

Commissioning of LHC and ALICE

Recent Results

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Erice, September 2008

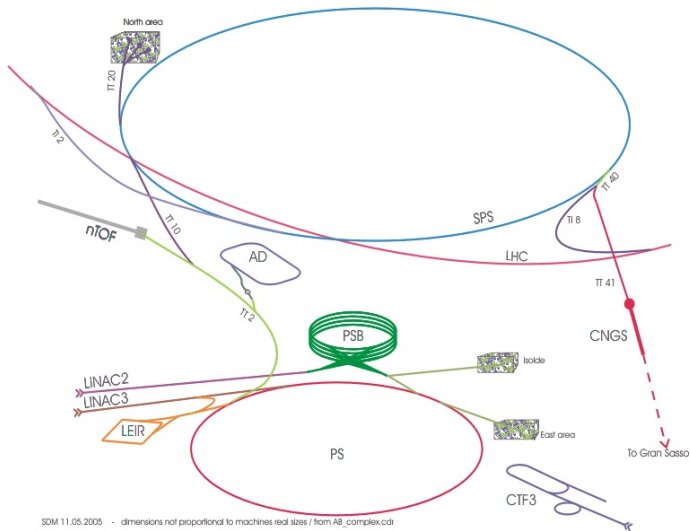
Introduction

- ▶ physics prospects of LHC
addressed in previous and coming talks
- ▶ Overview of recent events and
Outlook to the next steps
- ▶ Now: Commissioning of p-beam and collisions at LHC
- ▶ LHC beam detected in ALICE

Long-term schedule of the LHC

Approval of LHC	Dec 1994
LHC Conceptual Design Report	Oct 1995
LEP shutdown	Nov 2000
LHC construction start	2001
Last magnet installed	Apr 2007
Cooldown	Aug 2008
First Beam	Sep 2008

LHC accelerator chain

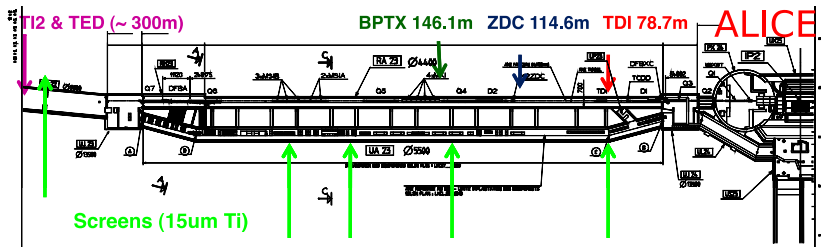


pp: LINAC2 → Booster → PS → SPS
PbPb: LINAC3 → LEIR → PS → SPS

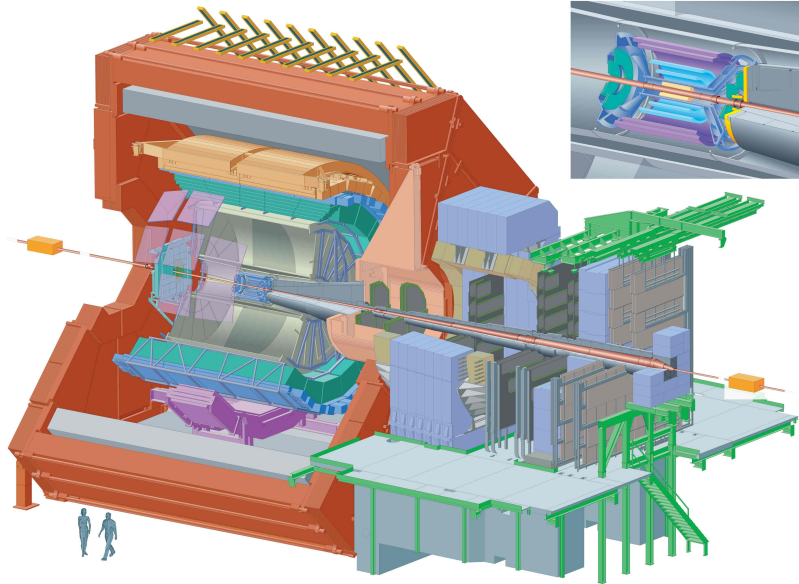
Transfer Lines to LHC

Beam Transfer from SPS to LHC

Intermediate beam dumps to decouple LHC and experiments
used during injection tests

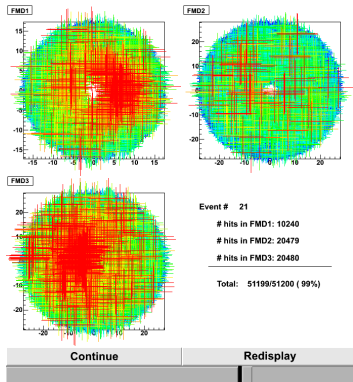
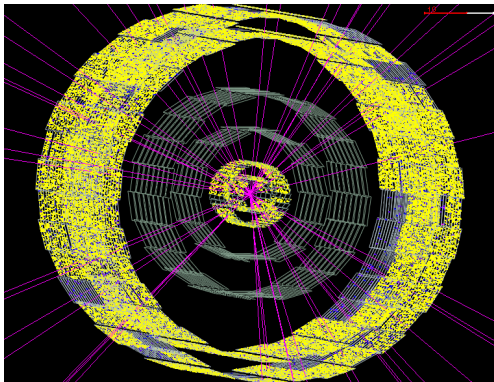


ALICE



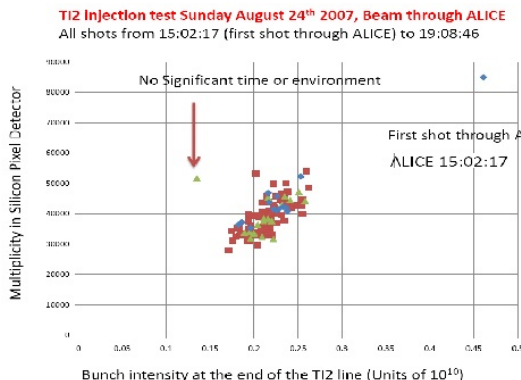
Injections tests as seen by ALICE

limited set of detectors active



Results from Injection Tests

- ▶ even with beam dumped before injection:
high particle densities in ALICE

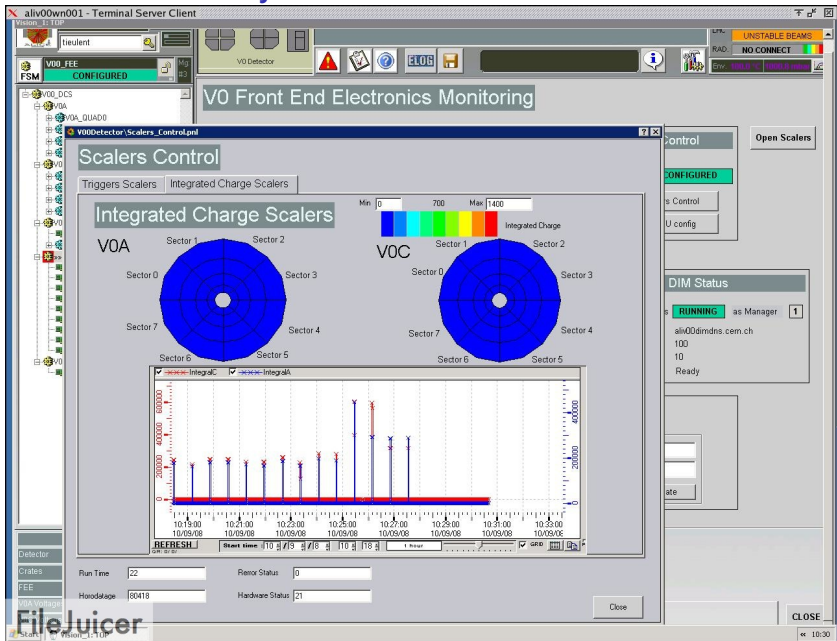


- ▶ reduced HV settings needed during injections
- ▶ Injection tests used for trigger alignment
- ▶ with beam screens removed injection very clean

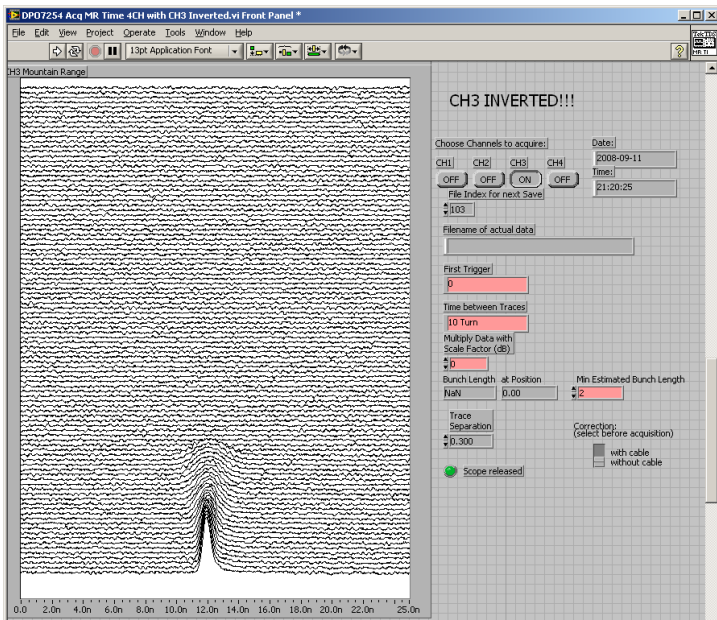
September 10th

- ▶ Injection of Beam 1 (direction of ALICE) (9 pm)
- ▶ circulation around 11 pm
- ▶ double turn seen by ALICE
- ▶ for stable beam: RF-capturing needed
- ▶ transverse beam profile ok
- ▶ longitudinal beam profile ok

Circulation seen by ALICE



RF Capturing

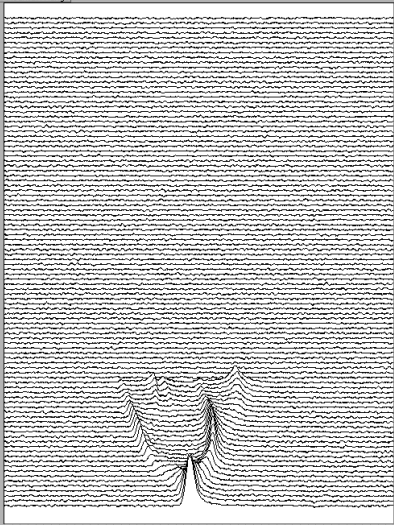


RF Capturing

DP07254 Acq MR Time 4CH with CH3 Inverted.vi

File Edit View Project Operate Tools Window Help

CH3 Mountain Range



CH3 INVERTED!!!

Choose Channels to acquire:

CH1	CH2	CH3	CH4
OFF	OFF	ON	OFF

Date: 2008-09-11
Time: 21:26:25

File Index for next Save: 103

Filename of actual data:

First Trigger: 0

Time between Traces: 10 Turn

Multiply Data with Scale Factor (dB): 0

Bunch Length at Position: NaN
Min Estimated Bunch Length: 2

Trace Separation: 0.300

Correction: (select before acquisition)
 with cable
 without cable

Scope released

Save to File

Display Data: Switch to Corrected

Extract & Measure Bunch

Show Bunch Length & Amplitude vs. Trace

Show Bunch Length & Amplitude vs. Index

Show Spectrum

Display Contour Plot

STOP

0.0 2.0n 4.0n 6.0n 8.0n 10.0n 12.0n 14.0n 16.0n 18.0n 20.0n 22.0n 25.0n

RF Capturing

DP07254 Acq MR Time 4CH with CH3 Inverted.vi Front Panel

File Edit View Project Operate Tools Window Help

13pt Application Font

CH1 Mountain Range

CH1 INVERTED!!!

Choose Channels to acquire: CH1 CH2 CH3 CH4

CH1: ON CH2: OFF CH3: OFF CH4: OFF

Date: 2008-09-11

Time: 22:43:36

File Index for next Save: 201

Filename of actual data:

First Trigger: 0 ms

Time between Traces: 1 Turn

Multiply Data with Scale Factor (dB): 0

Bunch Length: 2.14n at Position: 13.45n Min Estimated Bunch Length: 3n

Trace Separation: 1.000

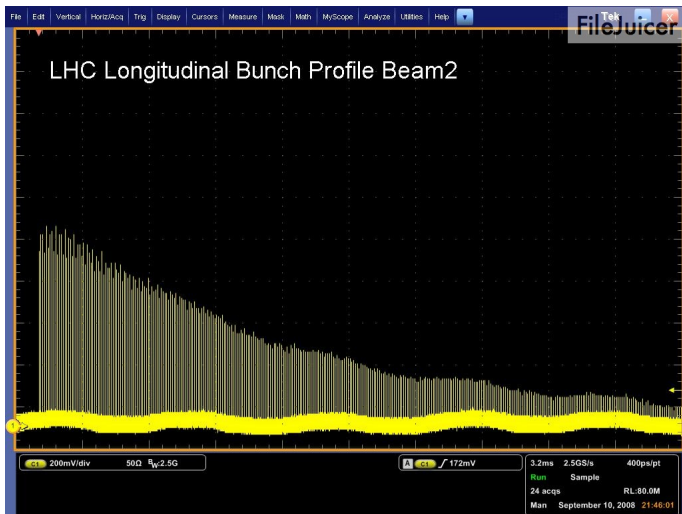
Scope released

with cable without cable

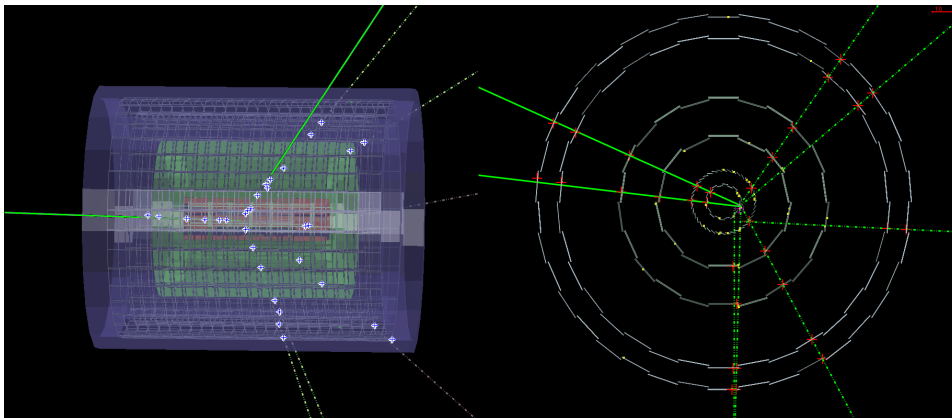
0.0 2.0n 4.0n 6.0n 8.0n 10.0n 12.0n 14.0n 16.0n 18.0n 20.0n 22.0n 25.0n

Beam Commissioning

- ▶ injection of second beam
- ▶ tuning of parameters to achieve sufficient beam life-time



Interaction in ALICE



Next Steps for LHC and ALICE

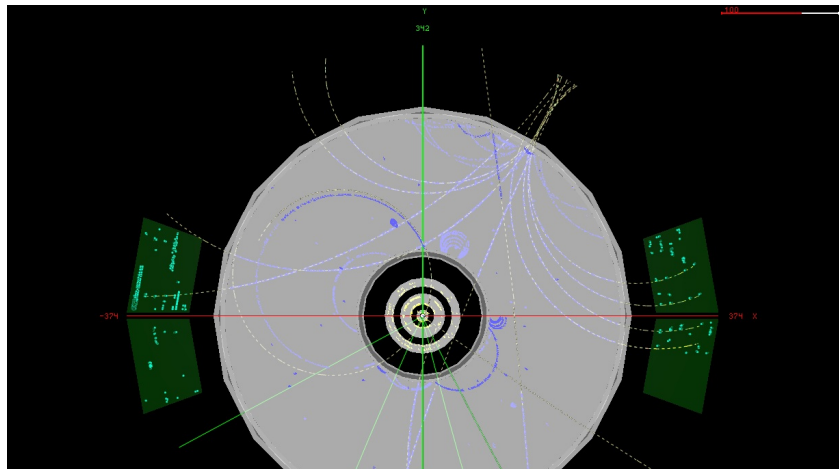
- ▶ stable circulation of two beams
ALICE looking for Beam-Gas events
- ▶ Short run with collisions at the injection energy (450 GeV)
ALICE looking for multiplicity spectrum
- ▶ beam acceleration up to 5 TeV
- ▶ shutdown, maintenance and further installation

Plans for PbPb

- ▶ in LHC magnetically equivalent
- ▶ commissioning of full injection chain until Nov. 2009
- ▶ injectors can run with p and Pb in parallel
- ▶ two weeks of running-in with PbPb
- ▶ 10 days of physics with PbPb

Cosmic data

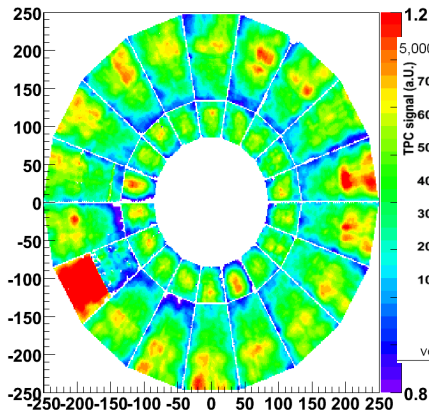
- ▶ ALICE uses time w/o beam for cosmic data taking
- ▶ used for calibration and alignment
- ▶ stability tests



Cosmic data

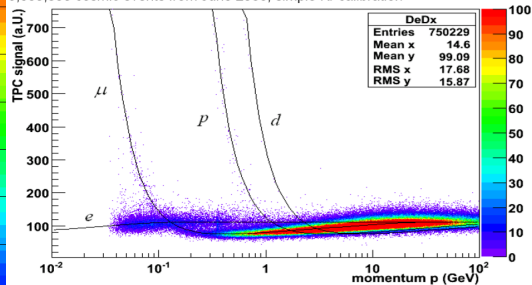
TPC gain calibration

TPC gain calibration



TPC PID

5,000,000 cosmic events from June 2008, simple Kr calibration



very basic cut (> 50 clusters) to not remove statistics at low p



Summary & Outlook

- ▶ Successful injection and circulation of both beams
ALICE ready and waiting for interactions
- ▶ Efforts for stable beams with high life-time
- ▶ First collisions at injection energy
- ▶ Acceleration up to 5 TeV
- ▶ Shutdown