

# ALICE ITS Upgrade Overview

#### Luciano Musa – CERN



ALICE ITS Upgrade

ITS Upgrade – Readou Electornics PRR 13 April 2018

# ALICE Upgrades – Layout and key systems

ALICE Upgrades



#### New Inner Tracking System (ITS)

- CMOS Pixels
- $\rightarrow$  improved resolution, less material, faster readout

### New Muon Forward Tracker (MFT)

- CMOS Pixels
- → vertex tracker at forward rapidity

#### New TPC Readout Planes

4-GEM detectors, new electronics
→ continuous readout

New trigger detectors (FIT, AD)

• Centrality, event plane

Upgrades readout for TOF, TRD, MUON, ZDC, Calor.

### Integrated Online-Offline system (O<sup>2</sup>)

 Record minimum-bias Pb-Pb data at > 50kHz (currently ~ 1 kHz)



### **ITS Layout**

ALICE ITS Upgrade





ALICE ITS Upgrade







4

# ALPIDE – A novel CMOS Pixel Sensors for the ALICE Upgrade



ALICE

R&D: CERN, CCNU, IPHC, INFN, IRFU, NIKHEF, RAL, Yonsey



pixel capacitance 2.5 fF (@  $V_{bb}$  = -3 V)  $\Rightarrow$  MIP signal ~ 50mV





130,000 pixels / cm<sup>2</sup> 27x29x25  $\mu$ m<sup>3</sup> Charge collection time <30ns (V<sub>bb</sub> = -3V) spatial resolution ~ 5  $\mu$ m max particle rate ~ 100 MHz / cm<sup>2</sup> fake-hit rate: < 10<sup>-9</sup> pixel / event

### **Inner Barrel Layout**

ALICE ITS Upgrade





### **Outer Barrel Layout**

ALICE ITS Upgrade





# **Readout Electronics**

### Austin, Bergen, Berkeley, CERN, NIKHEF, Prague

ALICE ITS Upgrade





#### Characterization ongoing

Readout Unit vers.1

### 2015-16 Readout Components radiation test and selection Readout Prototype Board RUv0

Engineering Design Review (Jan 2017)

2017 Readout Prototype Board RUv1: system integration (DAQ, trigger and DCS), integration with services

Readout Unit Production prototype Production Readiness Review

Jan-Apr 2018 ➡ Apr 2018

Production & test May-Dec 2018

### **Overall ITS Planning (Simplified Global View)**

ALICE ITS Upgrade

ALICE

