

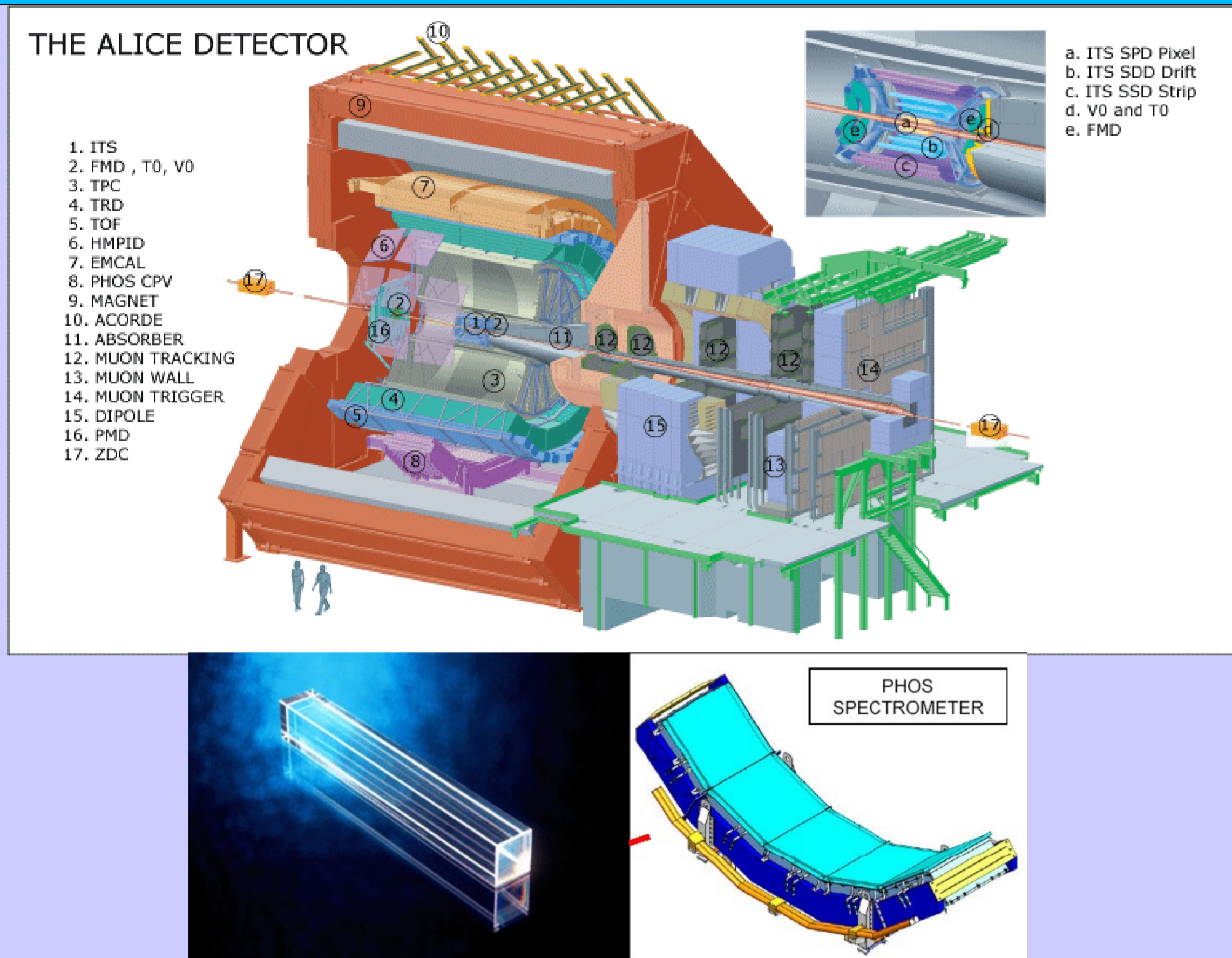
Azimuthal anisotropy of neutral pion production in Pb+Pb collisions at $\sqrt{s} = 2760$ GeV measured by ALICE PHOS



Dmitry Blau
For the ALICE collaboration
NRC «Kurchatov Institute», Moscow, Russia



ALICE experiment and PHOS spectrometer



ALICE (A Large Ion Collider Experiment) is a heavy ion experiment on LHC at CERN. Its main goal is to study strongly interacting matter at extreme energy densities where the formation of a new state of matter, the quark-gluon plasma, is expected. RRC “**Kurchatov Institute**” manages the development and construction of Photon Spectrometer (**PHOS**) at ALICE.

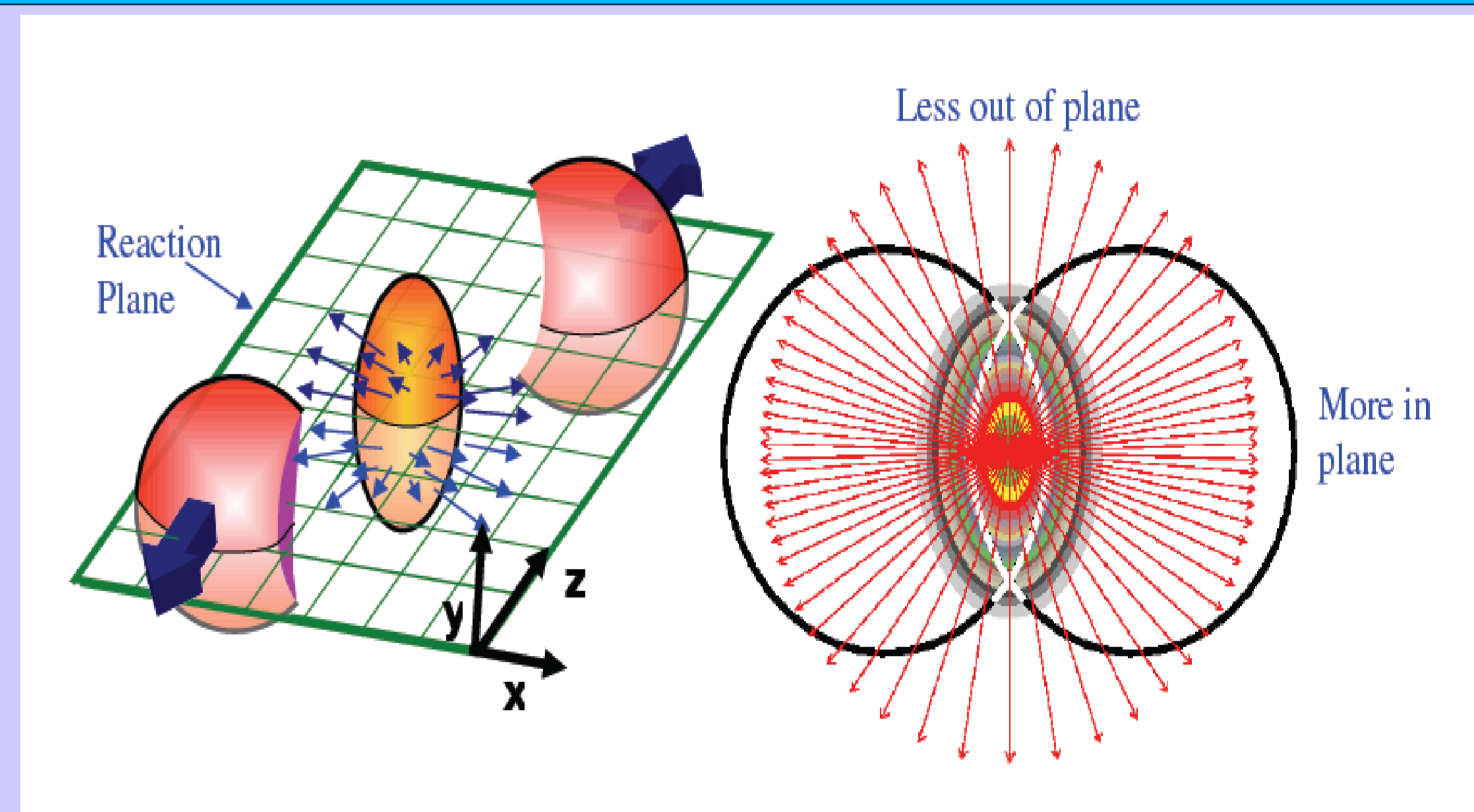
PHOS is a high resolution electromagnetic calorimeter consisting of 17920 detection channels based on lead tungstate crystals (**PWO**). Its distance to ip is 460 cm and it consists of 5 modules each containing 64×56 crystals. 3 modules are currently installed. PHOS covers $\Delta\phi=100^\circ$ and $|\eta|<0.12$ and its energy range is 0.1-100 GeV.

Elliptic flow

In non-central heavy ion collisions the initial overlap region of the colliding nuclei is asymmetric. Pressure gradients cause final-state anisotropy in momentum space. The particle production can be characterized by a Fourier expansion:

$$E \frac{d^3N}{d^3p} = \frac{1}{\pi} d^2 \frac{N}{dp_T^2 dy} [1 + 2v_1 \cos(\phi - \Psi_R) + 2v_2 (2[\phi - \Psi_R]) + \dots]$$

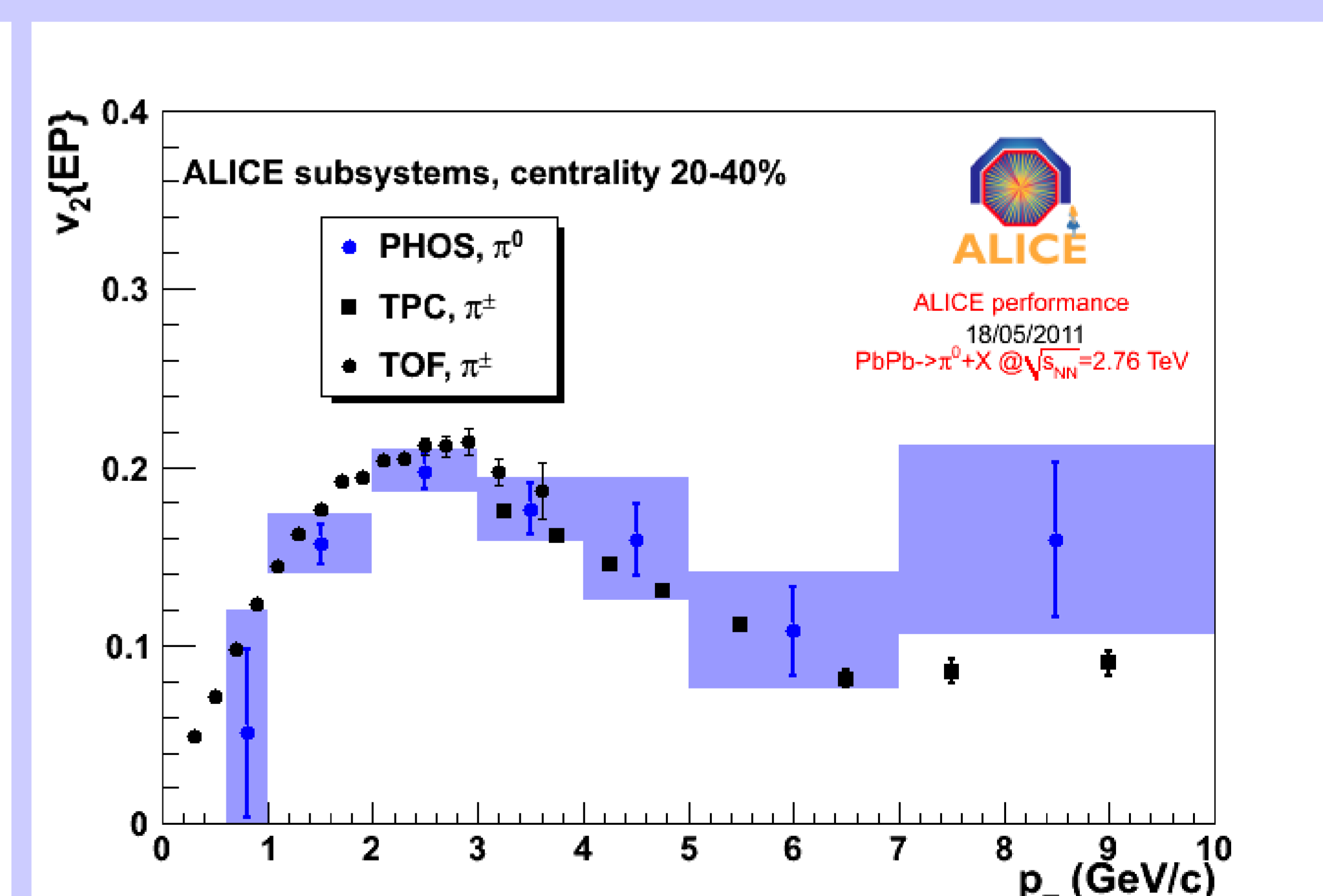
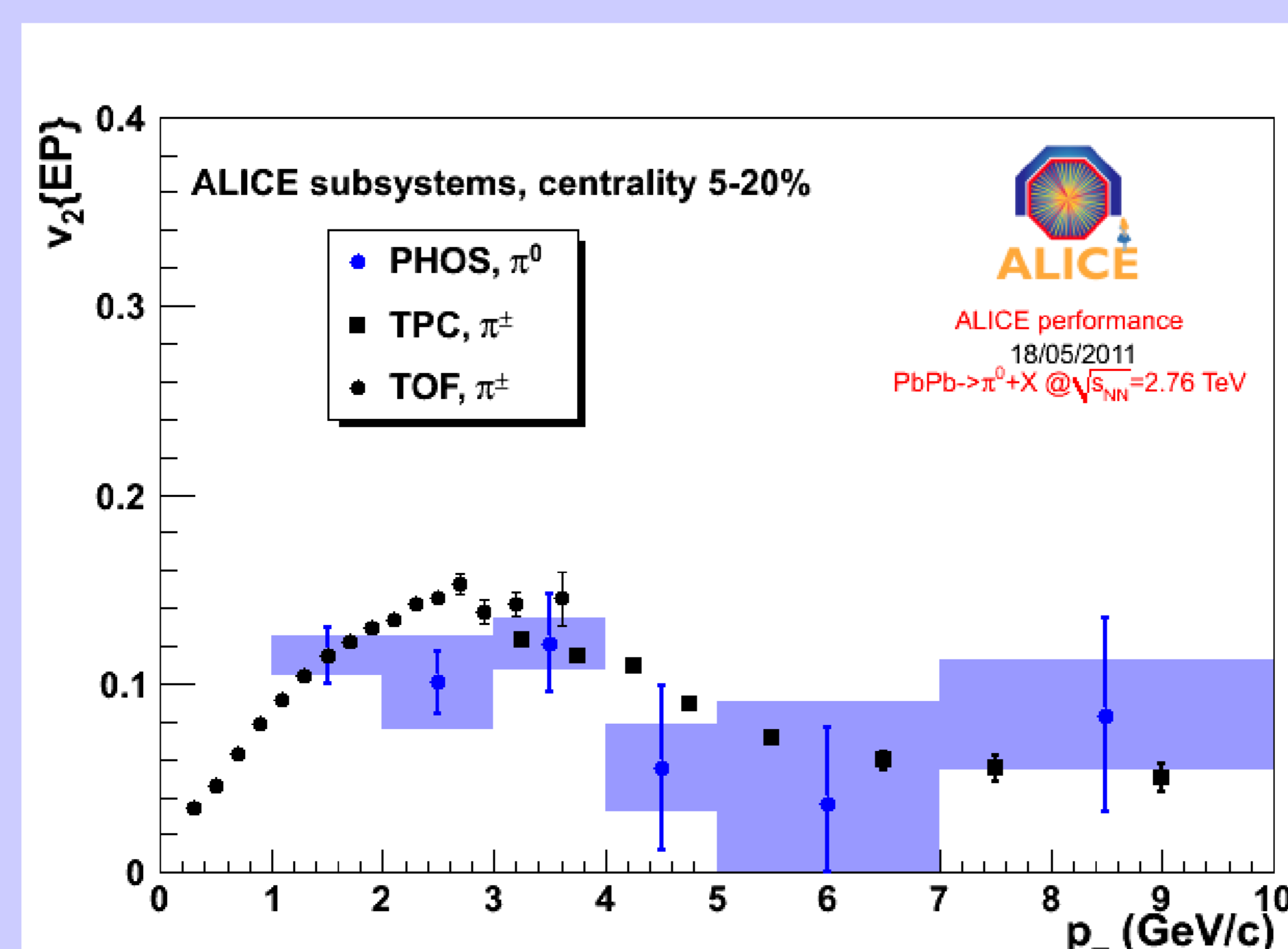
The most dominant contribution is v_2 (also called as **elliptic flow**). Elliptic flow is a key probe to the information about early state of the created system.



v_2 analysis and results

- Event Plane method correlates each particle with the event plane of the other particles.
- The estimated v_2 using this method is corrected on event plane resolution R , which is determined from the correlation between the event plane vectors of two independent subevents. In our case they were $\eta < -0.1$ and $\eta > 0.1$.
- Event plane was produced using tracks from Central Tracking System of ALICE (TPC + ITS).
- v_2 of neutral pions can be extracted from the total v_2 by separating contributions from background and pions. In order to do so we should estimate v_2 of background (Mixed events or fit of Real v_2) and signal to background ratio of number of π_0 s.

- 9.8M events of PbPb data at $\sqrt{s} = 2.76$ TeV were analyzed.
- Comparison to results from TPC/TOF group was made.



Conclusions

- v_2 with EP method was obtained in 2 centrality classes: 5-20% and 20-40%.
- PHOS is working on elliptic flow in PbPb collisions side by side with other ALICE groups (conversions, charged pions flow from TPC and TOF).