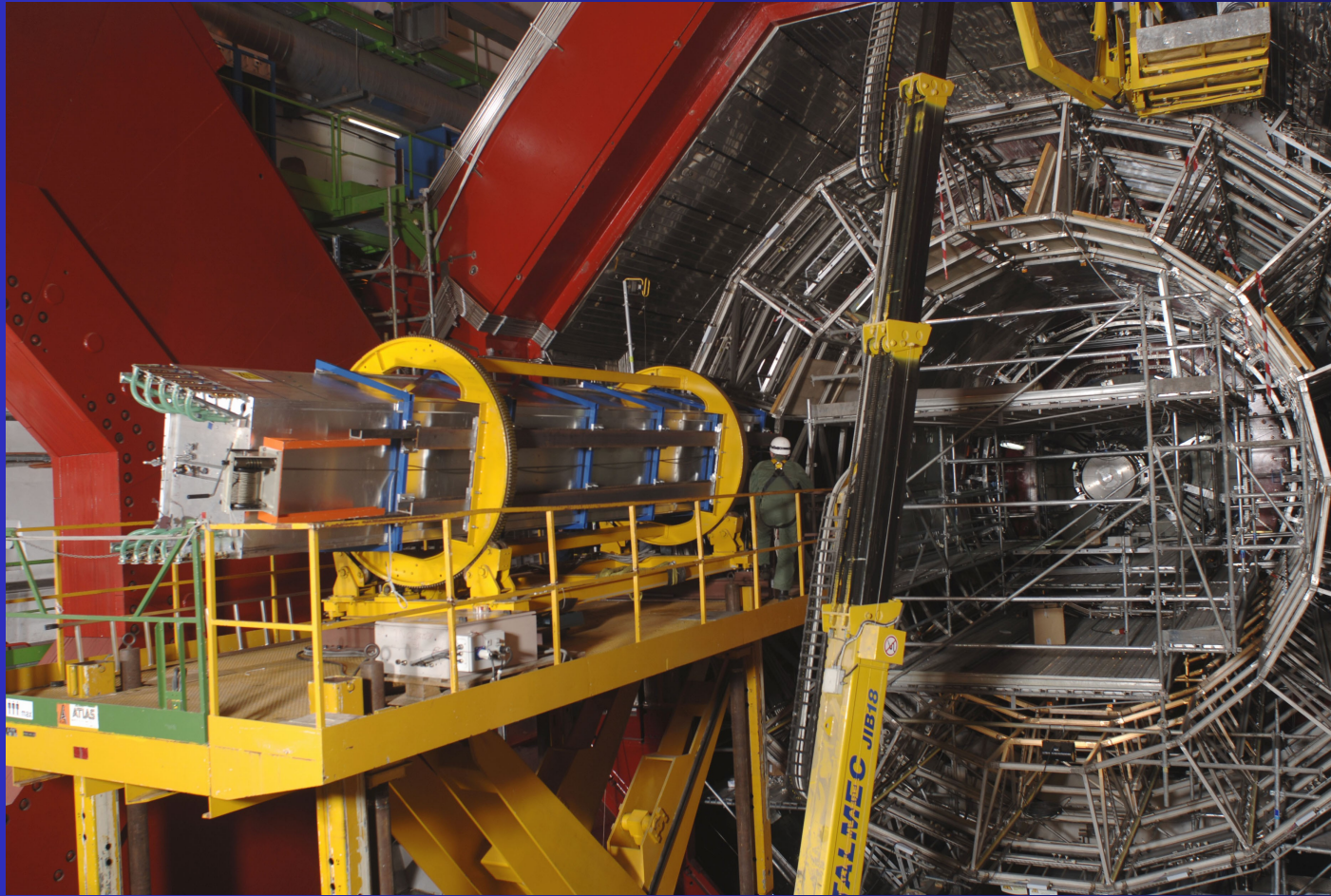
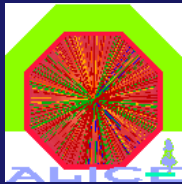


Insertion of TRD  
supermodule into  
space frame  
October 10, 2006

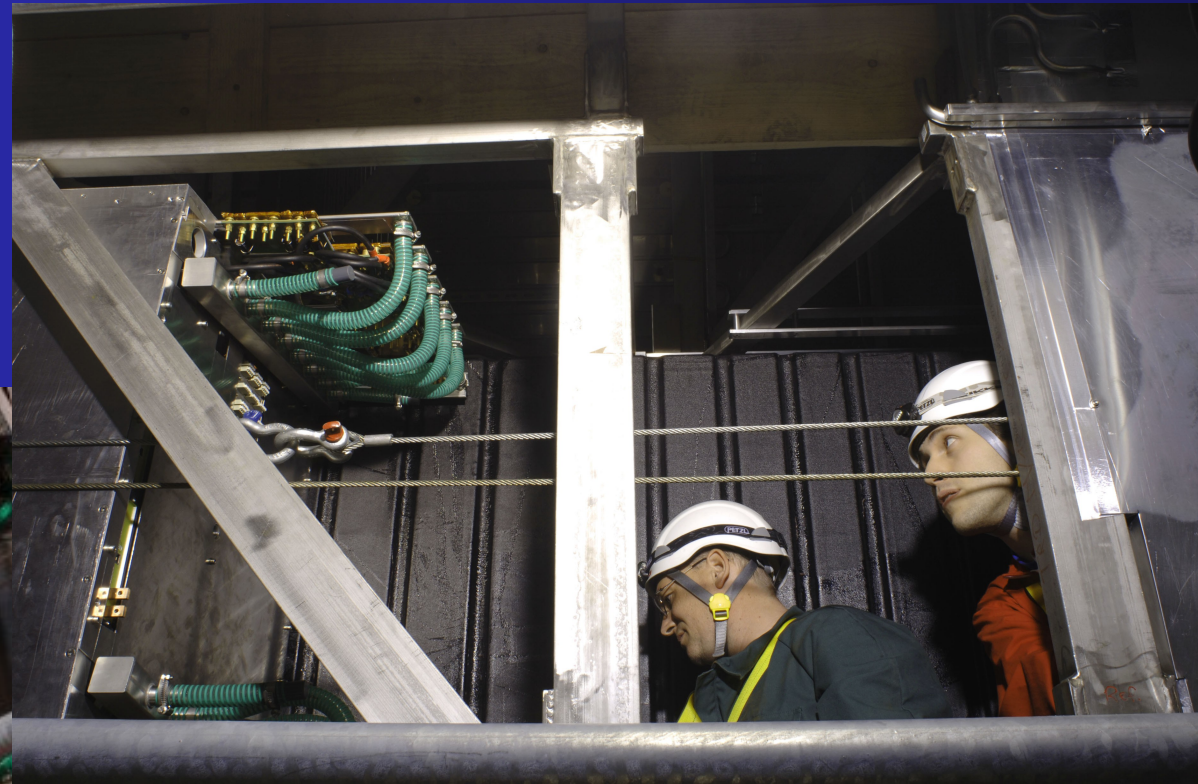
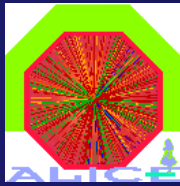




# Ready for TRD insertion

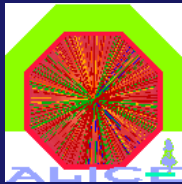


# Carefully pulling it in

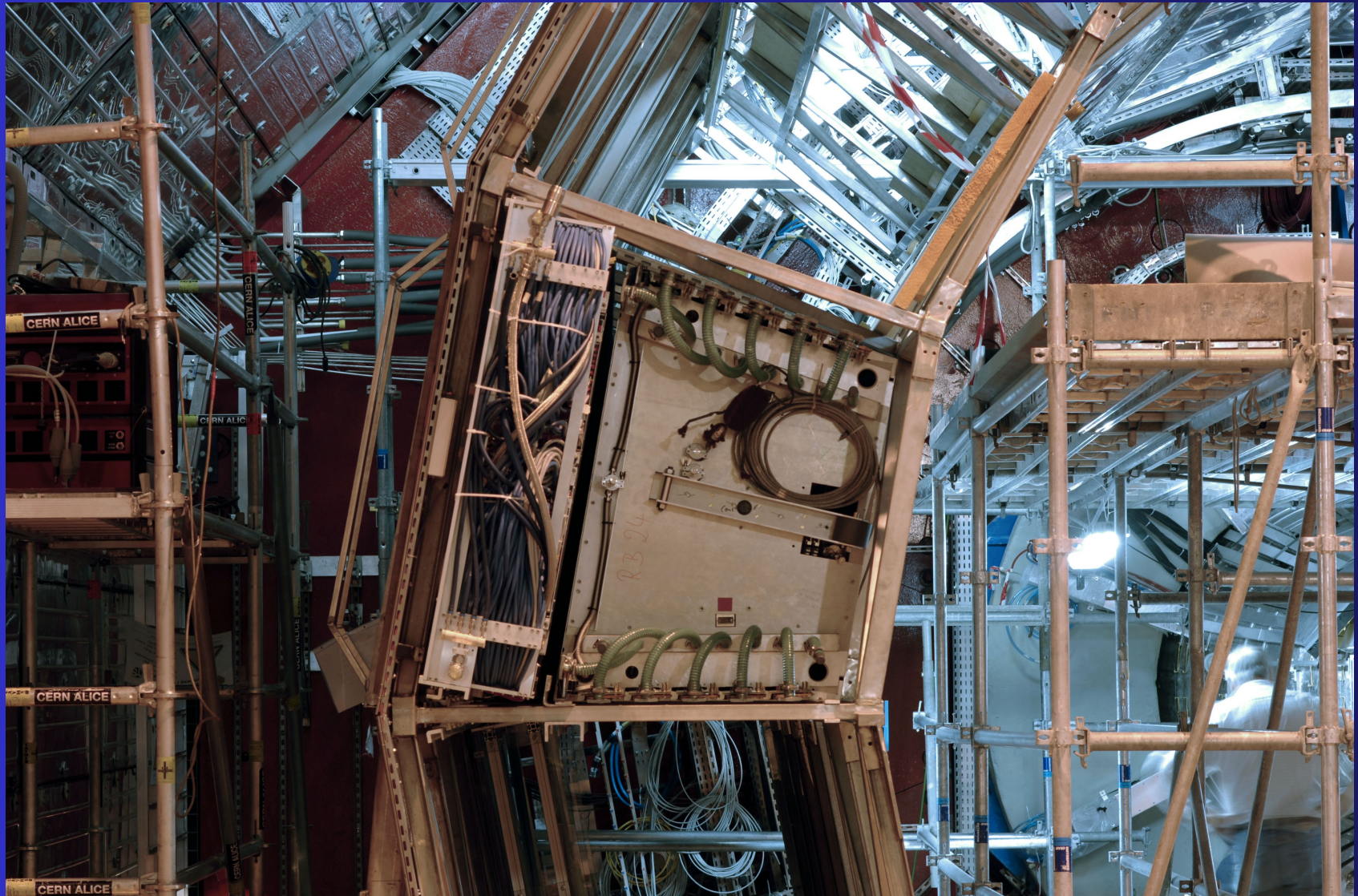
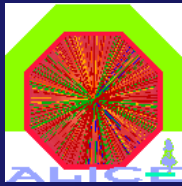


insertion of the 7m  
long super module  
took 1 afternoon

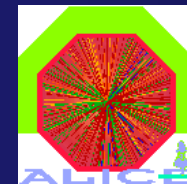
# A happy team leader



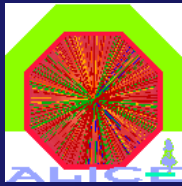
# The TRD is installed



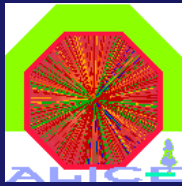
# Summary



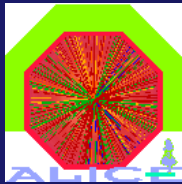
- no problems during SM installation
- services being installed, waiting to operate TRD underground
- TRD operation at CERN to begin in December 2006
- only 17 super modules left to be built until end of 2008



Thank you



# Backup

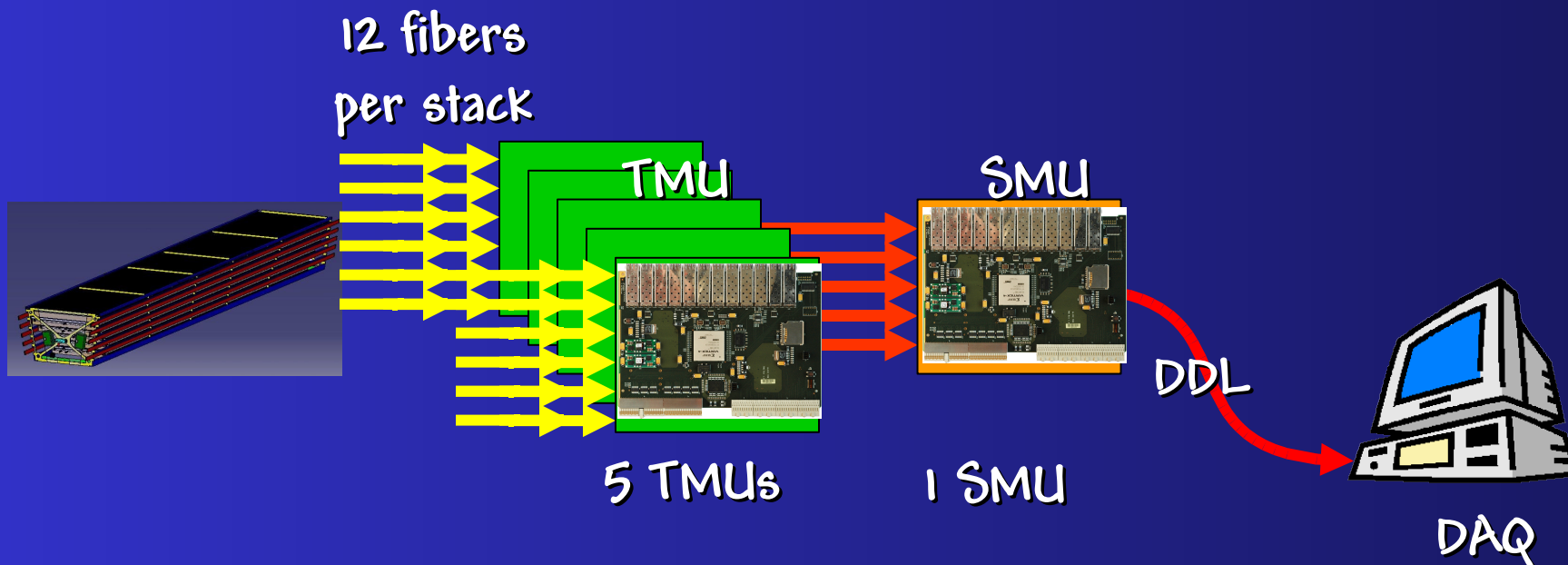
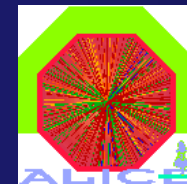


**Watch the time !!**





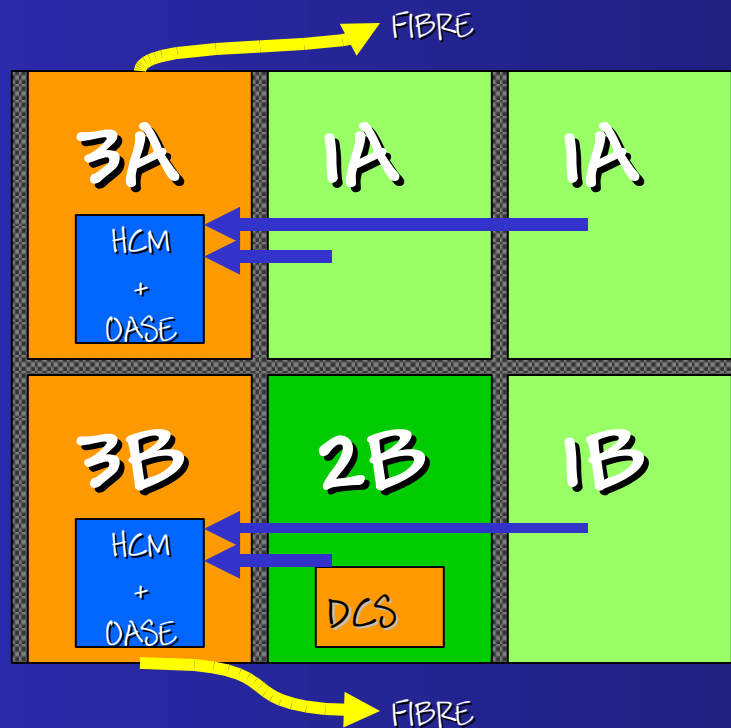
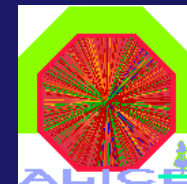
# GTU readout of a full SM



A full TRD Supermodule (5 stacks) connects  
with 60 fibers to 5 TMUs.

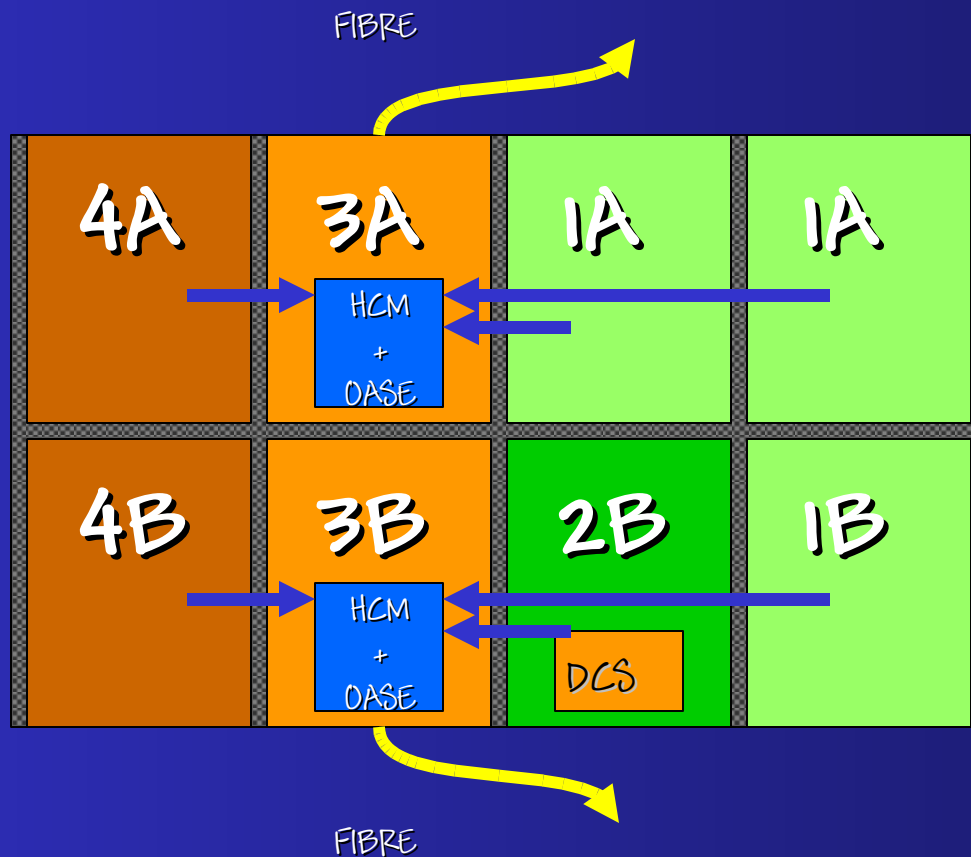
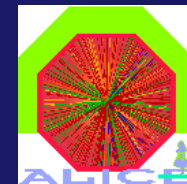
Full chain TMU + SMU to be tested in June.

# ROB types - CO chambers



5 out of 7 ROB types used on small ROCs

# ROB types - CI chambers



there are 7 different ROB types in total