

# Status of Ke3 (second analysis)

Michał Szleper

Northwestern University

Semileptonic Meeting, July 8, 2004

### Ke3, $\pi^+\pi^0$ selection criteria

- 1 track with no associated muon,
- $E/p = 0.95$  to decide between pion and electron,
- $p > 5$  GeV for  $e$ ,  $p > 10$  GeV for  $\pi$ ,
- $-20$  ns  $< t_{HODO} < 20$  ns,
- Standard fiducial cuts for track,
- At least 2 not associated clusters, in time within 3 ns,
- Vertex found as the closest approach of track with beam axis,  
 $-10m < z < 80m$ ,
- Look for best  $\pi^0$  mass,  $0.13 < m_{\pi^0} < 0.14$ ,
- $E_\gamma > 3$  GeV,
- Standard fiducial cuts for  $\gamma$ 's,
- Separation of  $\gamma$ 's with any other cluster  $> 9$  cm,

### Ke3:

- $0.65 < \text{Cluster RMS in } x, y < 0.85$ ,
- $m_K < 0.475$  MeV or  $m_K > 0.515$  GeV,
- $m_\nu^2 < 0.012$  GeV<sup>2</sup>,

$\pi^+\pi^0$ :

- $0.475 \text{ GeV} < m_K < 0.515 \text{ GeV}$ ,
- $0.23 \text{ GeV} < E_{CM}^\pi < 0.27 \text{ GeV}$ ,
- $|p_T^\pi - p_T^{\pi^0}| < 0.02 \text{ GeV}$ ,
- $m_X^2 > -0.0025 \text{ GeV}^2$ .

## Tighter kinematic cuts for particle-ID efficiency studies

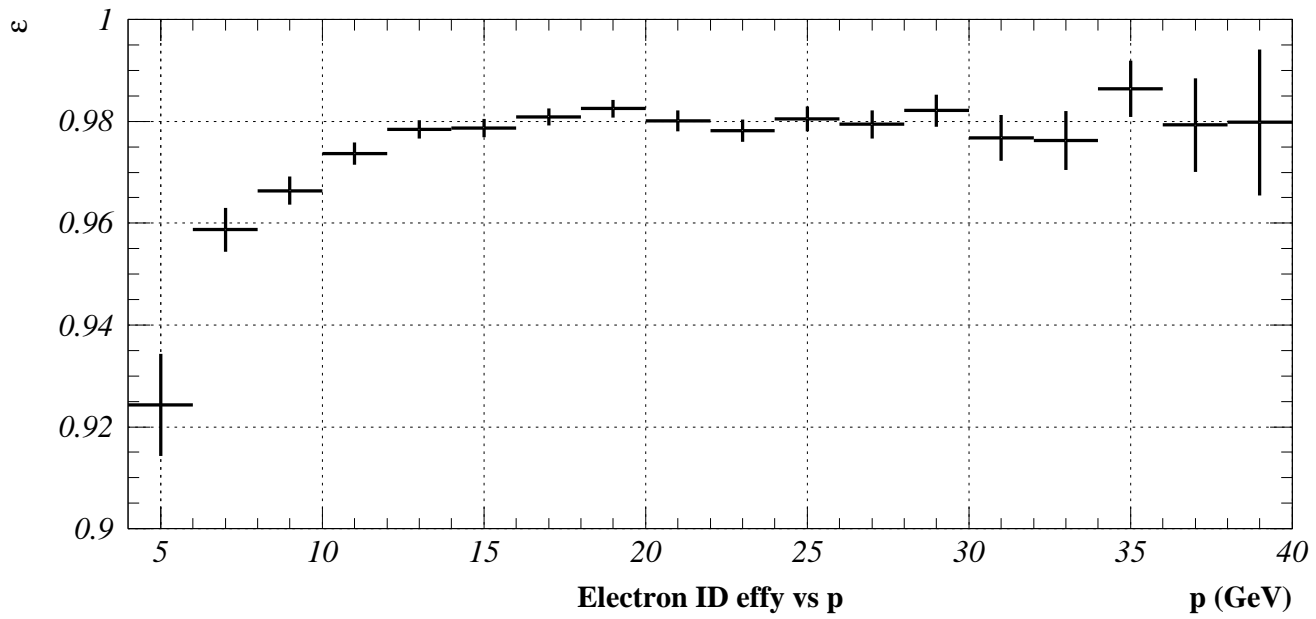
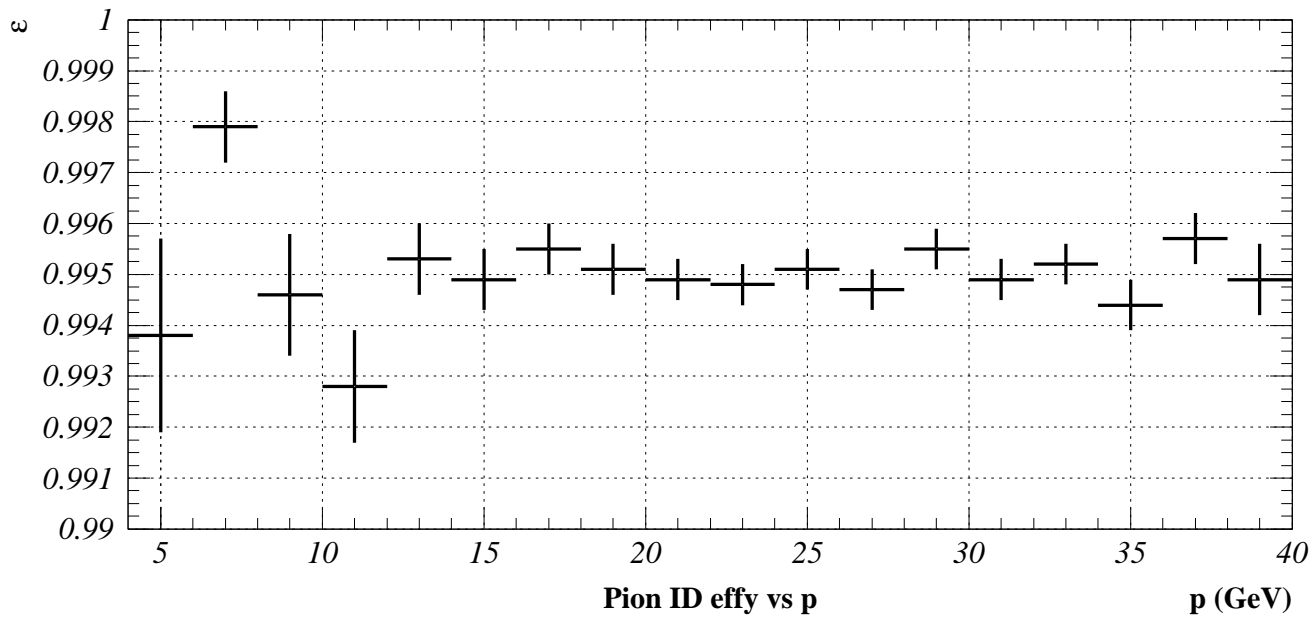
**Ke3:**

- $m_K < 0.465 \text{ MeV}$  or  $m_K > 0.525 \text{ GeV}$ ,
- $E_{CM}^\pi < 0.23 \text{ GeV}$  or  $E_{CM}^\pi > 0.27 \text{ GeV}$ ,
- $-0.005 \text{ GeV}^2 < m_\nu^2 < 0.0025 \text{ GeV}^2$ ,
- $m_X^2 < -0.0025 \text{ GeV}^2$ ,

$\pi^+\pi^0$ :

- $0.485 \text{ GeV} < m_K < 0.505 \text{ GeV}$ ,
- $0.245 \text{ GeV} < E_{CM}^\pi < 0.25 \text{ GeV}$ ,
- $m_X^2 > -0.0015 \text{ GeV}^2$ .

...and release E/p cut.



**Average E/p efficiencies:**

e-ID:  $0.9783 \pm 0.0006$ ,

$\pi$ -ID:  $0.9957 \pm 0.0001$  (corrected for residual electron contamination of the test sample, MC-estimated to be 0.0006) ← a better idea would have been to use a  $3\pi$  sample instead!

**Cluster RMS cut efficiency:**

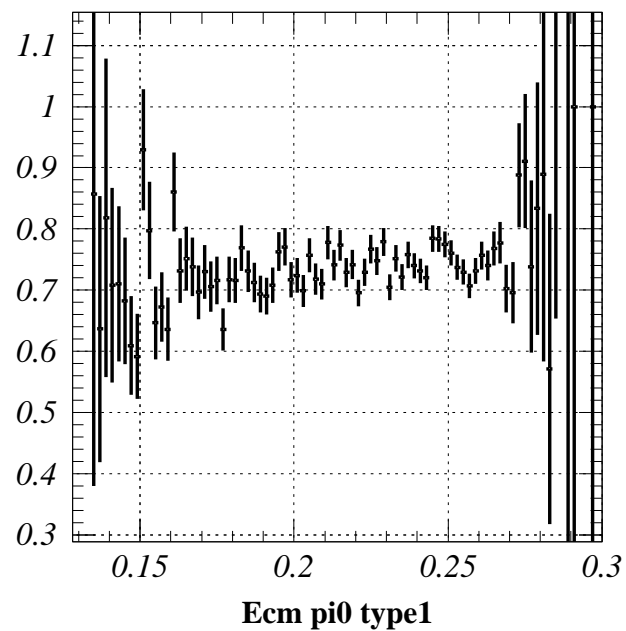
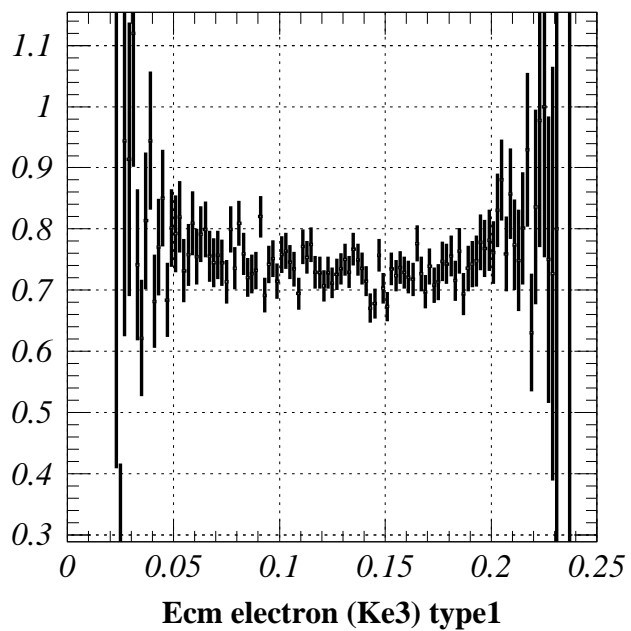
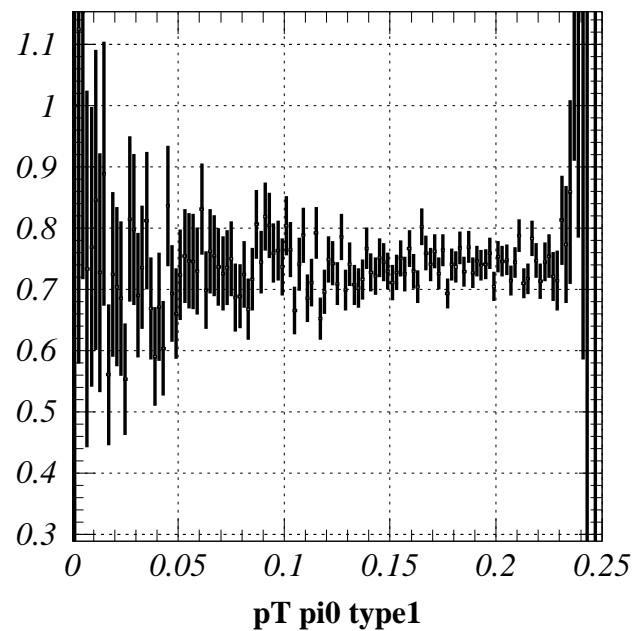
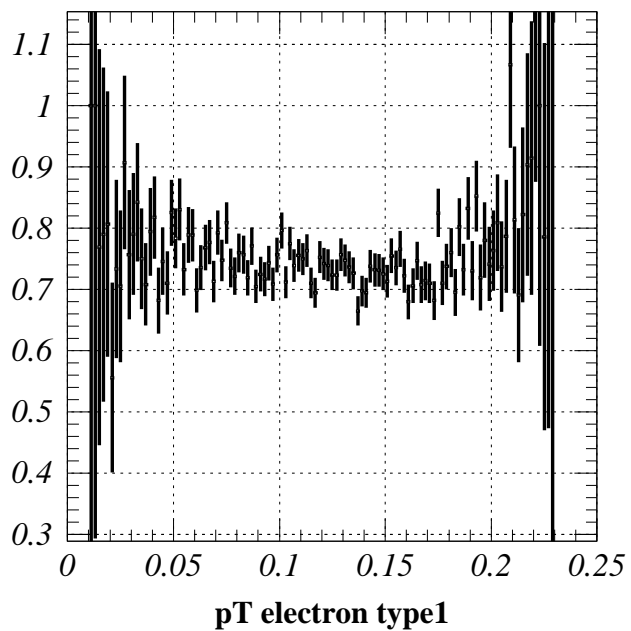
- 20-fold reduction factor of  $\pi^+\pi^0$  sample.

**MC geometrical acceptance studies:**

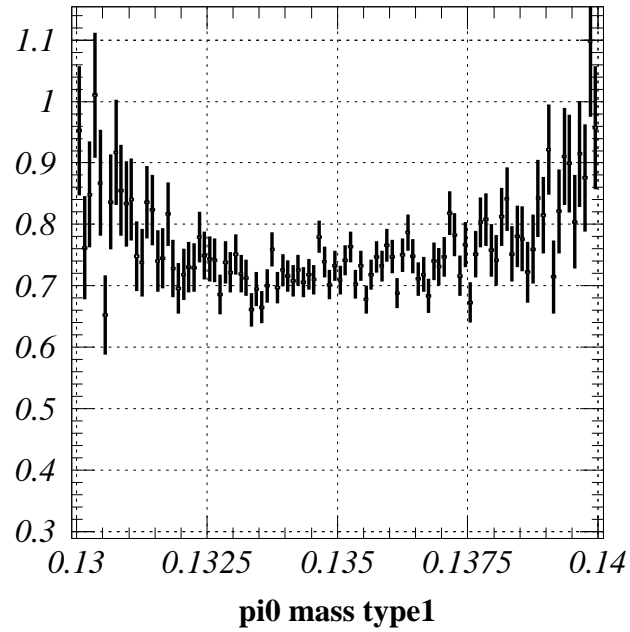
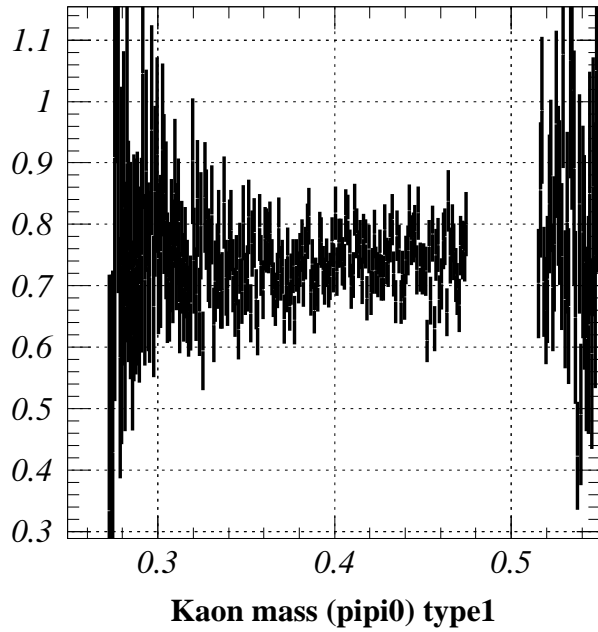
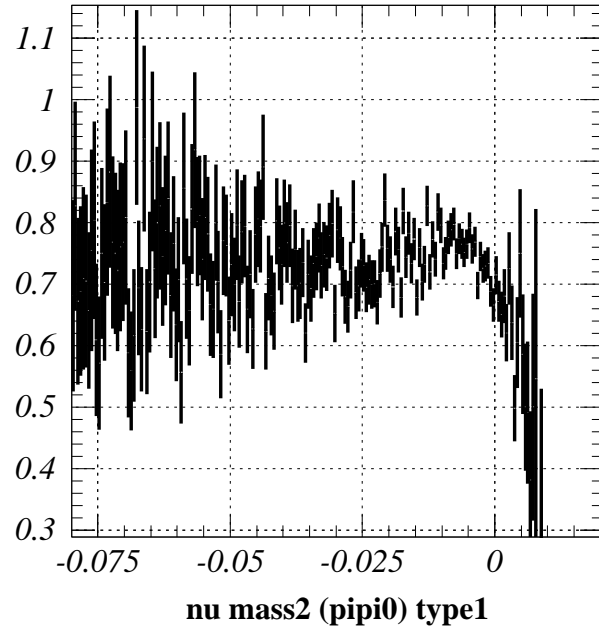
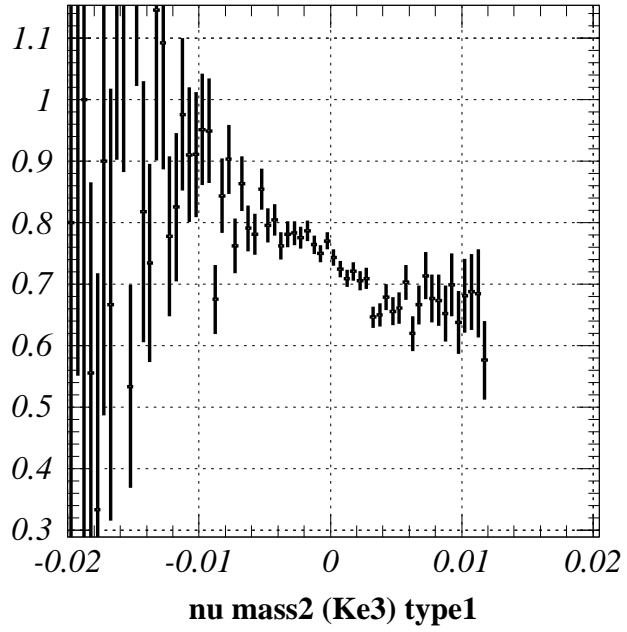
- Further 20-fold reduction of background  $\pi^+\pi^0$  in Ke3 sample by Ke3 kinematic cuts,
  - 100-fold reduction of background Ke3 in  $\pi^+\pi^0$  sample relative to  $E/p$  alone by  $\pi^+\pi^0$  kinematic cuts.

**Conclusion:** Both Ke3 and  $\pi^+\pi^0$  samples are clean to less than 0.01%. Background is not an issue.

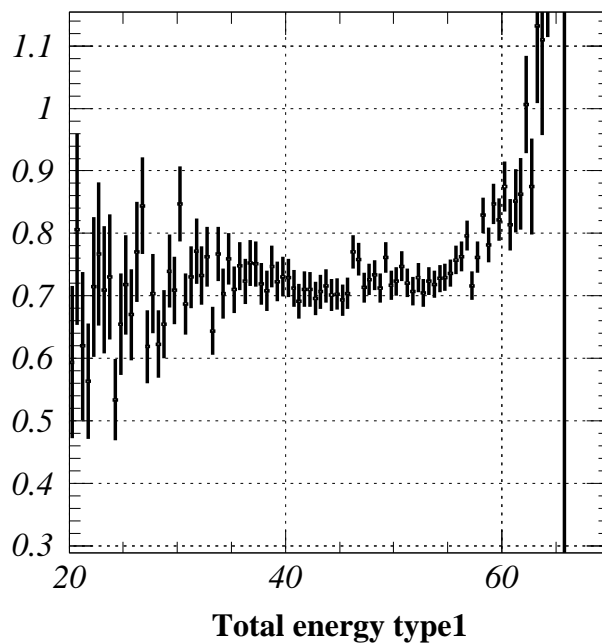
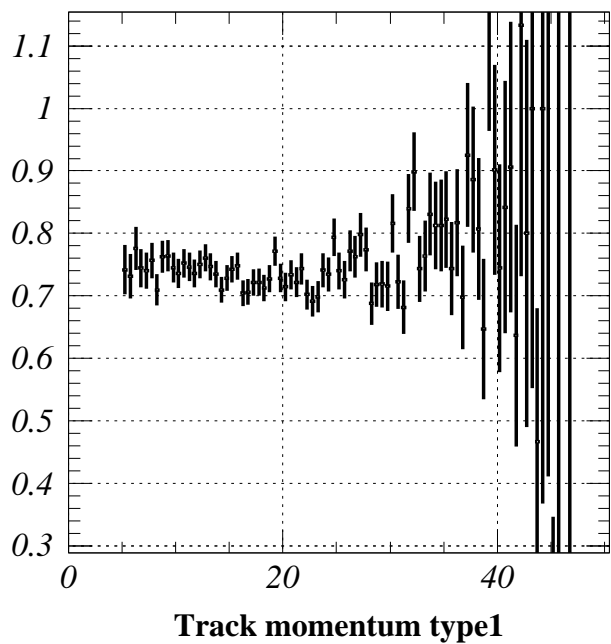
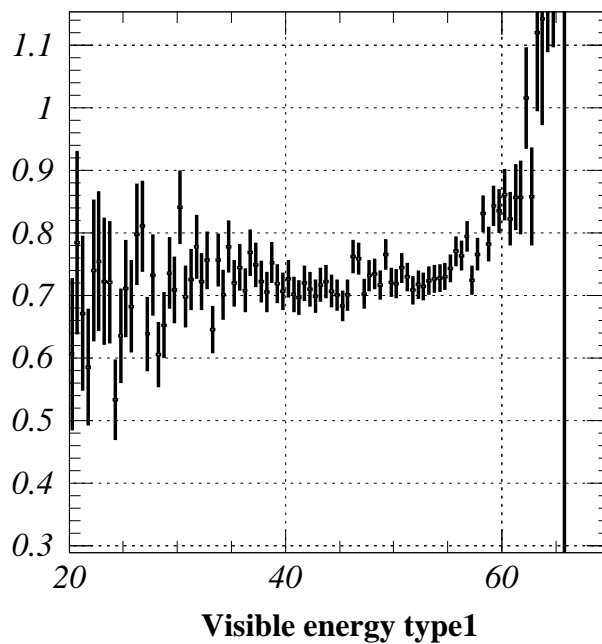
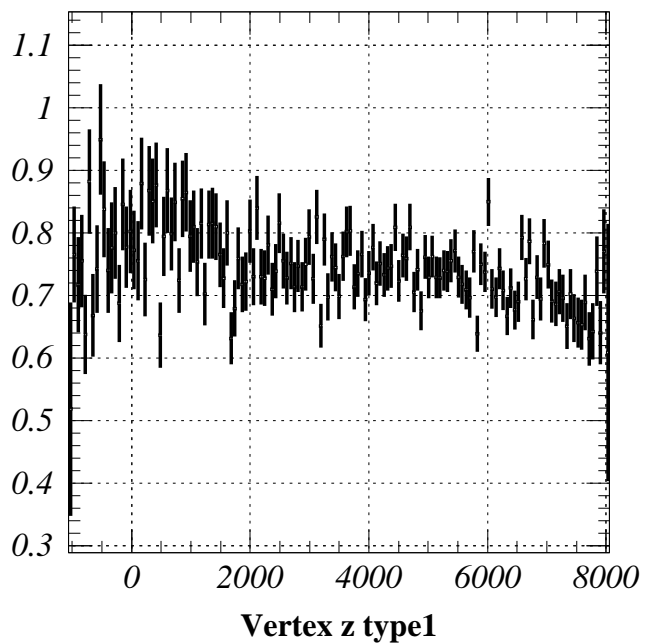
*Ke3 Data / MC (Jul 5)*



*Ke3 Data / MC (Jul 5)*



*Ke3 Data / MC (Jul 5)*



*Ke3 Data / MC (Jun 27)*

