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PMT Tiling Schemes - the Second Attempt

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Abstract

Several tiling schemes have been tested for kaon reconstruction efficiency. Very little variation was observed for a wide variety of choices.

1 The programs and data

Each tiling scheme was generated by using the pmtile program of M. Starič. The PMT data file was then read in by the reconstruction program. For the event data the MC generated $J/\psi K_s$ superimposed onto 4 minimum bias events were used. The reconstruction program was always run on the same set of 1000 events, assuming 27 photons per a $\beta = 1$ track. The reconstruction used was Marko's iterative method with 20 iterations.

2 Tiling schemes

Several tiling schemes were tried, starting from the one which is inspired by the occupancy (c.f. Roy's report). Each scheme is twice symmetric with fully equipped 2x2 modules, so that it uses 1488 M16s and 752 M4s (twelve of each sort are spares). The last two schemes

(17 and 18) were inspired by the observation (Fig. ??) that there are fewer rings centered above the beam pipe due to the fact that such tracks are necessarily of low momenta, which are shifted to the left and right in the magnetic field.

The integrated efficiency for K from B's typically amounts to 73%, reaches 74.4% (scheme 4), is equal to 72% for the occupancy driven design, but is as low as 67% for the sparcified tiling scheme (scheme 8). Note also that an overall 2% statistical error has to be taken into account.

This clearly is an introductory study. Further analyses will also explore the high momentum part of the spectrum to see whether that offers a clearer scheme discrimination tool.

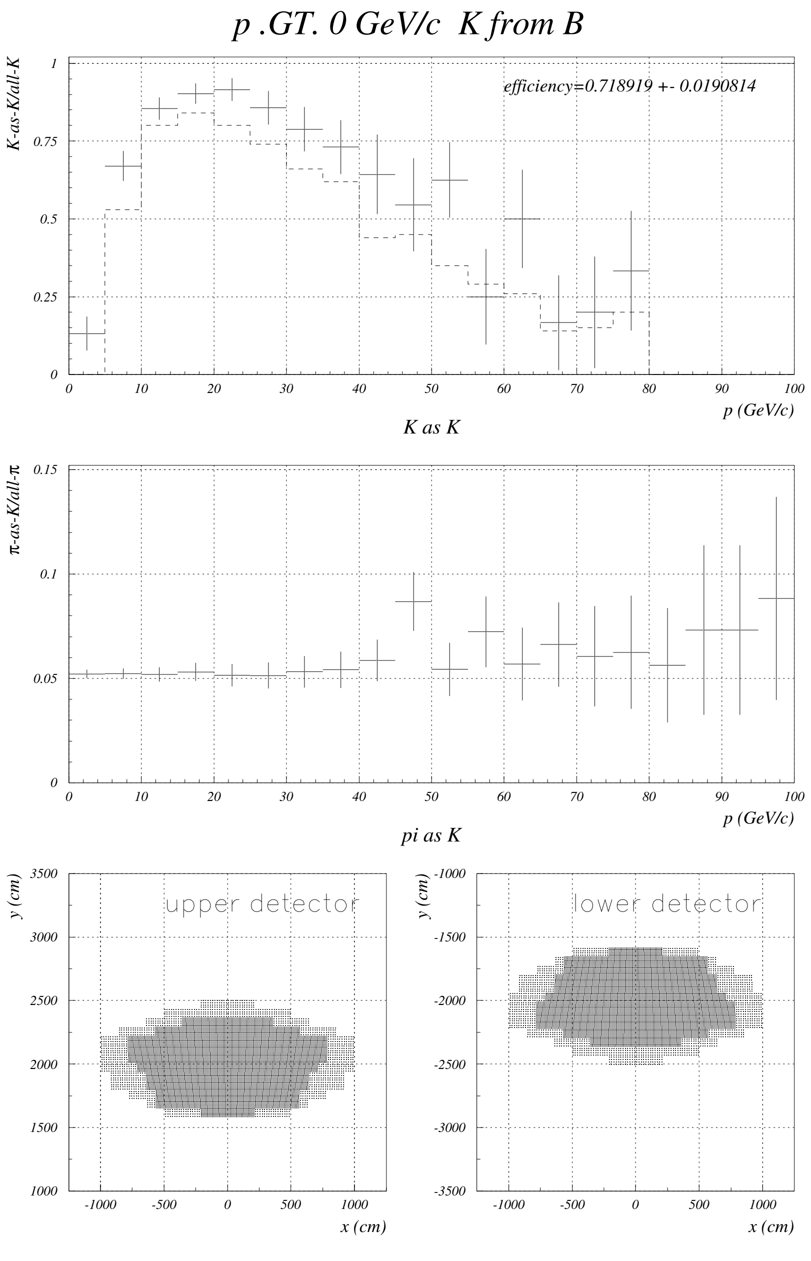

Figure 1: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). This particular scheme was developed by Roy and follows the occupany. Dashed: for comparison to older analyses we add Tomi's reference efficiency plot.*

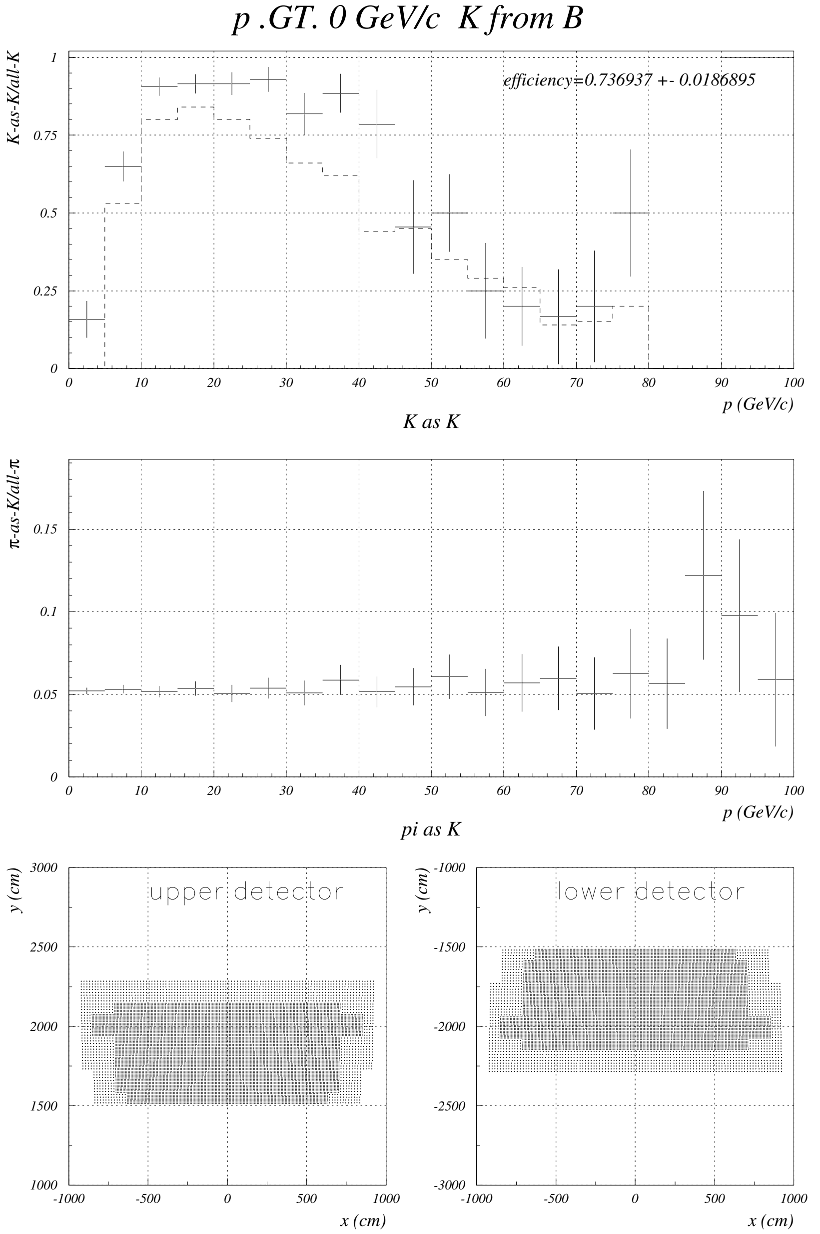

Figure 2: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 2.*

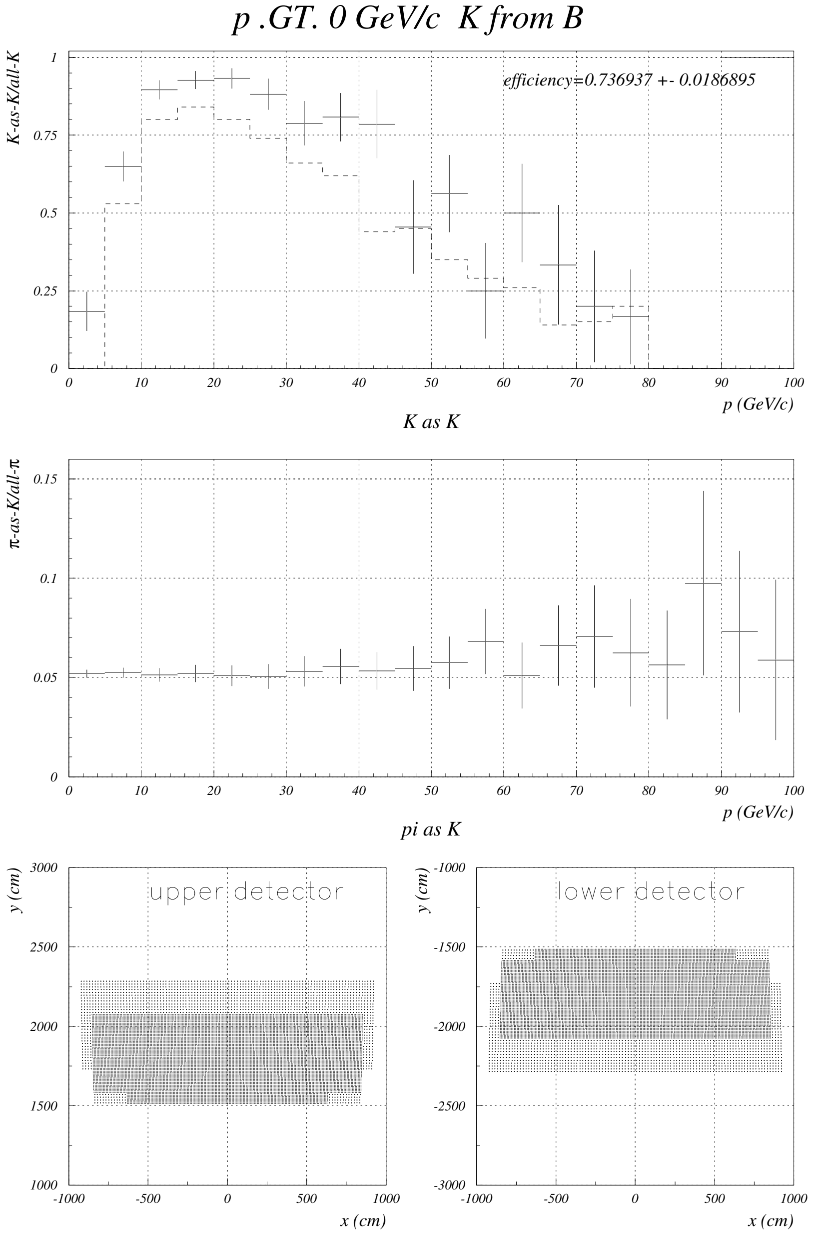

Figure 3: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 3.*

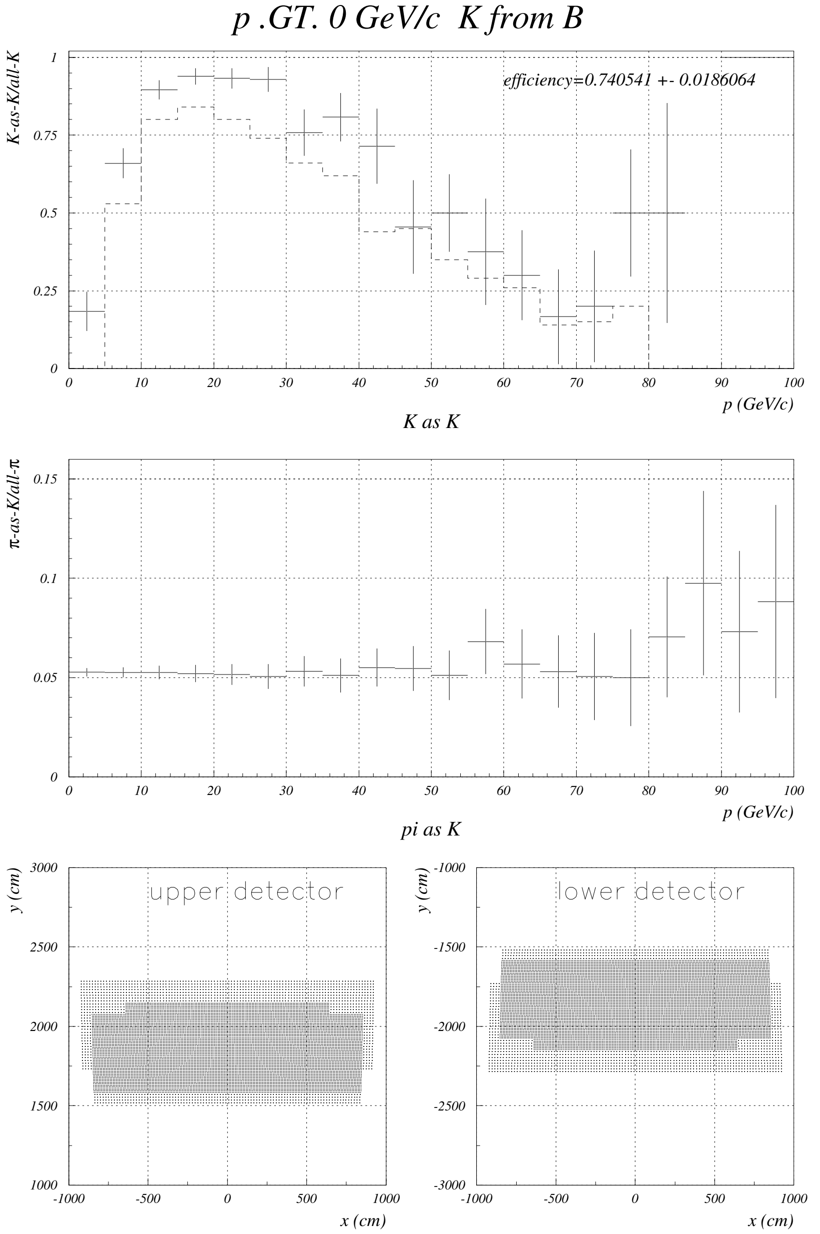

Figure 4: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 4.*

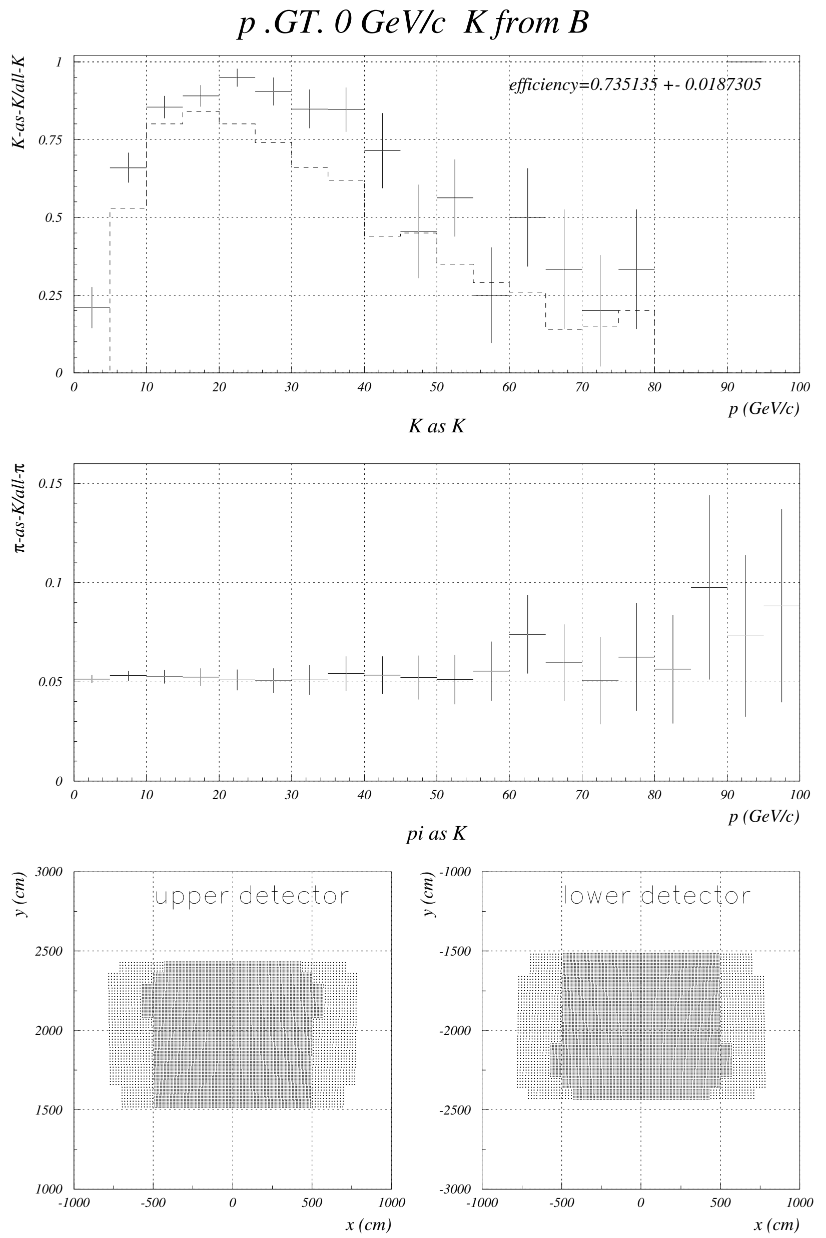

Figure 5: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 5.*

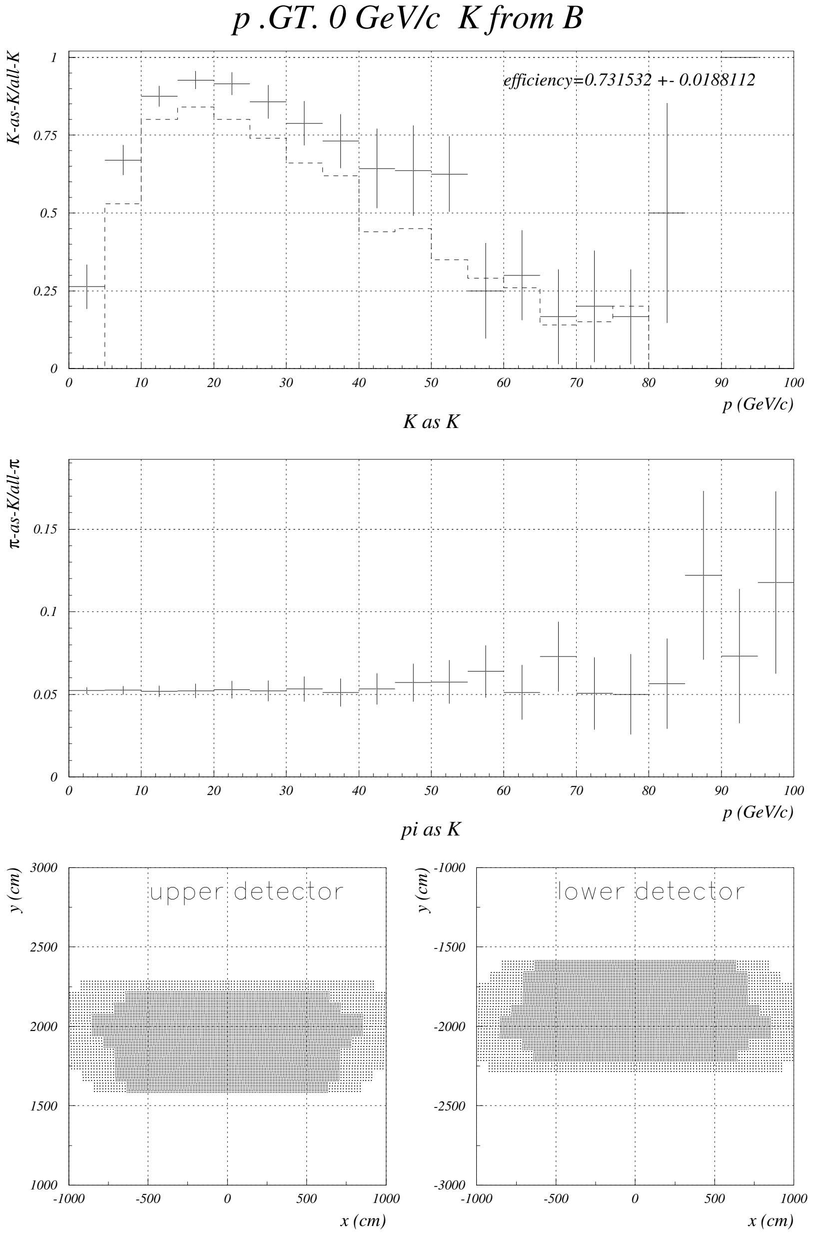

Figure 6: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 6.*

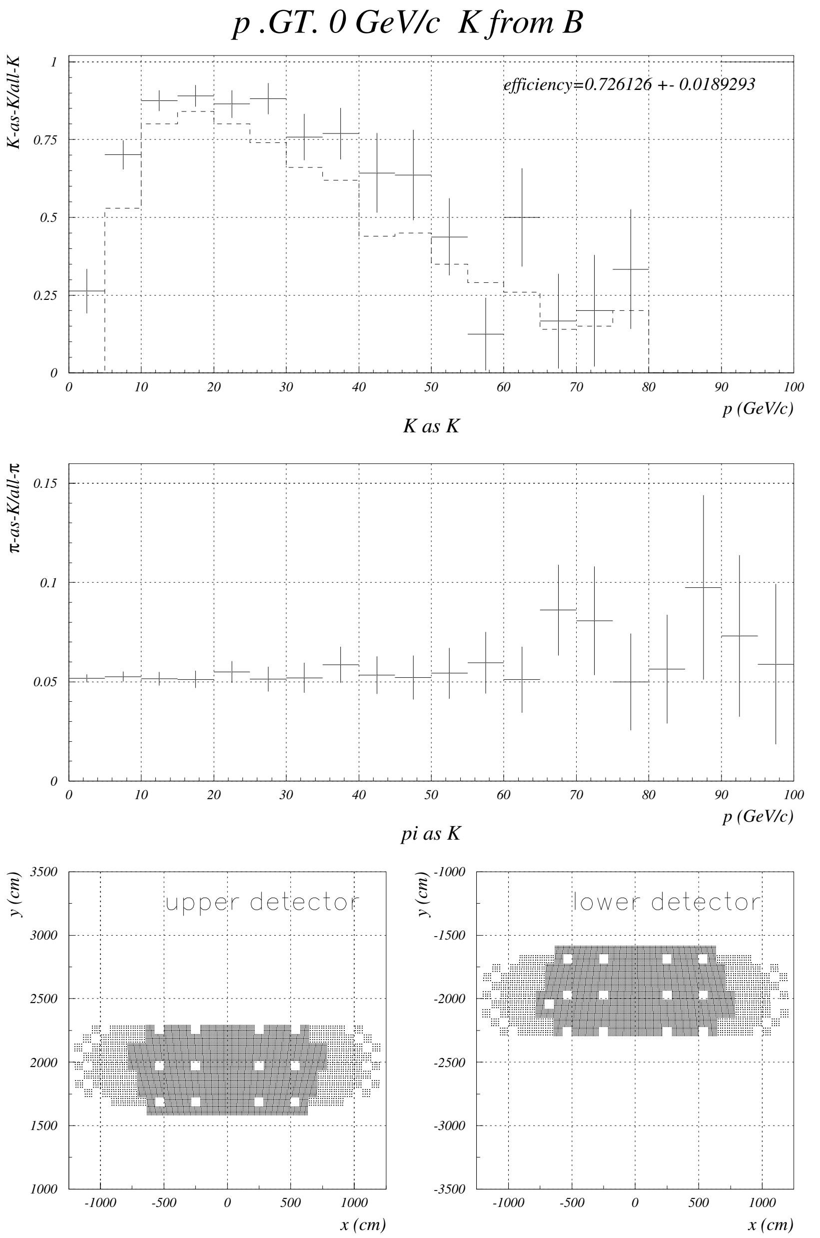

Figure 7: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 7.*

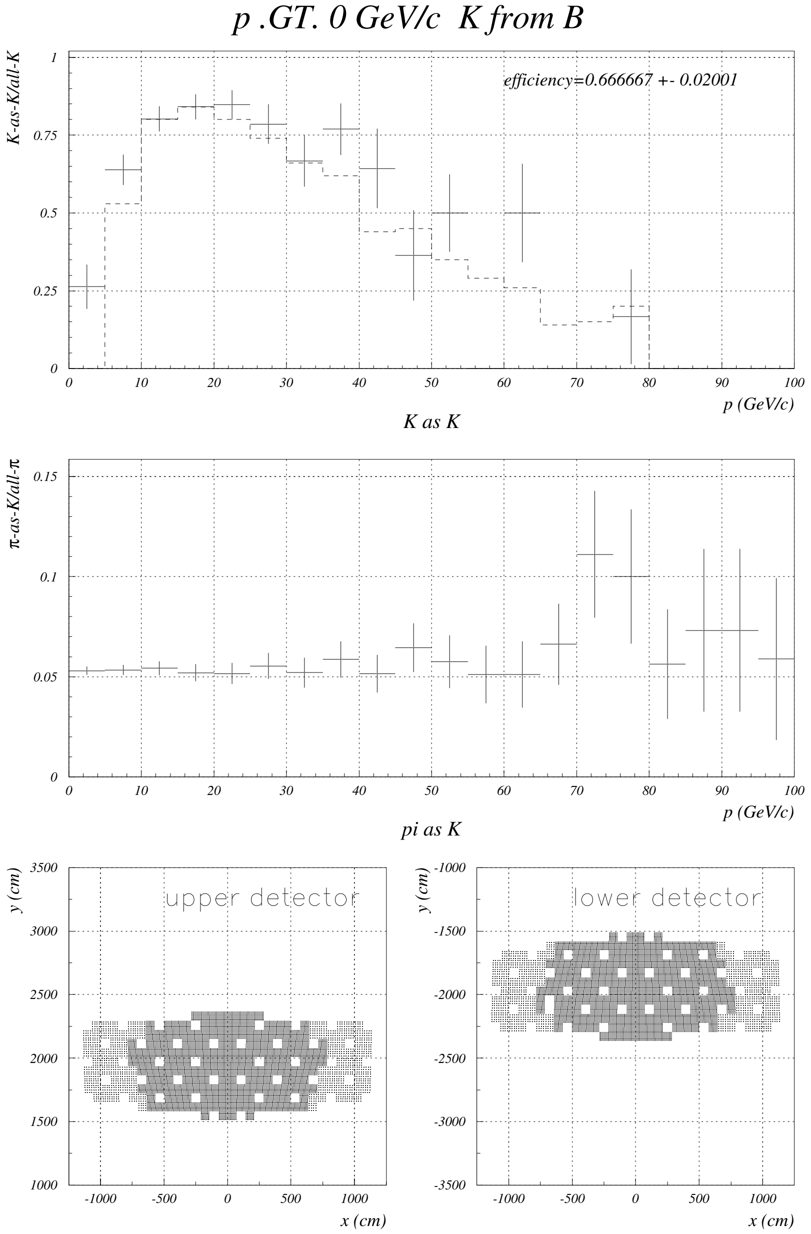

Figure 8: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 8.*

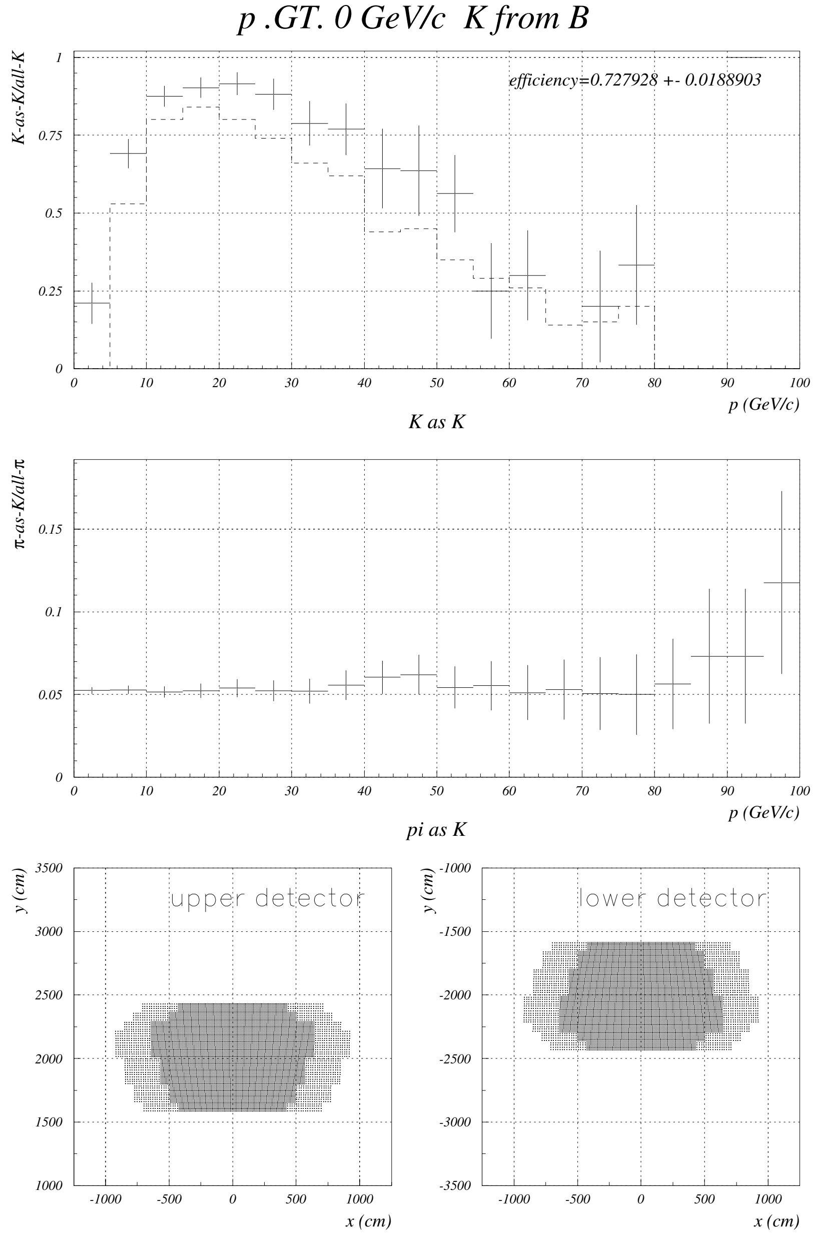

Figure 9: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 9.*

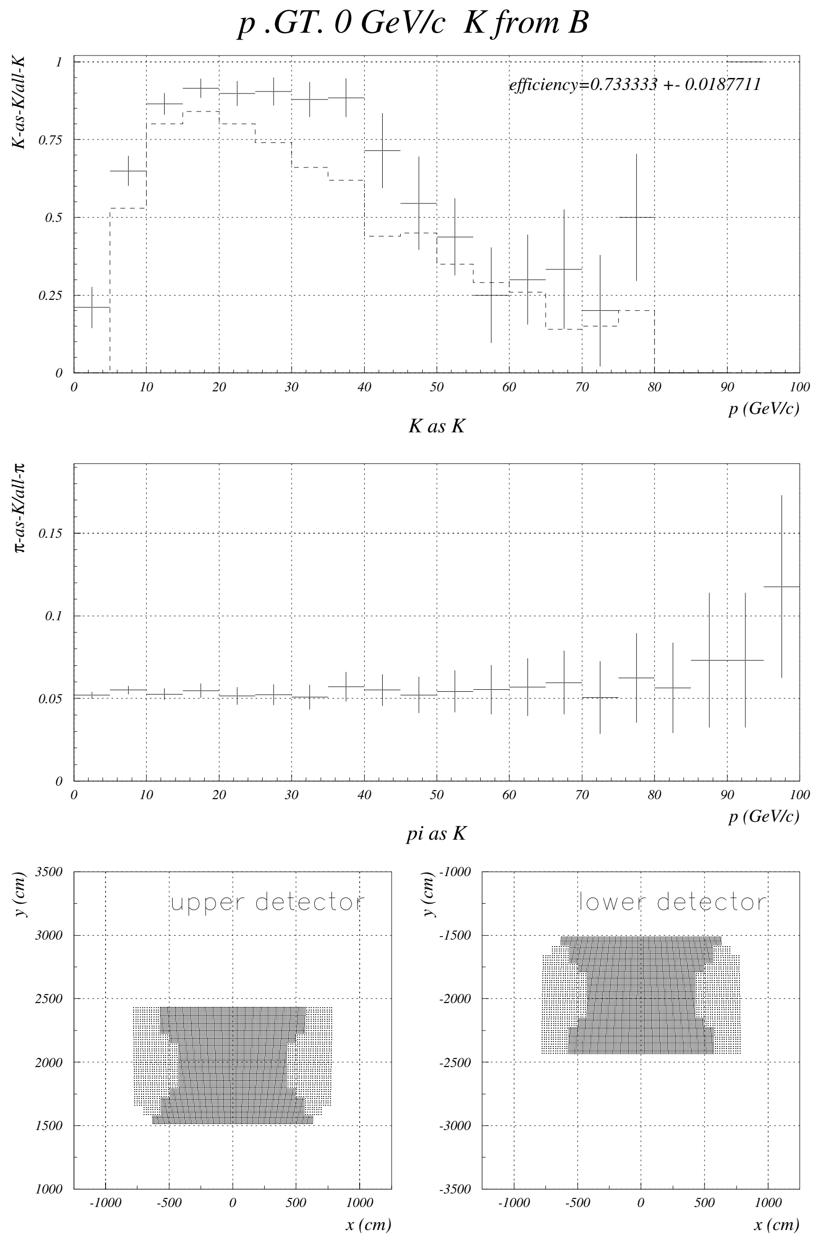

Figure 10: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 12.*

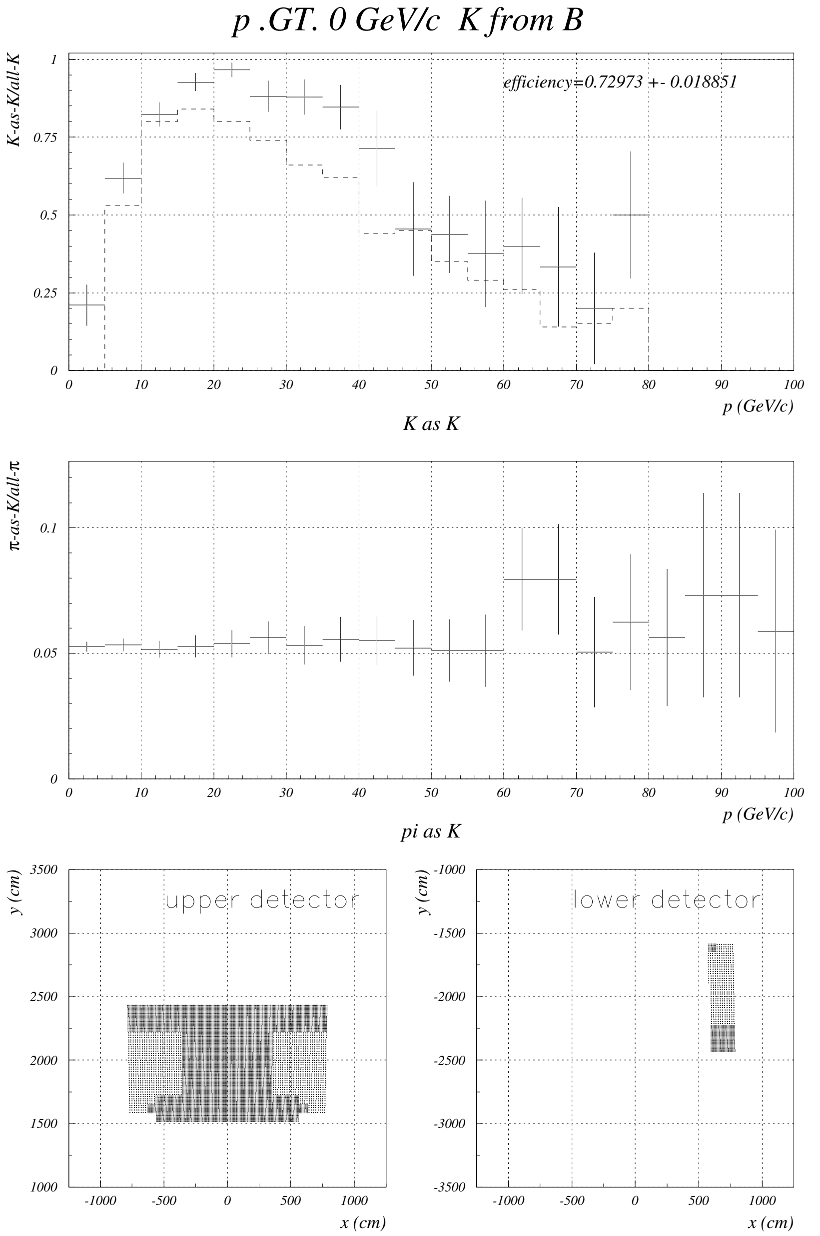

Figure 11: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 12.*

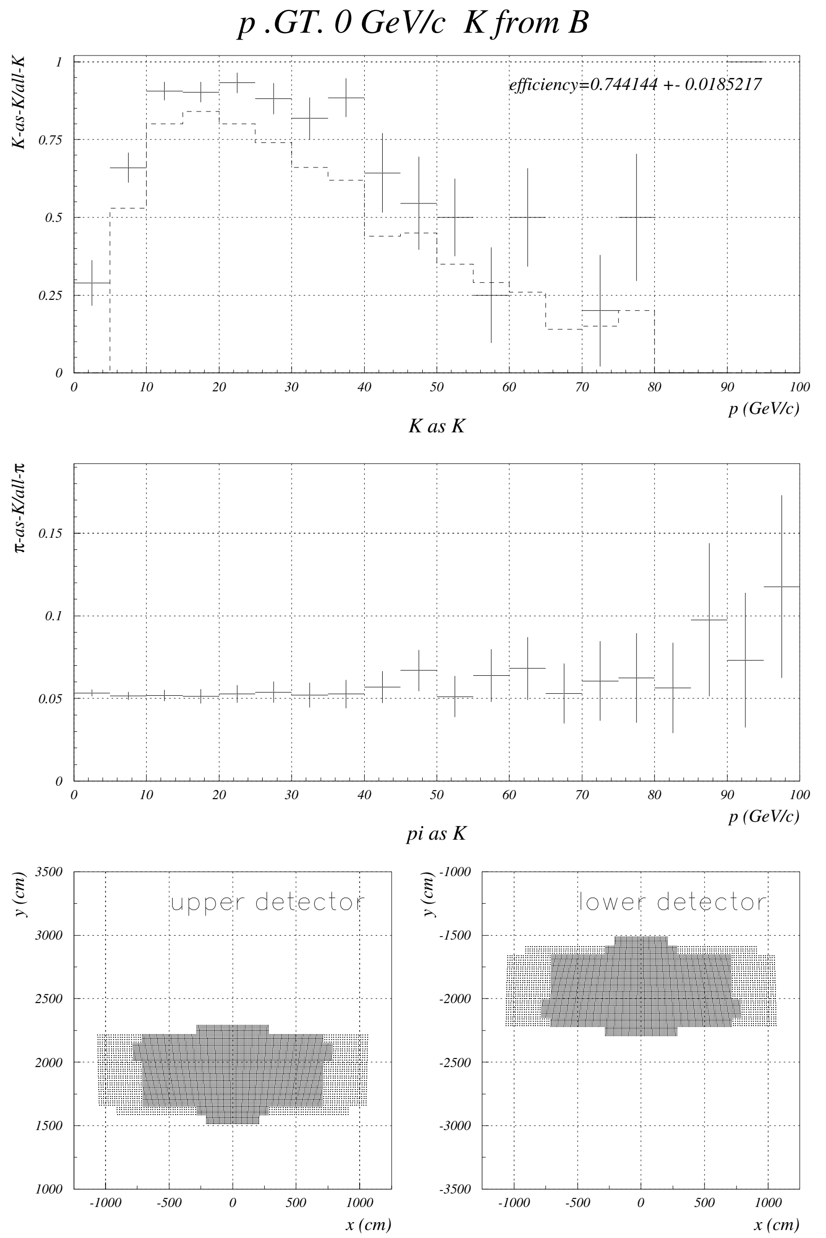

Figure 12: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 13.*

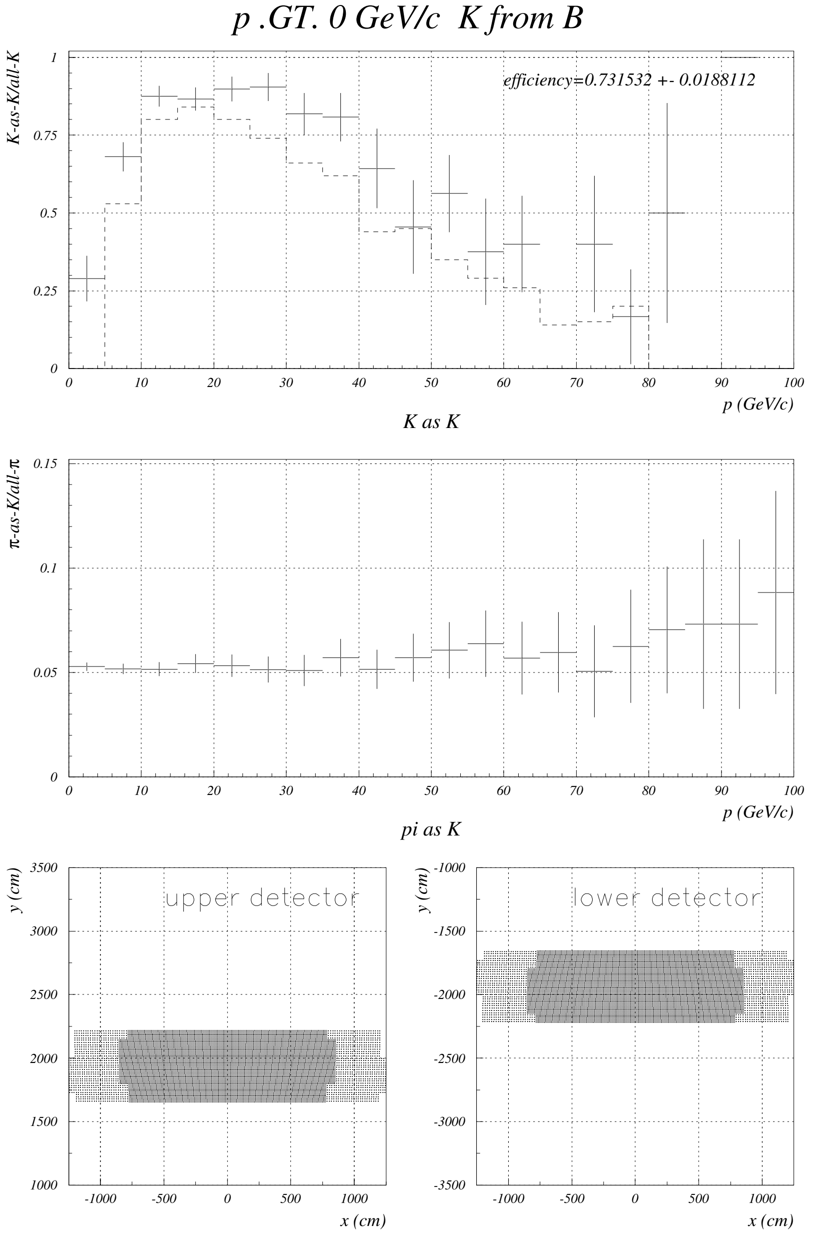

Figure 13: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 14.*

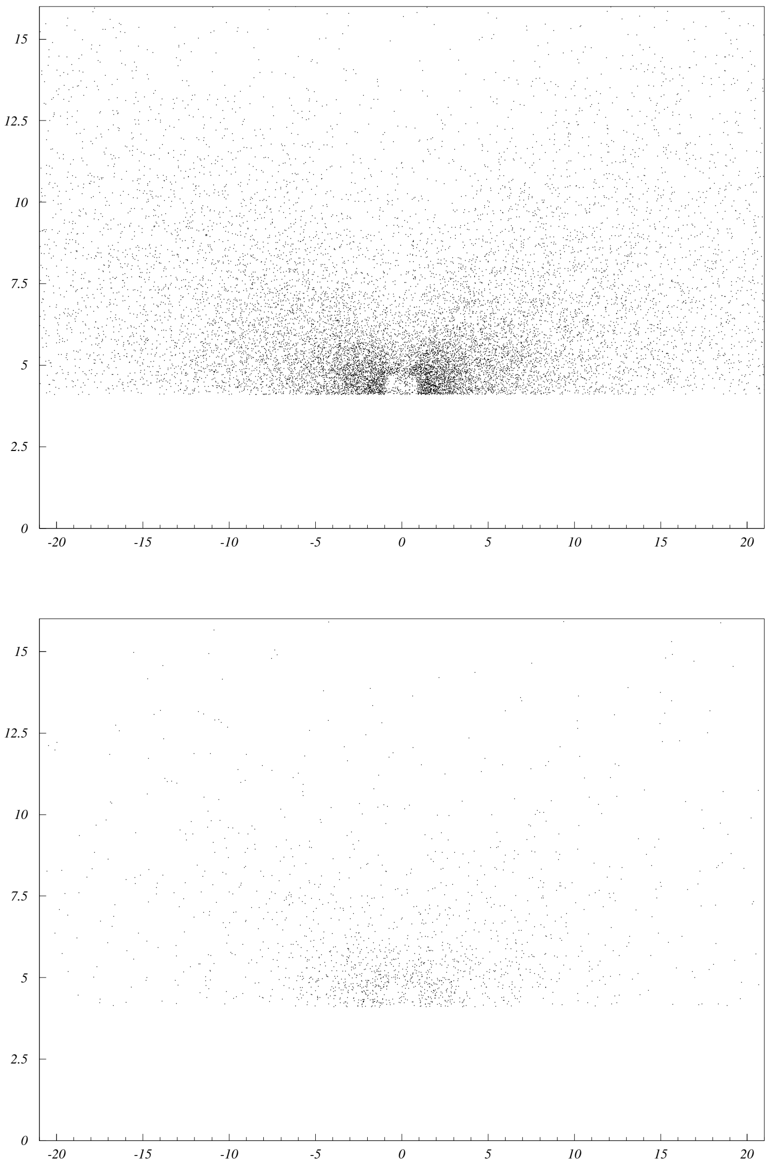

Figure 14: *Ring centers distribution as a function of coordinate in units of 2x2 PMT modules: pions (top), kaons (bottom).*

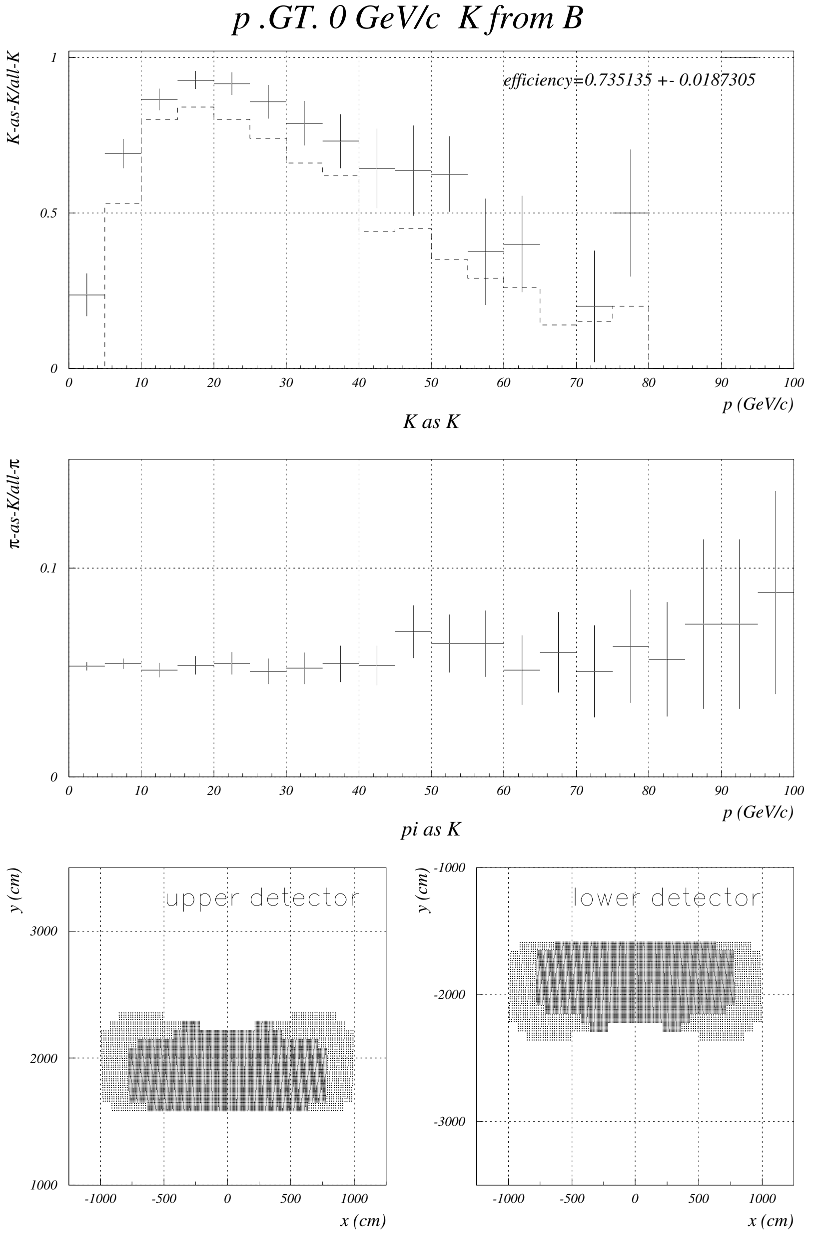

Figure 15: *Efficiency for K identification (top), fake probability (middle), detector tiling scheme (below). Scheme Nr. 18.*