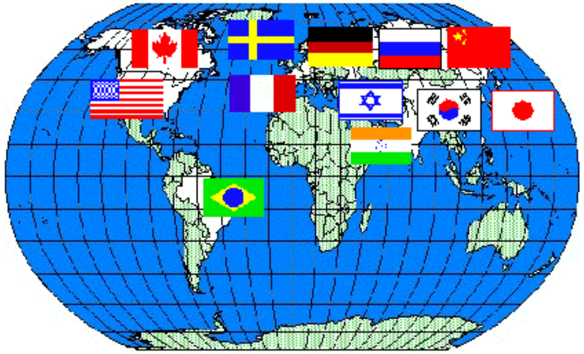
Hadron production in 65AGeV Au + 65 AGeV Au collisions at RHIC-PHENIX (1)

Susumu SATO for PHENIX
(Univ. of Tsukuba)

PHENIX collaboration and Japanese Contributions



Japan: **CNS, Hiroshima, KEK, Kyoto, Nagasaki RIKEN, RIKEN BNL Res. Cent., TITech., Tokyo, Tsukuba, Waseda**

Korea: Korea, Myongji, Yonsei
Russia: IHEP Protvino, JINR Dubna, Kurchatov, PNPI, St. Petersburg STU
Sweden: Lund
U.S. : (National Labs) BNL, LANL, LLNL, ORNL (Universities) Abilene Christian, Alabama-Huntsville, California-Riverside, Columbia, Florida State, Georgia State, IowaState, New Mexico, New Mexico State, SUNY-Stony Book, Tennessee, Vanderbilt

Brazil: Sao Paolo
Canada: McGill
China: Academia Sinica, CIAE
France: SUBATECH
Germany: Muenster
India: BARC, Banaras Hindu University
Israel: Weizmann Institute

Japan takes large roles among 12 nations (46 institutions)

Physics of hadron measurement with PID

(1) Observation and characterization of QCD plasma (QGP).

Observables	distinctive feature of fireball
2nd rise of <pt>	1st order of phase transition into hadron
$R_{out} >> R_{side}$	longer hadronization time
high-pt hadron production	reduced dE/dx of quarks in fireball
change of p-bar production	change in a baryon susceptibility
change of width or/and branching ratio for $\phi \rightarrow K^+K^-$	different reaction inside the fireball

PID makes constrains **stronger.**

PID is **required.**

(e/photon signal, muon signal, etc.)

QGP?!

(2) Understanding of basic collision dynamics for heavy ion collisions at $s^{1/2}$=130AGeV

change in transverse kinetic energy spectra	change in temperature, flow, stopping, baryon density.
change in particle ratio	change in thermodynamics

PID is **required.**

Basic Collision Dynamics

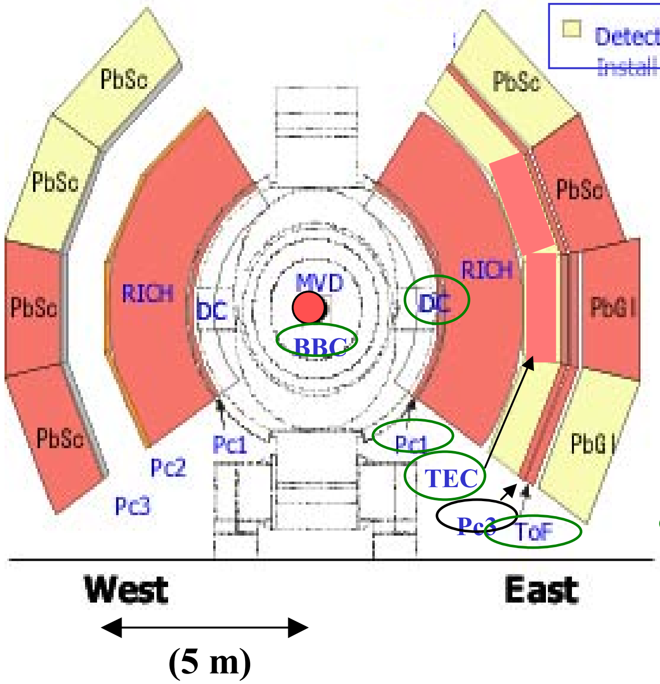
Susumu SATO (Univ. of Tsukuba)

PHENIX
Central Arm detectors

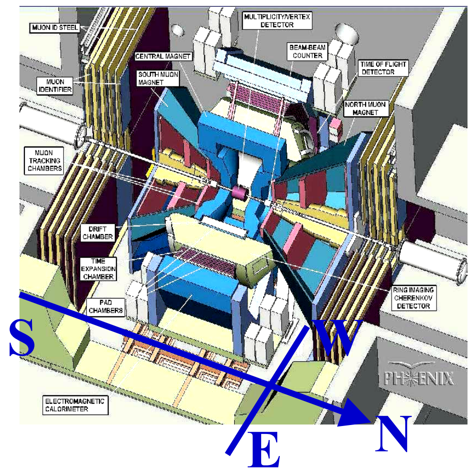
Beam axis cross section

Detector operated in Year 2000

Detector installed
Install in summer 2000



Bird view



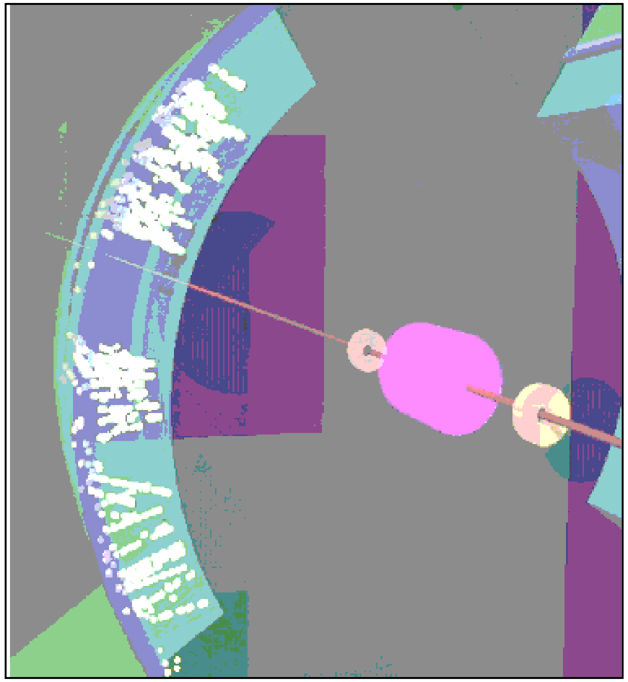
- Tracking + hadron PID (TOF)
- e ID (RICH)
- EMcal (PbSci,PbGl)
- Vertex detector (MVD)

Tracking devices in Central arm

	Location (m)	Technology	# of Ch.	Performance
Drift Ch. (DC)	2.02-2.46: (East & West)	Low mass multi-wire drift ch.	12.8 k	150μm (r-φ)
Pad Ch. (PC)	2.47 : (East, PC1) 4.15 : (West, PC2) 4.91 : (East, PC3)	pad readout	210 k	4 –8 mm (z & r-φ)
Time Expansion Ch. (TEC)	4.23-4.88 (East)	multi-sampling dE/dx	43 k	250 μm (r-φ)

- DC is fundamental device for momentum reconstruction
- TEC is for higher momentum reconstruction
- PCs are for z-info, and pattern recognitions

First detection of Au + Au collisions at PHENIX

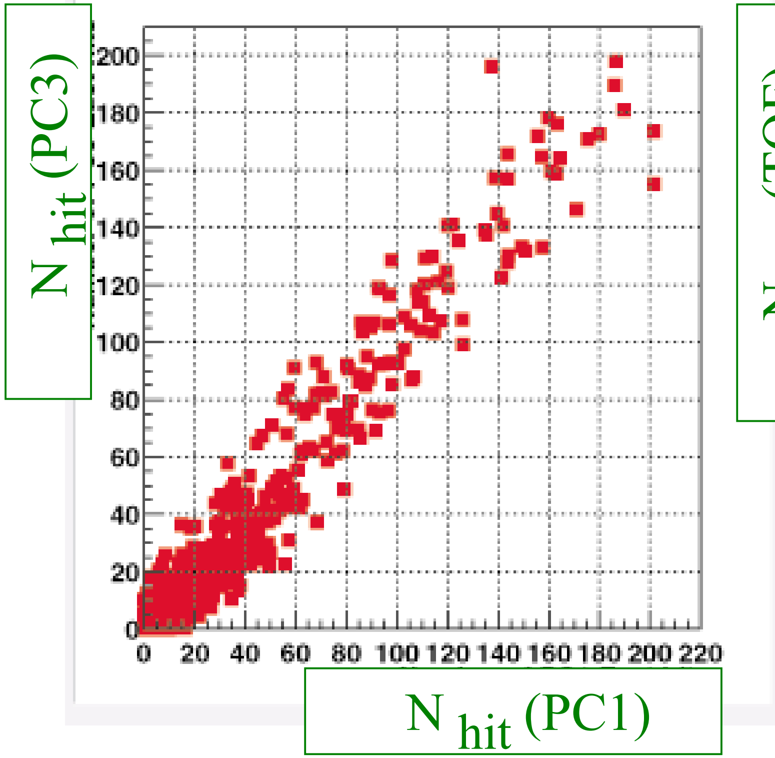


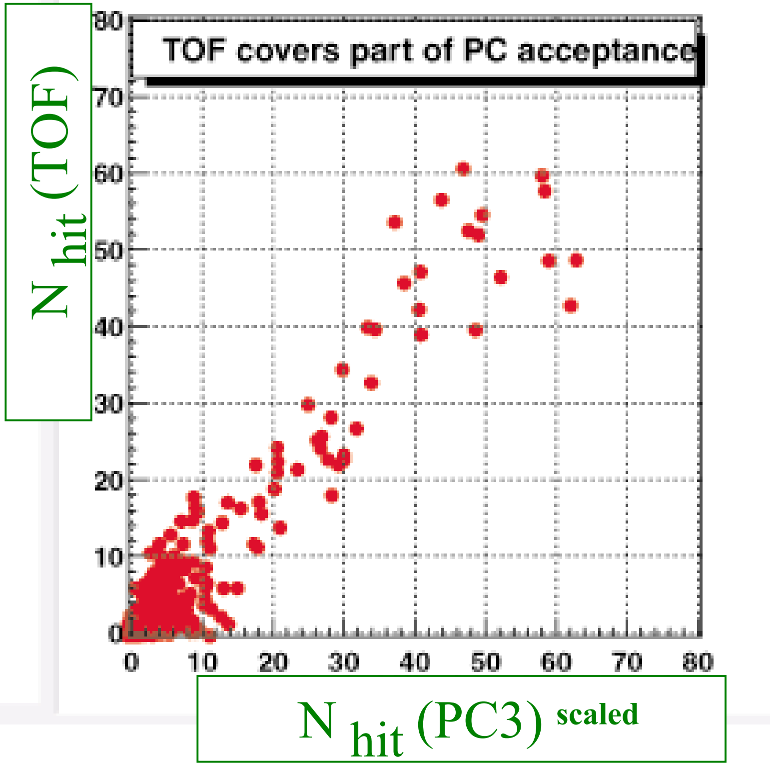
On Jun/15/ 2000.

Signals were recorded simultaneously in seven PHENIX detectors **ZDC, BBC, TOF, PAD, DC, TEC, EMCal**.

The event display shows reconstructed tracks pointing to the collision.

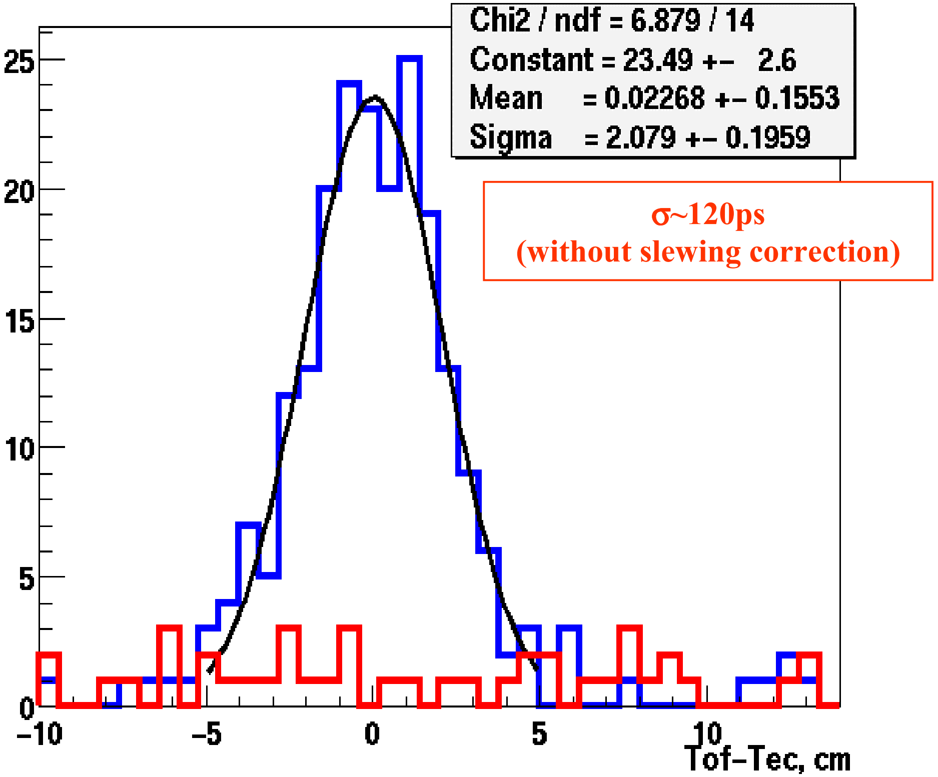
PC1/PC3/TOF correlation





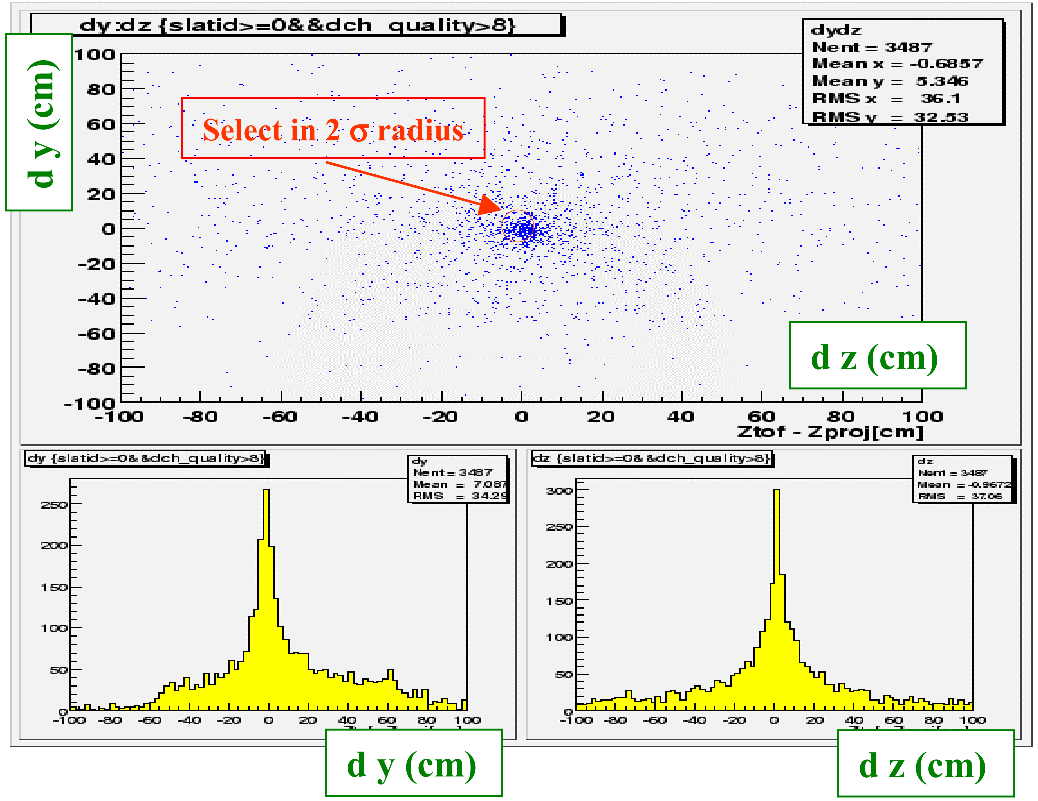
• Clear correlation among PC1, PC3, and TOF.

TEC/TOF matching



- Good matching with TEC tracking detector

TOF association with DC/PC1 tracking

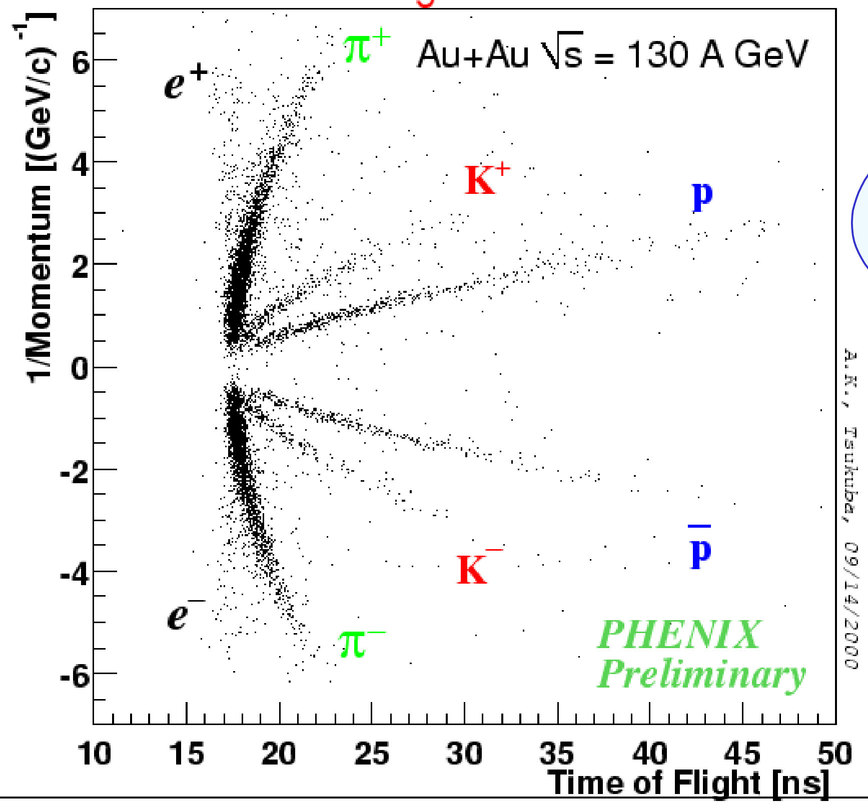


Searching window with r = 5cm (2σ in y [or r-ϕ] correlation)

- Clear correlation between DC/PC1 track and TOF.

Particle Identification *by Time of Flight method*

PHENIX High Resolution TOF



PHENIX preliminary

Corrections to be done:
(1)Acceptance
(2) Reconstruction efficiency
(3) Slewing

- **Clear particle identification has been achieved !**

Mass square distribution

using Time-of-Flight method

Positive Particle

Negative Particle

All p

p < 0.5

0.5 < p < 0.8

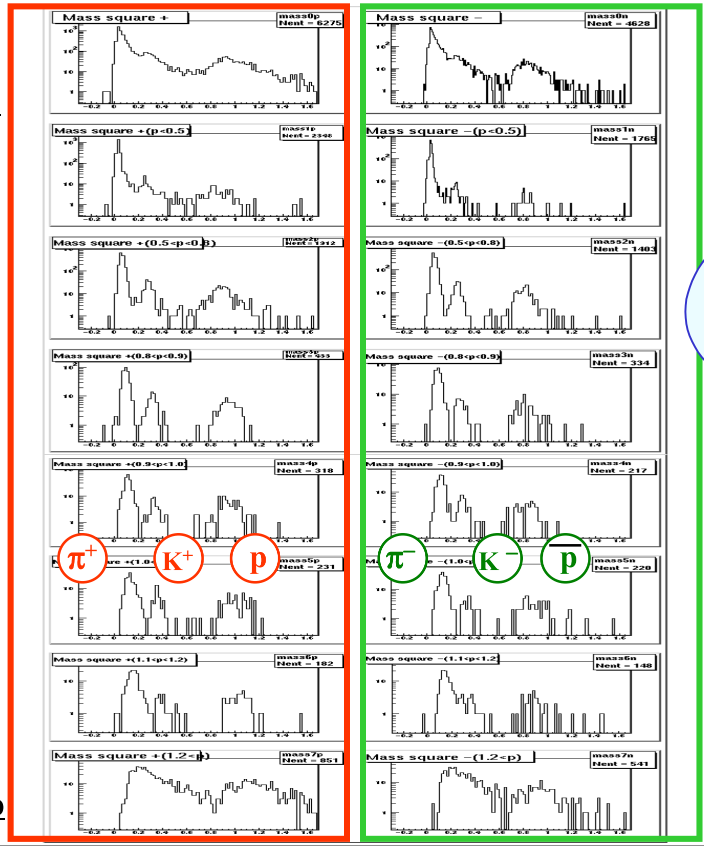
0.8 < p < 0.9

0.9 < p < 1.0

1.0 < p < 1.1

1.1 < p < 1.2

1.2 [GeV/c] < p



PHENIX preliminary

Corrections to be done:
(1)Acceptance
(2) Reconstruction efficiency
(3) Slewing

• Clear particle identification in high *p* region, where Time-of-Flight method is required !

Summary

- Tracking detectors (DC/PC1/TEC/PC3) and
the TOF at the ***PHENIX*** central arm
are demonstrated to be functioning
in the first RHIC operating year (Year-2000),
at 65 AGeV Au + 65 AGeV Au collisions.

- The magnetic spectrometer enables
the PIDed hadron physics at higher momentum region,
which is one of the distinctive advantages in ***PHENIX***.