

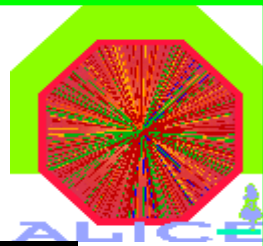
# The ALICE Experiment at the CERN LHC

P. Kuijer

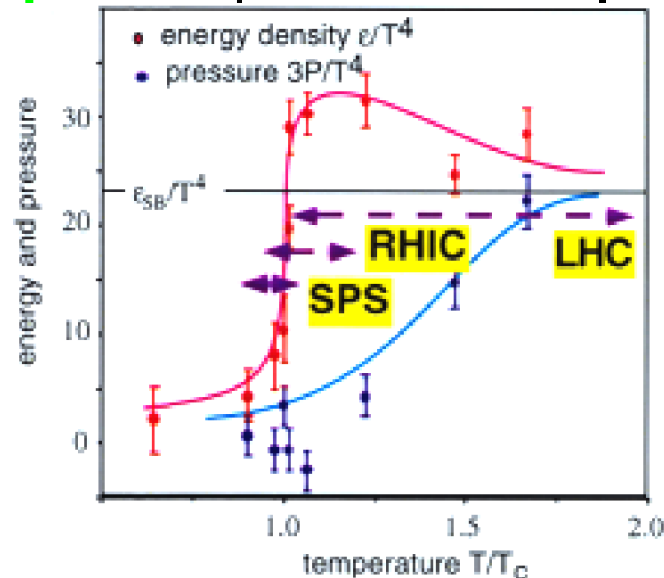
for the Alice collaboration

ICHEP 2002

# SPS-RHIC-LHC



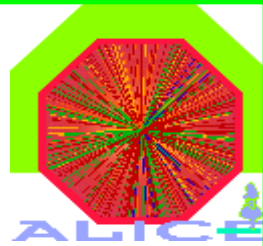
PbPb central	SPS	RHIC	LHC
$dN_{ch}/dy$	500	700-1500	2000-8000
$\varepsilon$ [GeV/fm <sup>3</sup> ]	2.5	3.5-7.5	15-40
$V_f$ [fm <sup>3</sup> ]	103	$7 \cdot 10^3$	$2 \cdot 10^4$
$\tau_{QGP}$ [fm/c]	<1	1.5-4	1-10
$\tau_0$ [fm/c]	1?	0.5	<0.2?
$\tau_{QGP}/\tau_0$	1	6	30



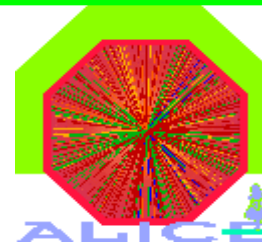
Hotter, bigger and longer life time at higher energies:

Alice: properties of QGP well above threshold

# Observables for Alice

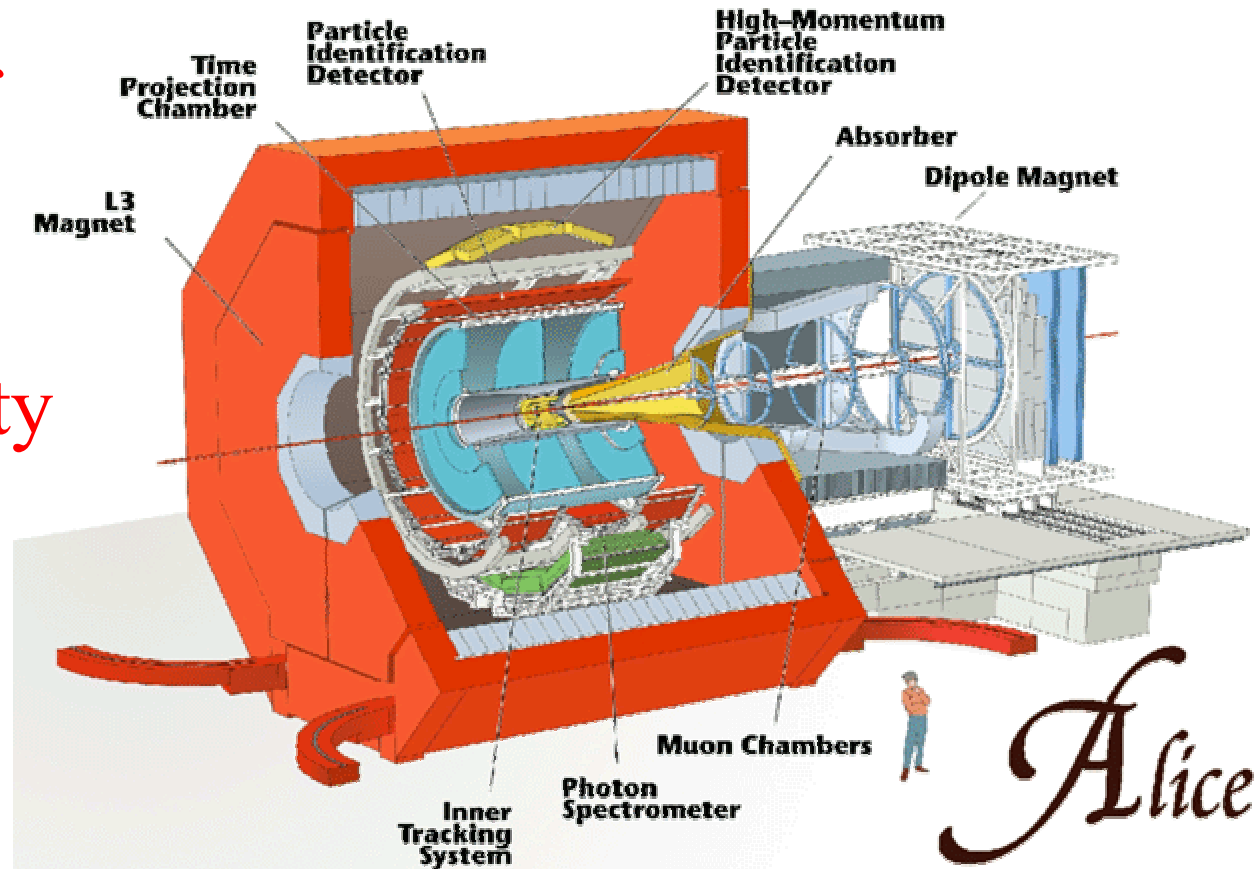


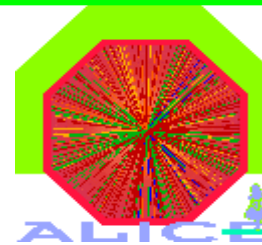
- AA Event by event!
  - Particle multiplicities: scaling laws pp to AA
  - Particle correlations: Flow (eq of state) and HBT (size, lifetime)
  - Particle spectra: Kinetic freeze-out temperature + suppression
  - Particle yields: Chemical freeze-out temperature + suppression
  - Jets: Energy loss of partons in matter
  - Direct photons: Yield increases strongly with T
  - Heavy quark + quarkonia: pQCD production + modification in medium
- pp and pA
  - Global pp properties: baseline for AA
  - Structure functions in nuclei (shadowing)
- Cosmics
  - muons around ‘knee’ region



# Alice detectors

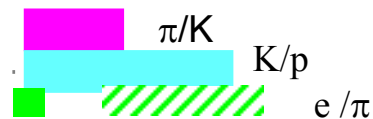
- Low  $p_T$  cut-off
- Particle ID
- High granularity tracking





- p, K,  $\pi$  identified in  $2\pi \cdot 1.8$  units of  $\eta$  by tracker (dE/dx) and TOF for 100 MeV/c up to several GeV/c
- e identified from 100 MeV/c to 100 GeV/c by tracker+TOF+TRD
- HMPID extends identification in small acceptance up to 5 GeV/c
- Photons with high resolution in PHOS, counting in PMD

TPC + ITS  
(dE/dx)



**ALICE uses ~all known methods**

TOF



HMPID  
(RICH)



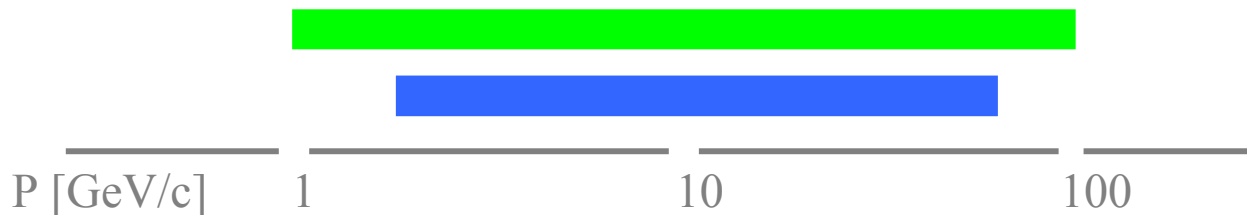
P [GeV/c] 0 1 2 3 4 5

TRD

e/ $\pi$

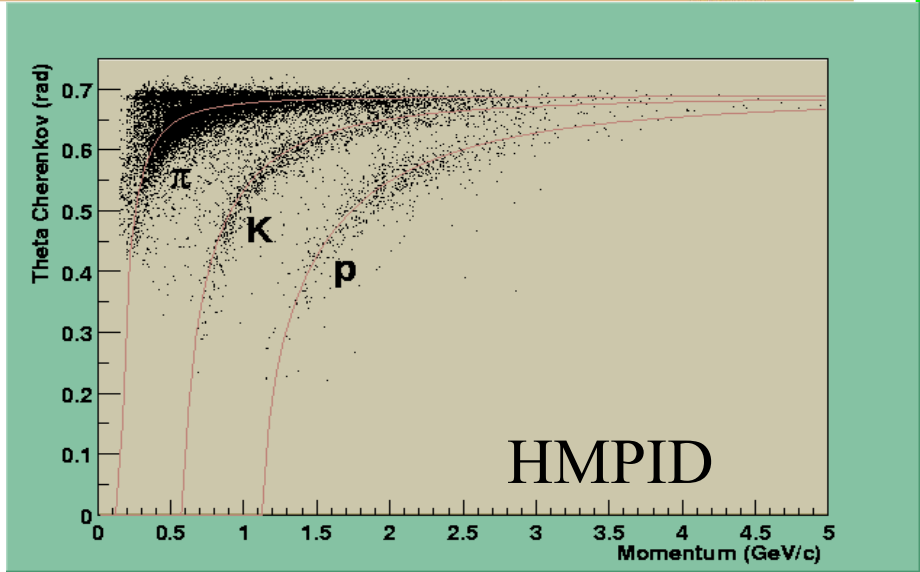
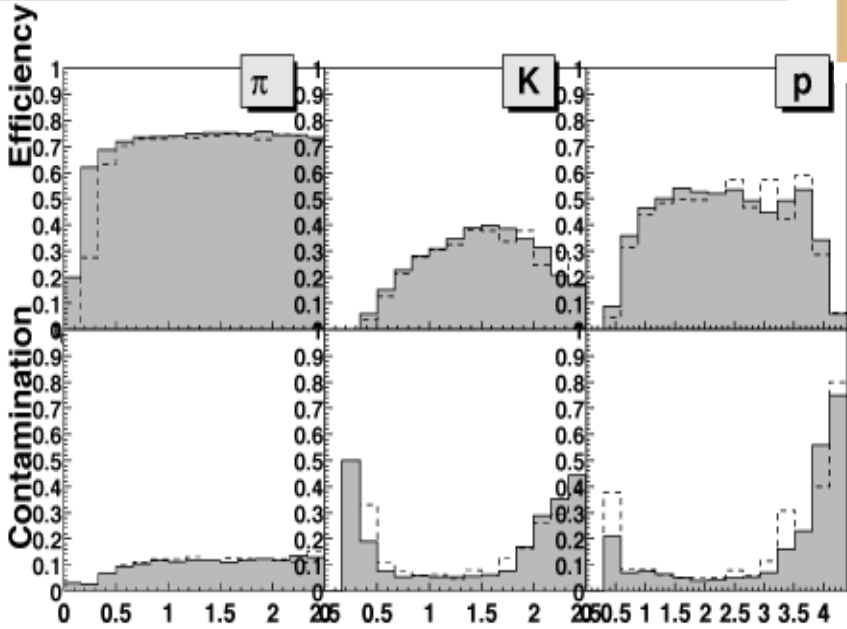
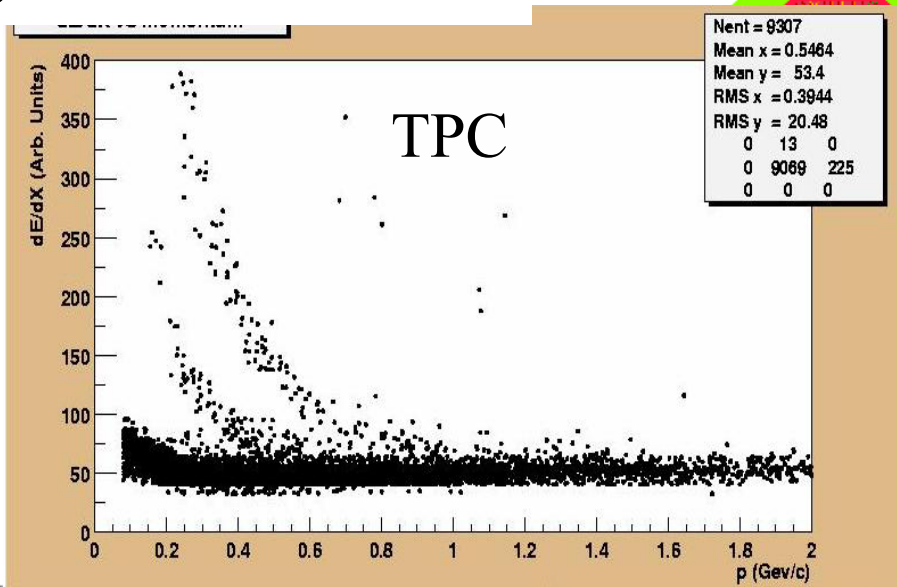
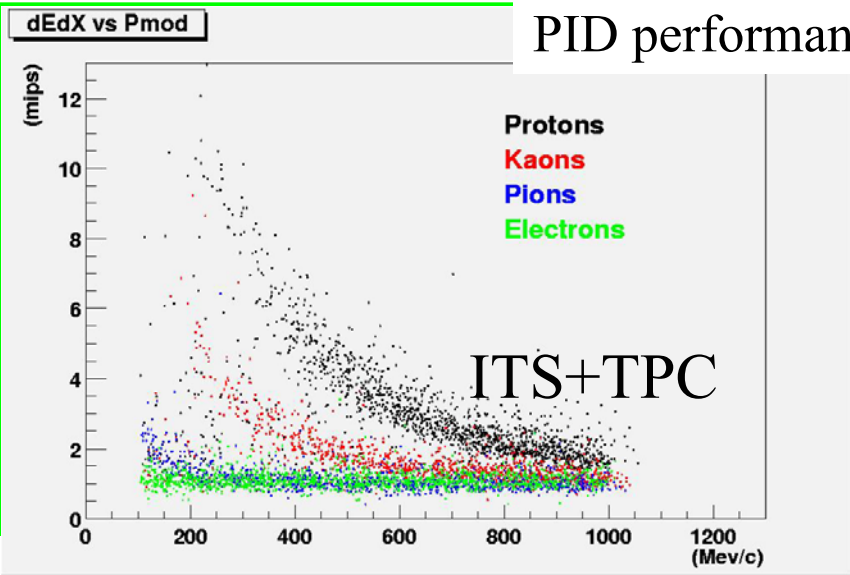
PHOS

$\gamma/\pi^0$



P [GeV/c] 1 10 100

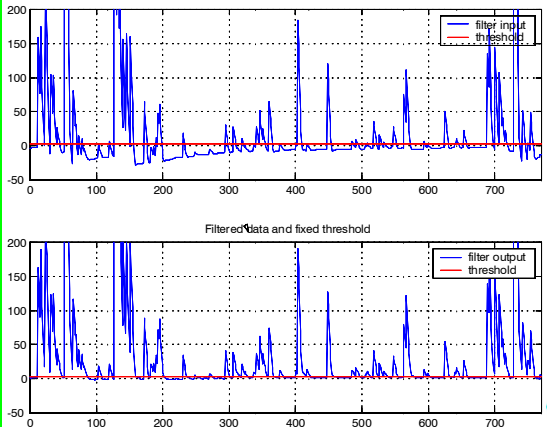
# PID performance



TOF

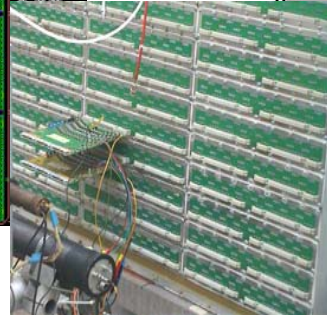
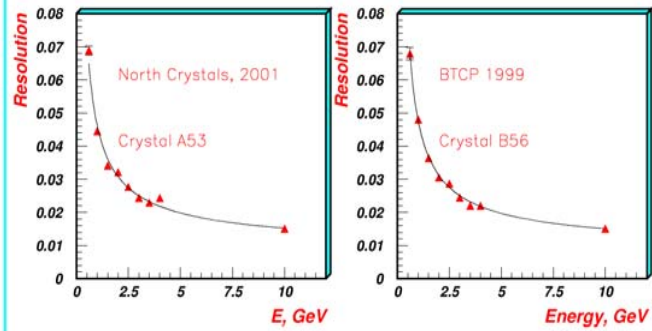
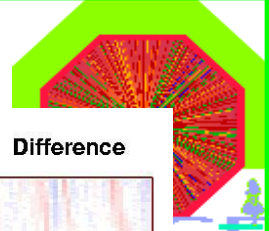
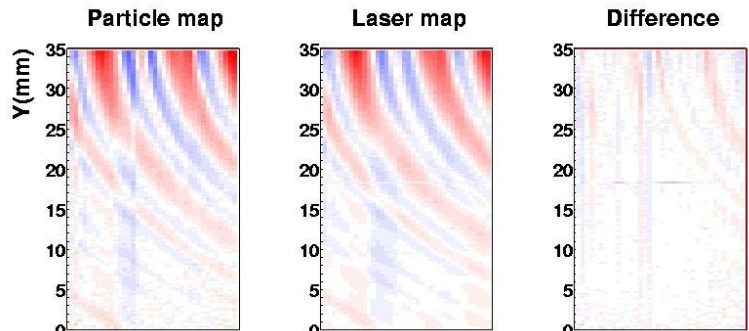
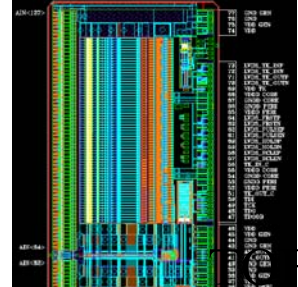
p (GeV/c)  
P. Kuijer

# TPC

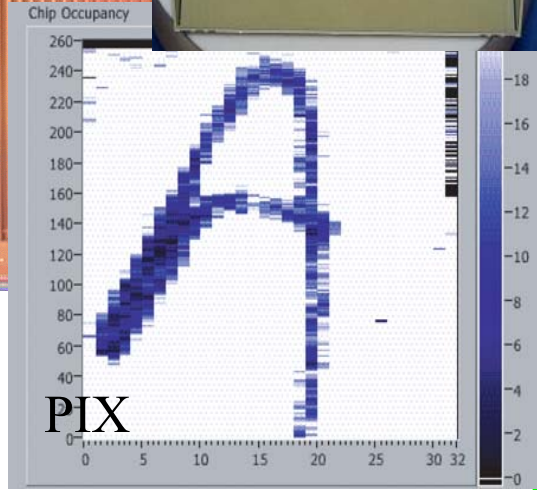
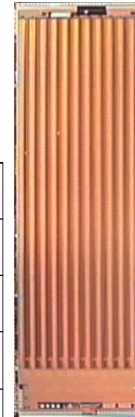
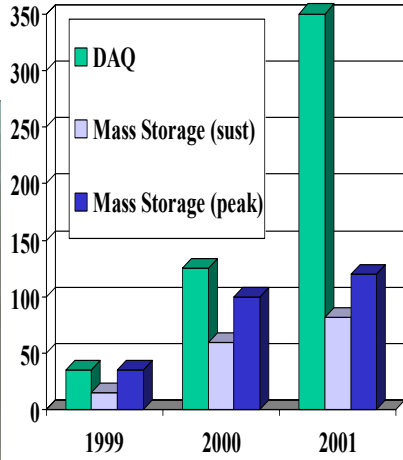
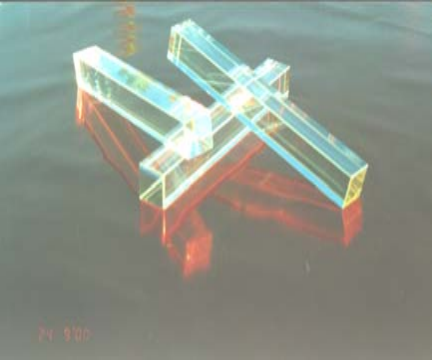
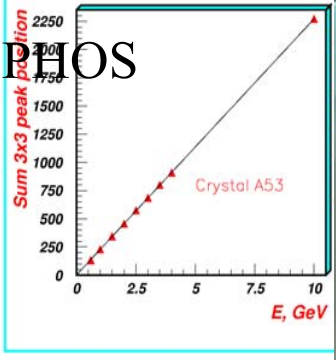


# R&D phase finishing

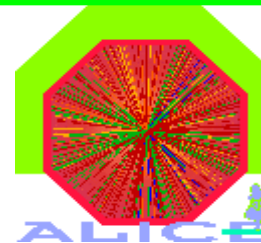
## SSD



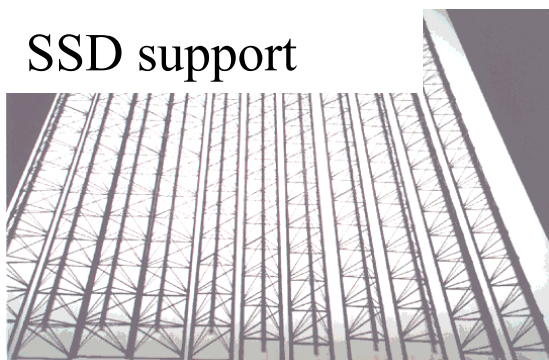
## SDD



•Production phase starting



SSD support



PHOS crystals

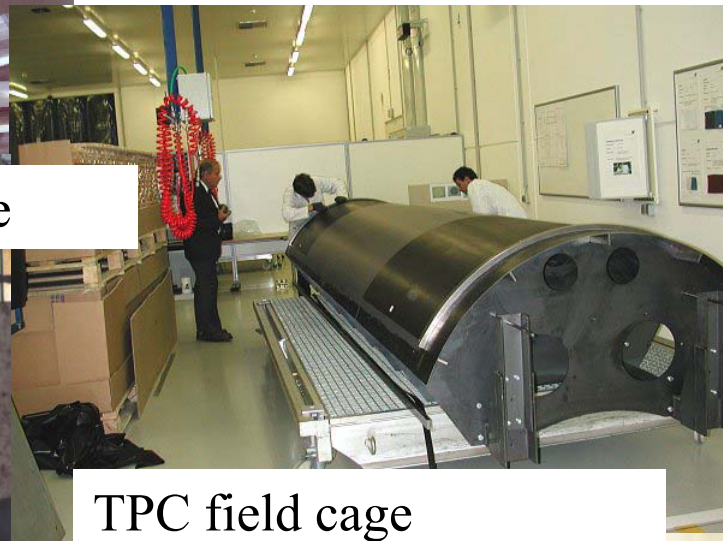


Lead Tungstate (PbWO<sub>4</sub>)  
STC "Institute for Single Crystals"  
National Academy of Sciences of Ukraine

Muon magnet yoke



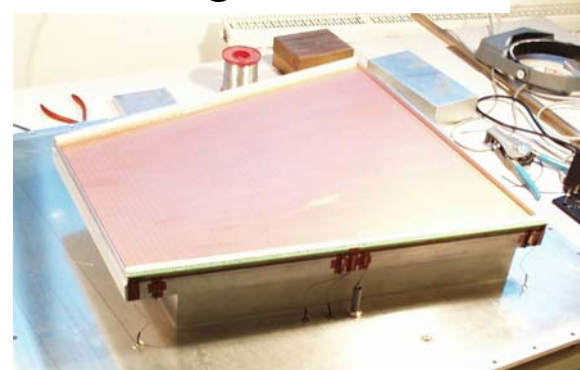
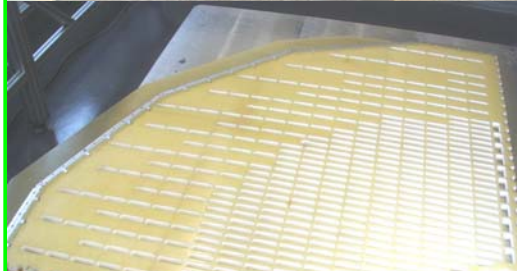
TPC field cage



HMPID module



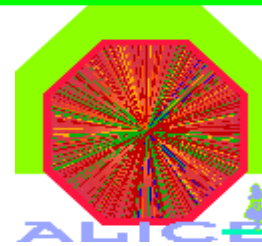
Muon stations 3-4 and 1-2



TPC RO chamber



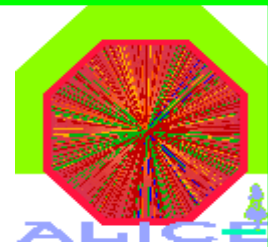
- Point 2 ready to receive ALICE



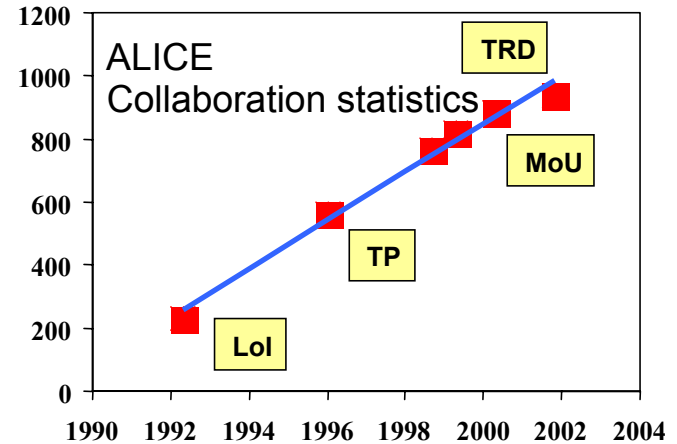
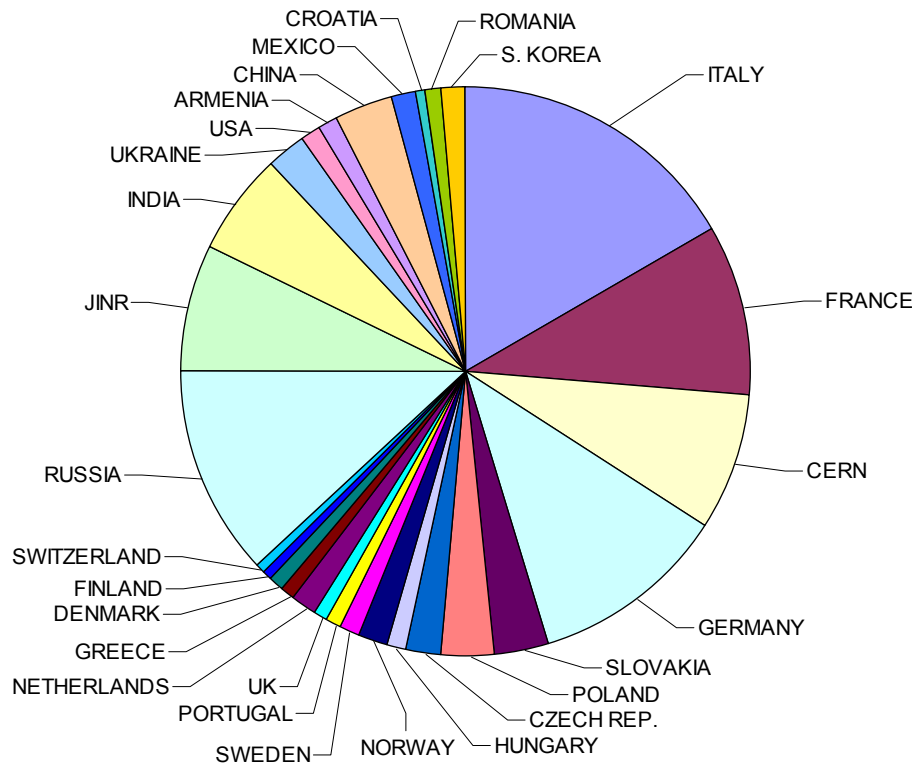
TPC assembly hall  
taking shape



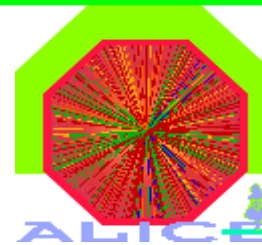
# Alice collaboration



**77 Institutions,  
28 Countries**



**937 members**  
(63% from CERN MS)



# Summary

- Alice is an all-round Heavy Ion experiment
  - Excellent  $p_T$  acceptance: 100 MeV/c up to 100 GeV/c
  - Good particle ID
  - The project is in transition from R&D to production
- The collaboration is still growing
- **ALICE is on track for 2007!**