EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

DIRAC Note 2005-22
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FRITIOF6: the test of Q- and $\cos\theta$-distributions for $\pi\pi$-pairs

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1 Simulation and results

Our goal was to check if the Q-distribution of pion pairs is proportional to Q^2 and cosθ-distribution is flat. We used the FRITIOF6 for it. GEANT and ARIANE were not used. There is no restriction on pion angle.

The results are shown on Fig. 1 - 16. First eight pictures represent the short lived sources, last eight ones - long lived ones ($\eta, \eta\prime$ and Σ^0). Such weak decayed particles like Λ, K_S^0, Σ^+ and Σ^- were treated as stable ones.

The distributions were fitted by the polynomials like $a_0 + a_1 * Q$, $a_0 + a_1 * cos\theta$ or $a_0 + a_1 * Q + a_2 * Q^2$. The corresponding values of a_0,a_1 and a_2 are presented in the figure captions.

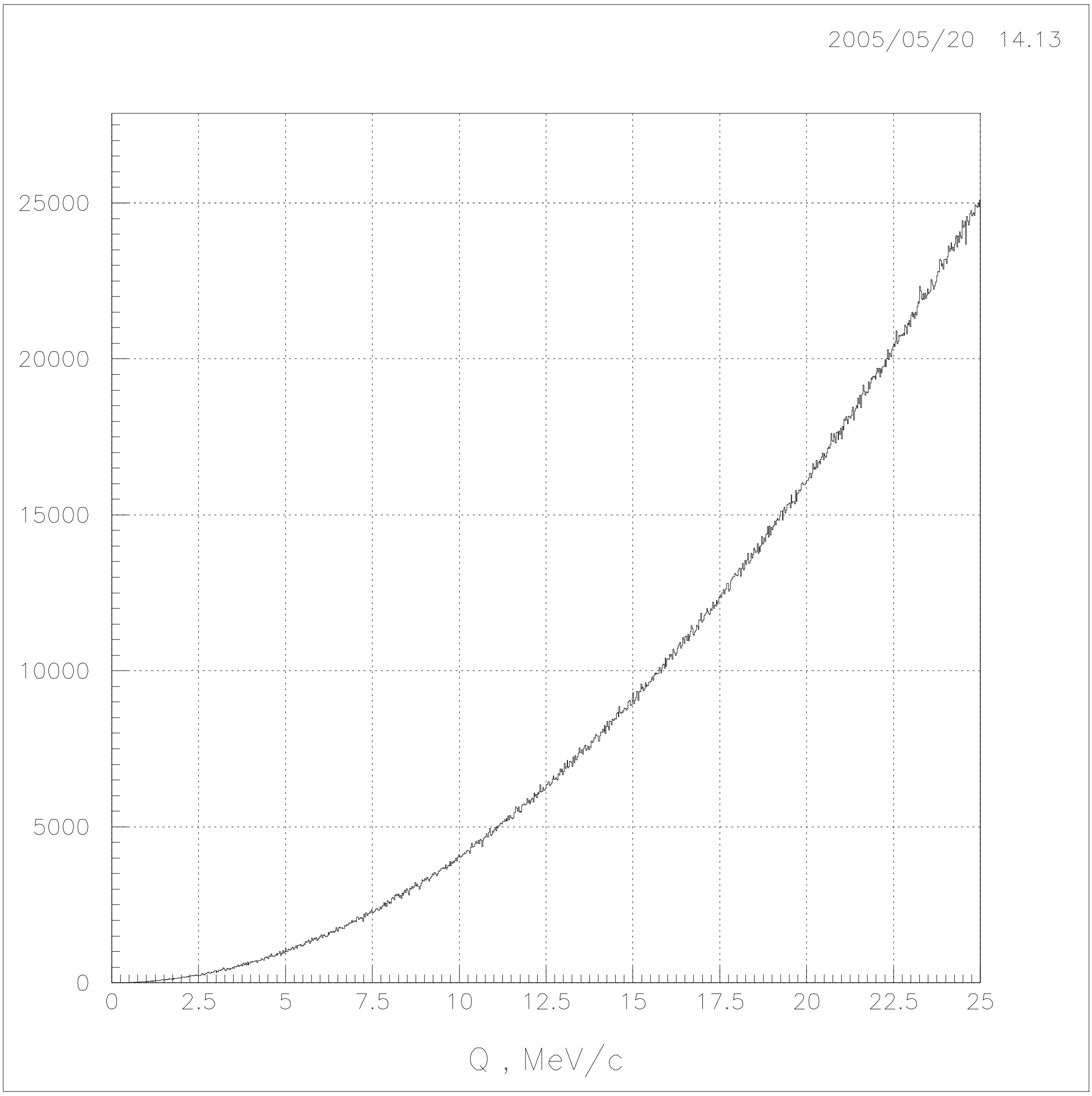

Figure 1: *The dN/dQ distribution of short lived pion pairs.*

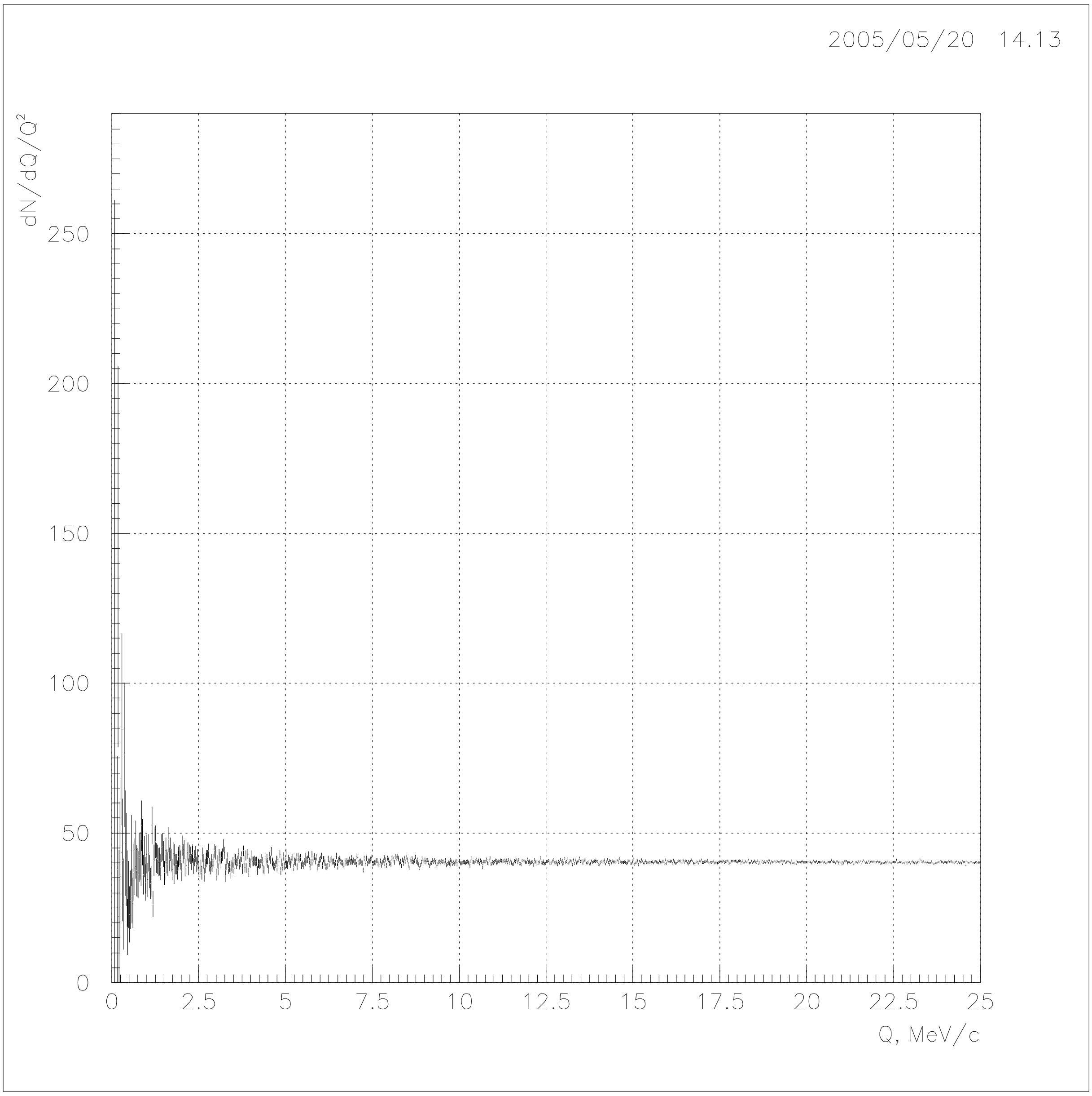

Figure 2: *The $dN/dQ/Q^2$ distribution of short lived pion pairs.*

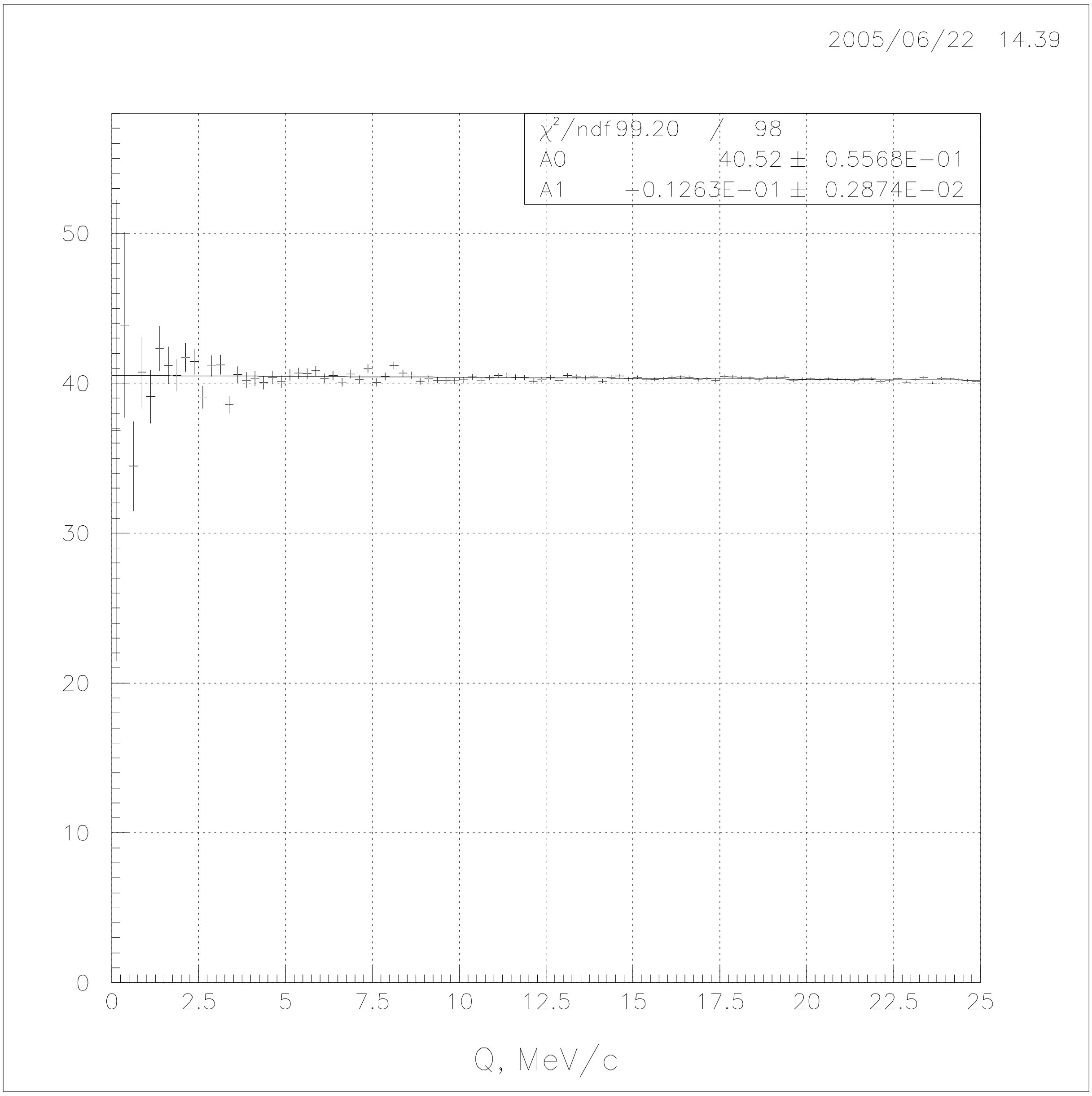

Figure 3: *The $dN/dQ/Q^2$ distribution of short lived pion pairs. The fitting function is $dN/dQ/Q^2 = a_0 + a_1 * Q$ and $a_1/a_0 = (-3.1 \cdot 10^{-4} \pm 7.1 \cdot 10^{-5})(MeV/c)^{-1}$. If the fitting function is $dN/dQ/Q^2 = a_0 + a_2 * Q^2$ then $a_2/a_0 = (-9.4 \cdot 10^{-6} \pm 2.1 \cdot 10^{-6})(MeV/c)^{-2}$.*

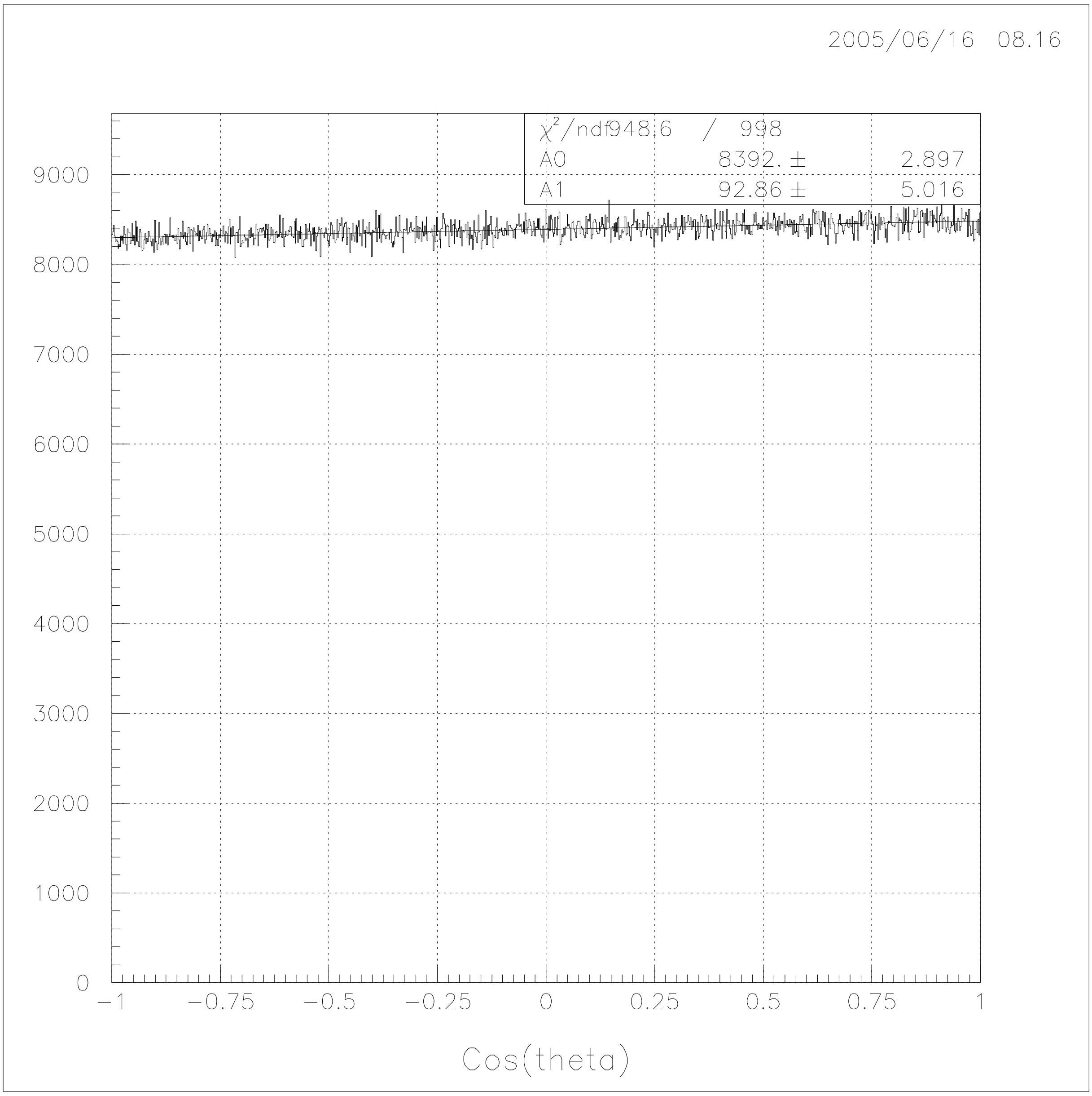

Figure 4: *The distribution of short lived pion pairs on* $cos\theta$. $Q < 25$ *MeV/c. The fitting function is* $dN/dcos\theta = a_0 + a_1 * cos\theta$ *and* $a_1/a_0 = 1.1 \cdot 10^{-2} \pm 6 \cdot 10^{-4}$.

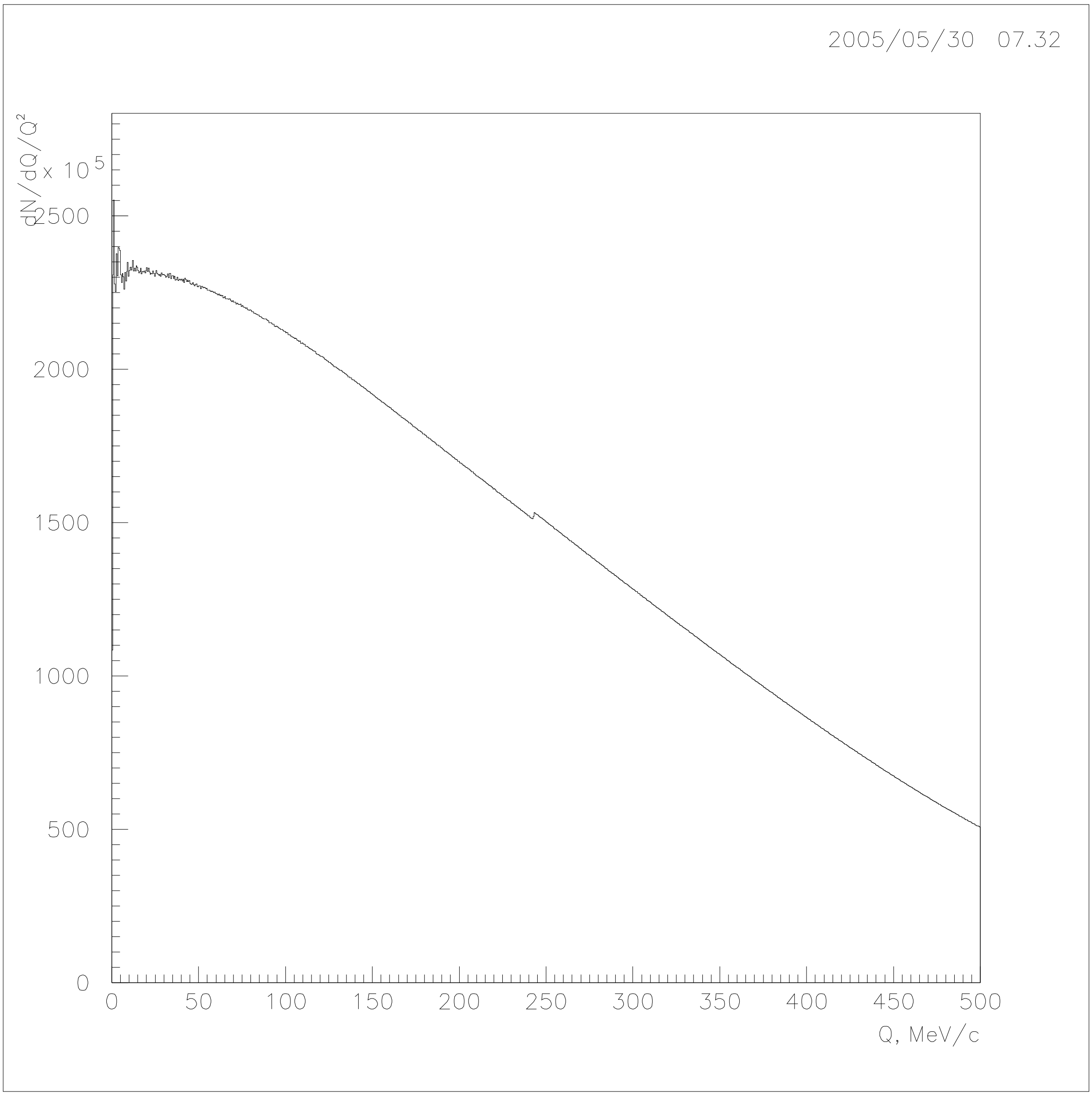

Figure 5: *The $dN/dQ/Q^2$ distribution of short lived pion pairs.*

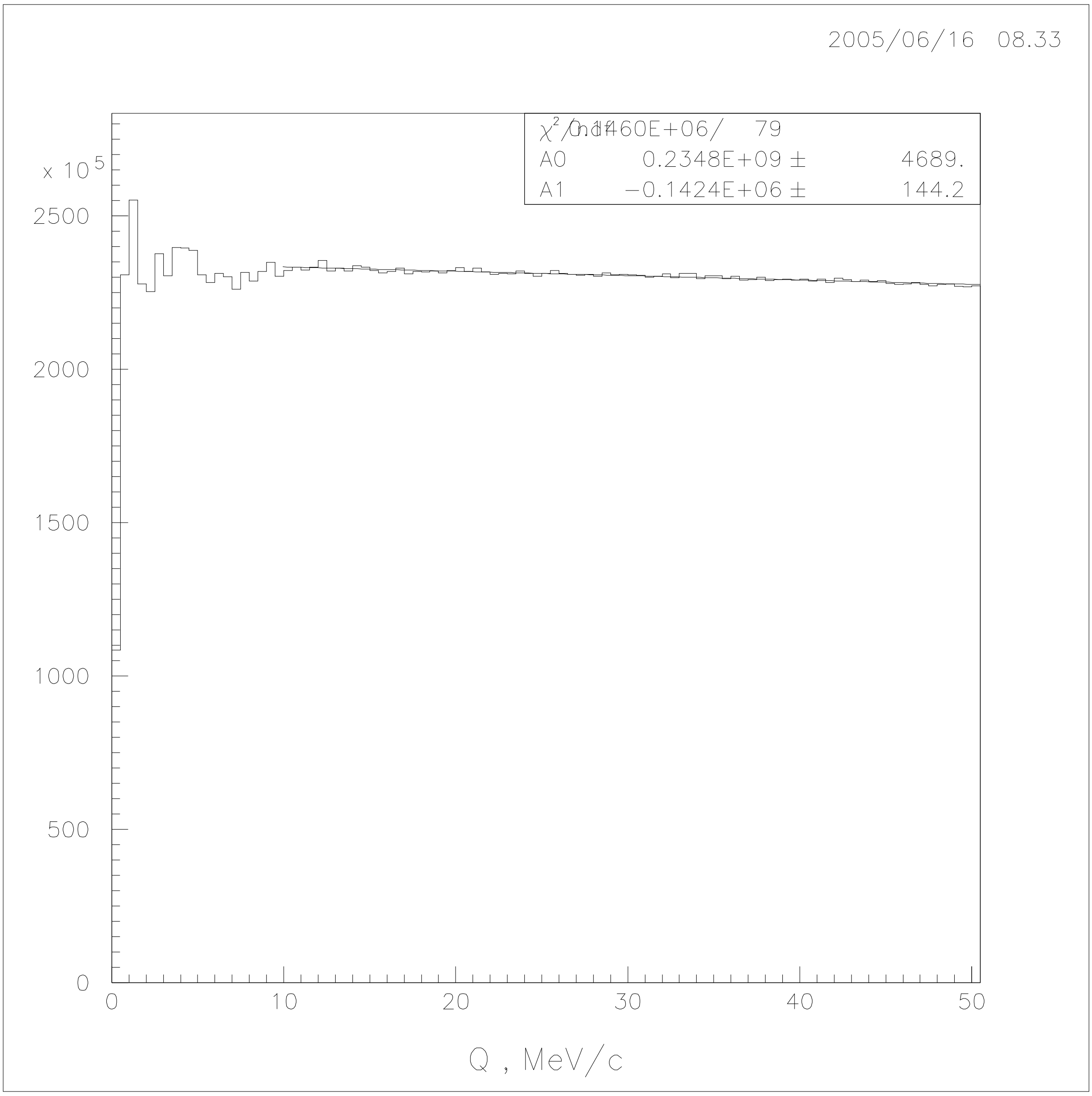

Figure 6: *The $dN/dQ/Q^2$ distribution of short lived pion pairs. The fitting function is $dN/dQ/Q^2 = a_0 + a_1 * Q$ (at $Q > 10 MeV/c$) and $a_1/a_0 = (-6.1\cdot10^{-4} \pm 6.1\cdot10^{-7})(MeV/c)^{-1}$* .

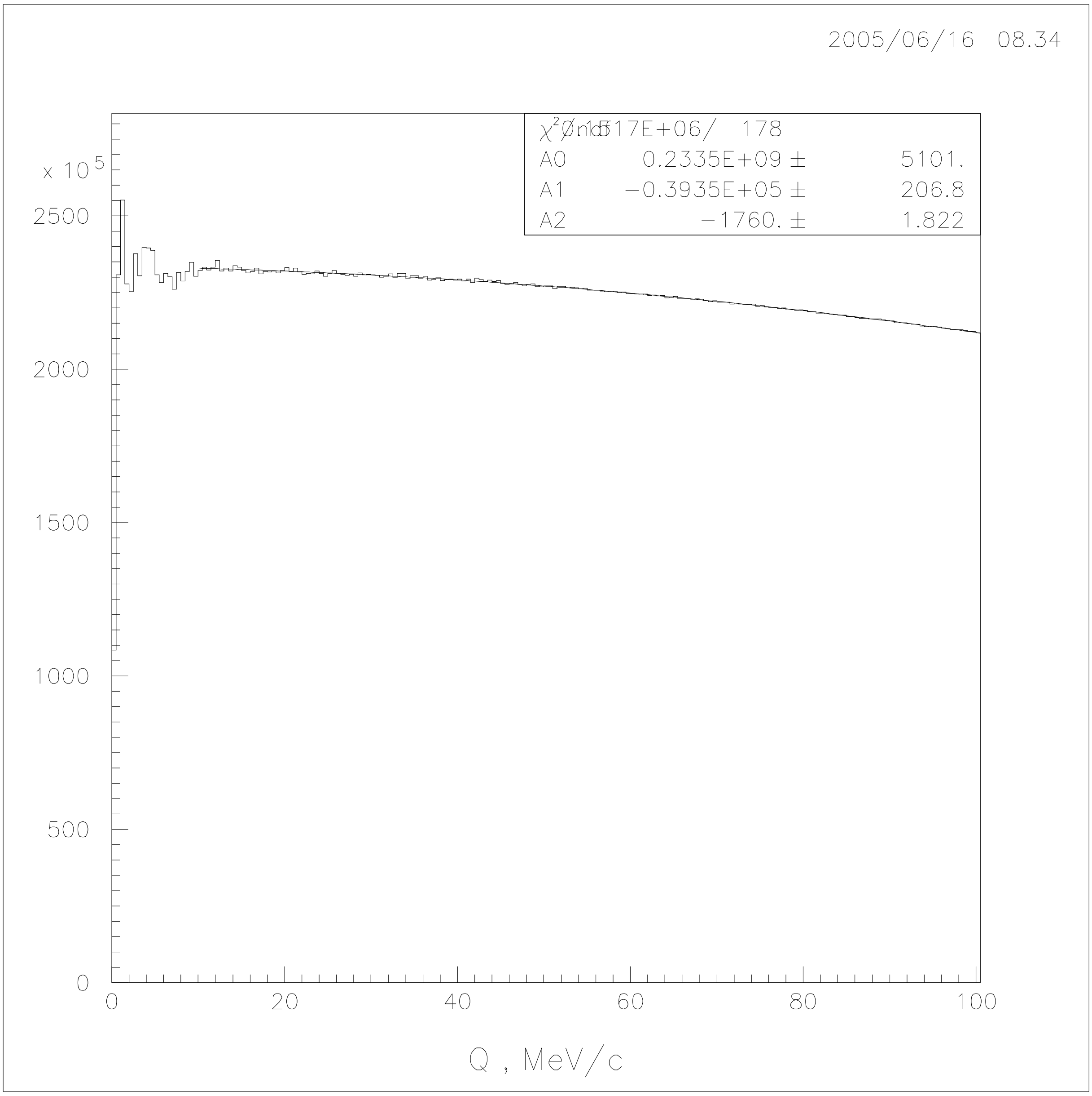

Figure 7: *The $dN/dQ/Q^2$ distribution of short lived pion pairs. The fitting function is* $dN/dQ/Q^2 = a_0 + a_1 * Q + a_2 * Q^2$ *(at $Q > 10 MeV/c$) and* $a_1/a_0 = (-1.7 \cdot 10^{-4} \pm 8.9 \cdot 10^{-7})(MeV/c)^{-1}$, $a_2/a_0 = (-7.5 \cdot 10^{-6} \pm 7.7 \cdot 10^{-9})(MeV/c)^{-2}$.

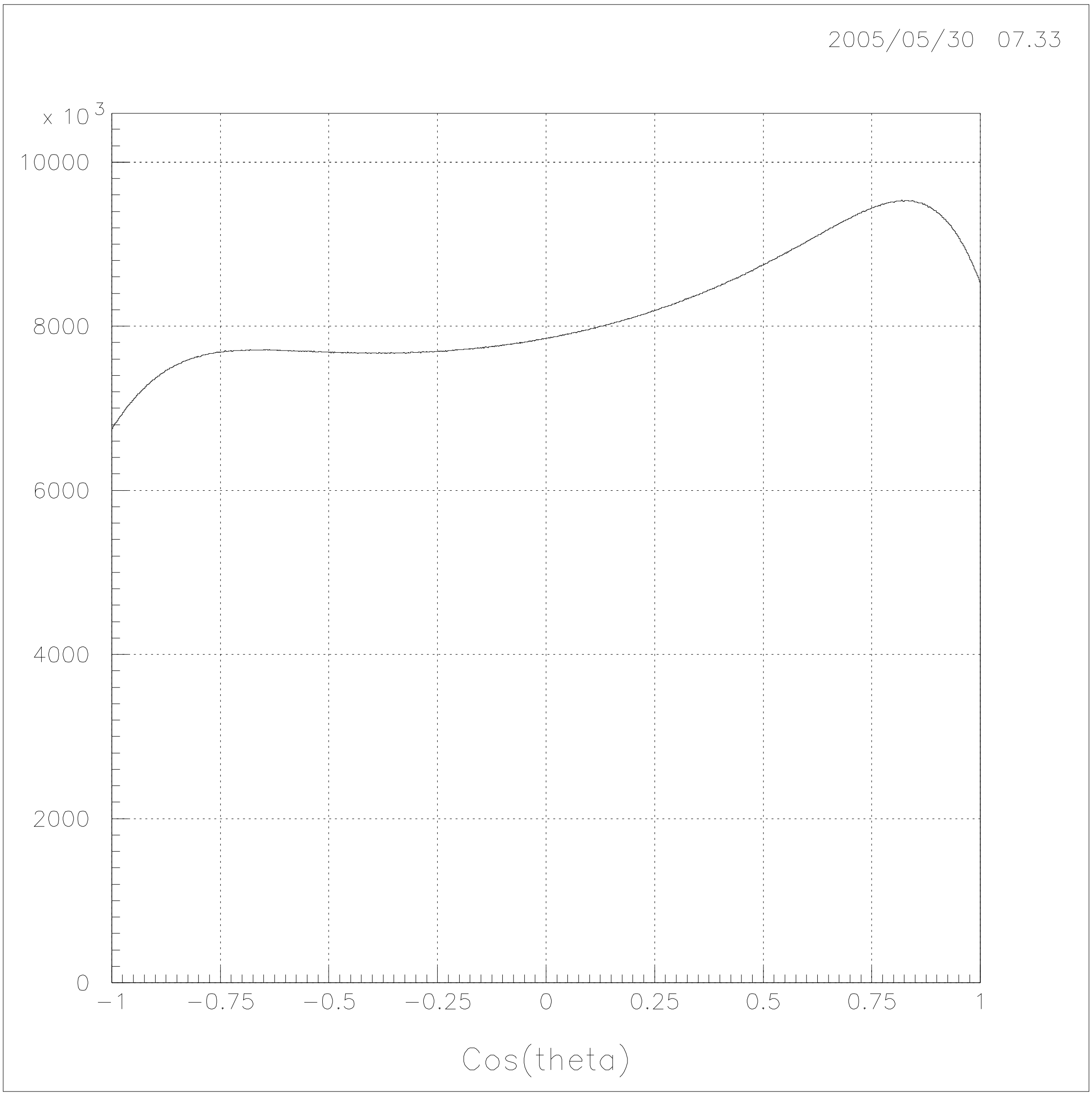

Figure 8: *The distribution of short lived pion pairs on* $cos\theta$. $Q < 500$ *MeV/c.*

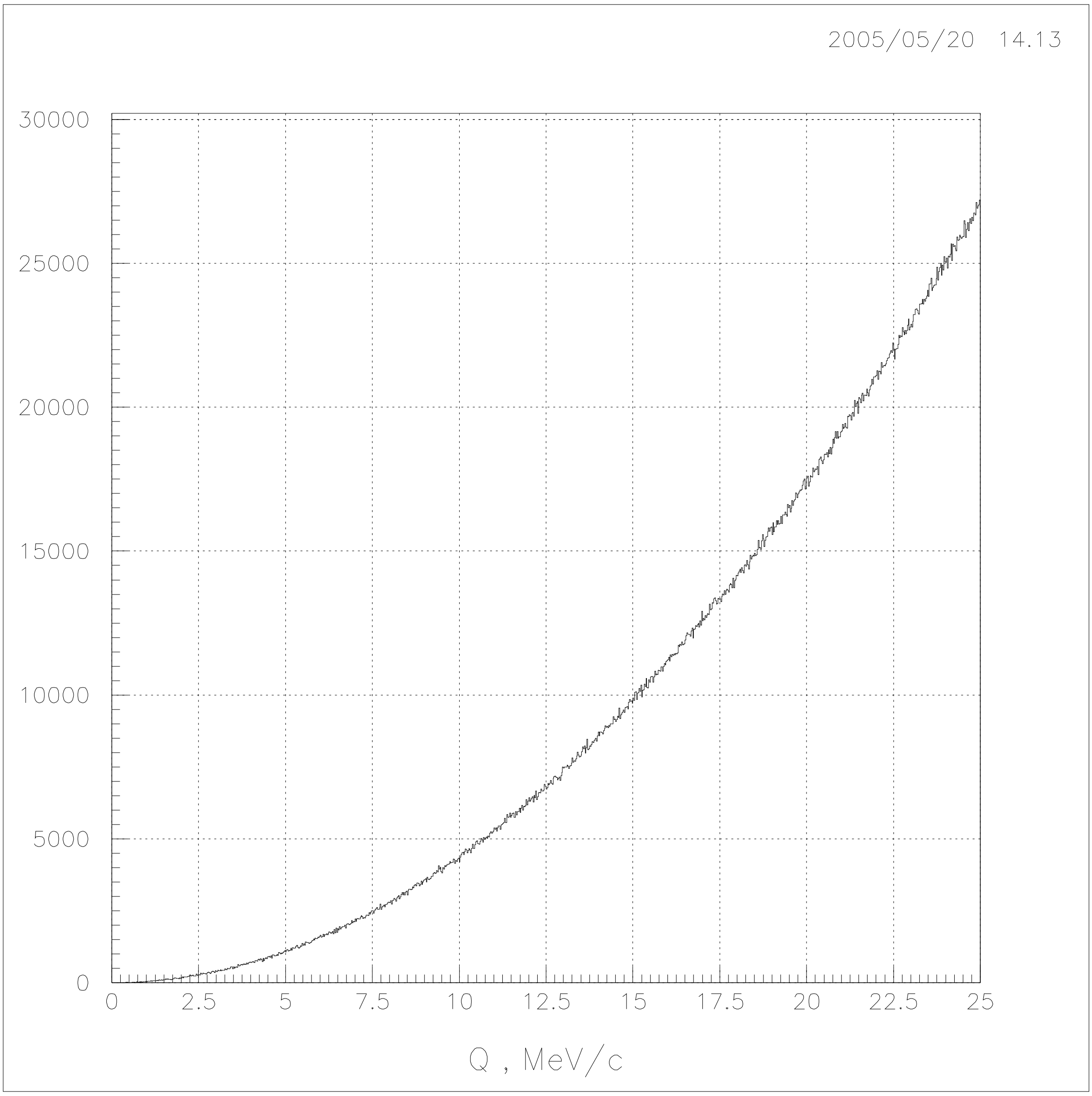

Figure 9: *The dN/dQ distribution of long lived pion pairs.*

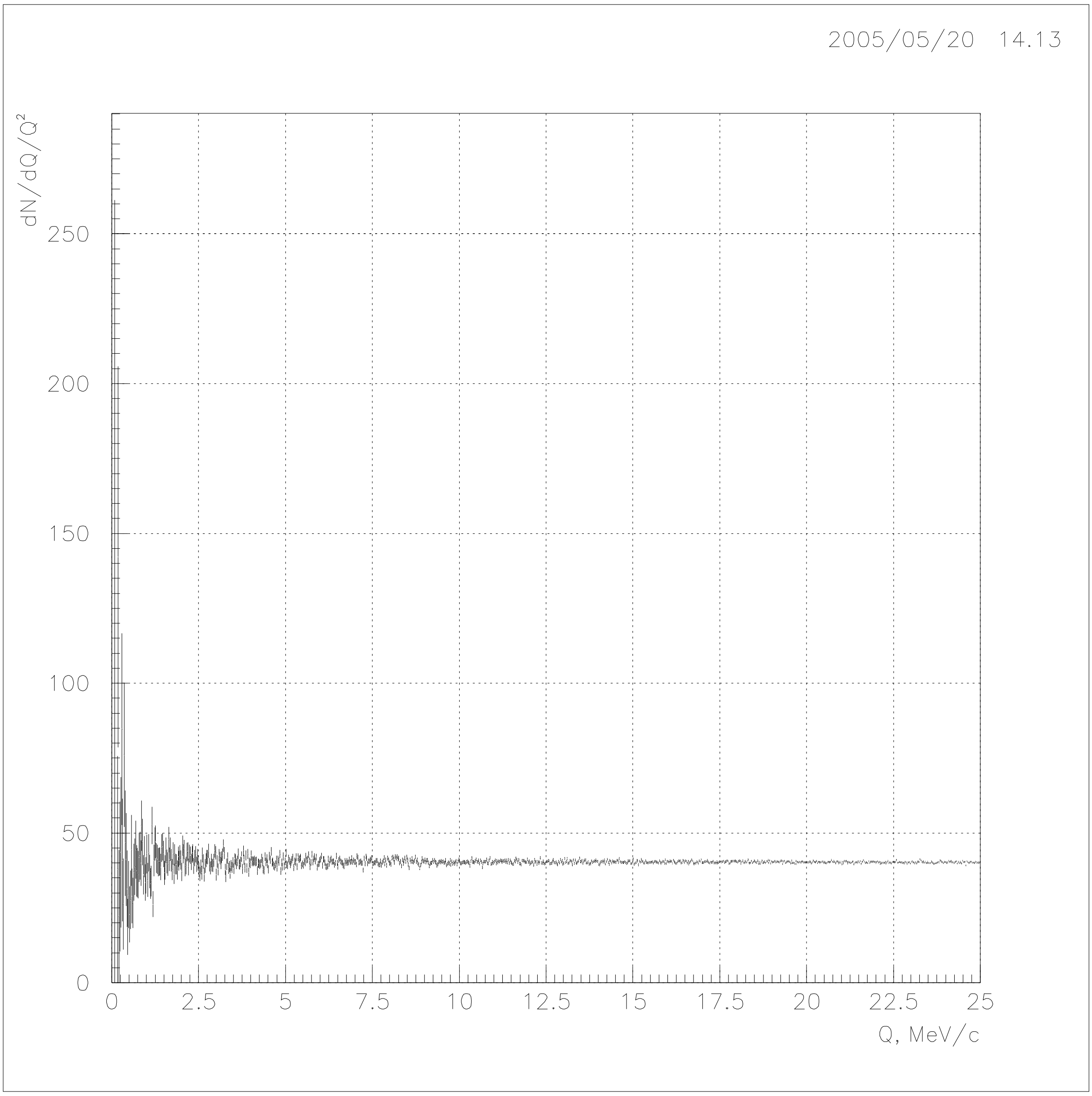

Figure 10: *The $dN/dQ/Q^2$ distribution of long lived pion pairs.*

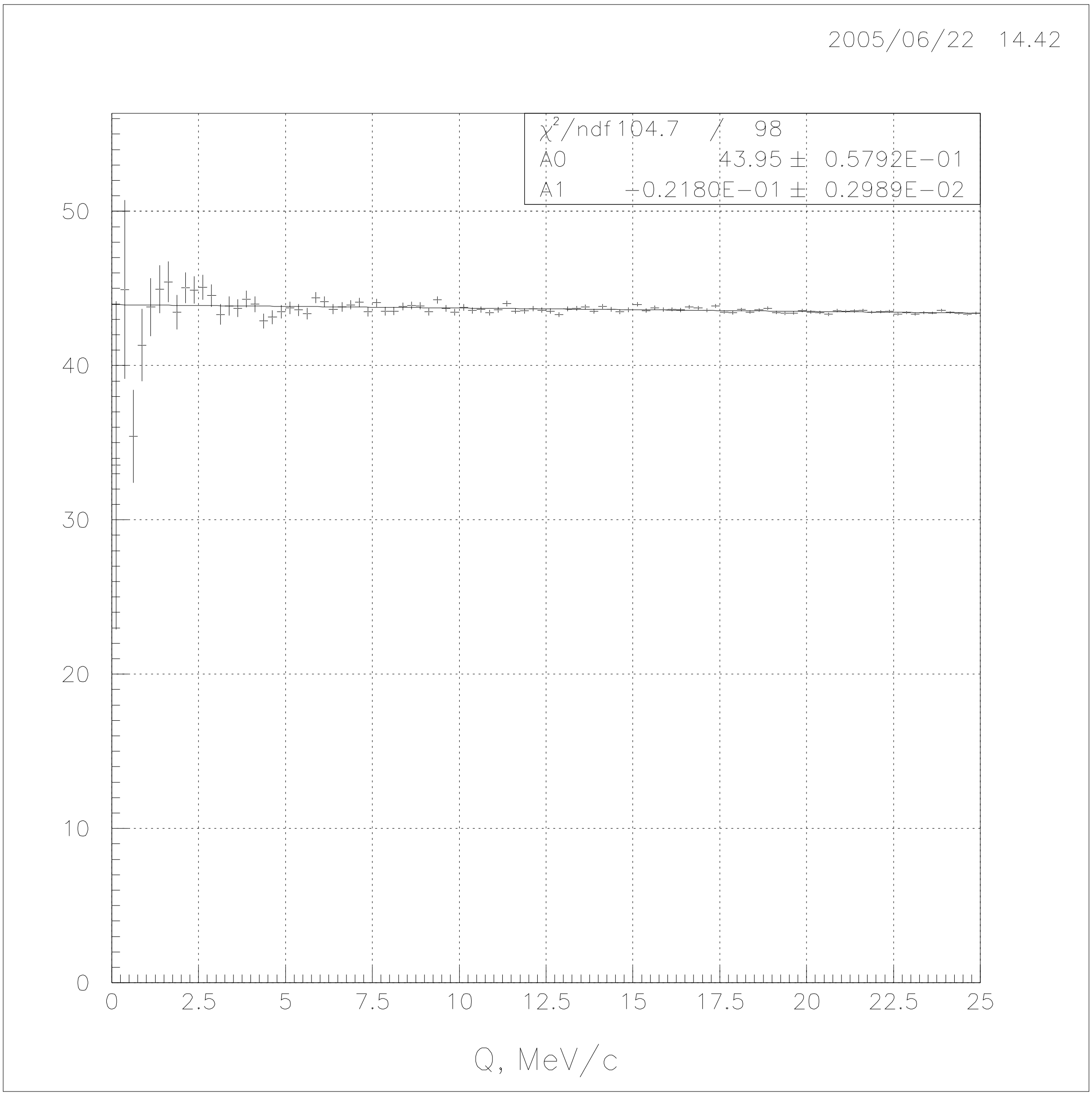

Figure 11: *The $dN/dQ/Q^2$ distribution of long lived pion pairs. The fitting function is $dN/dQ/Q^2 = a_0 + a_1 * Q$ and $a_1/a_0 = (-5 \cdot 10^{-4} \pm 6.9 \cdot 10^{-5})(MeV/c)^{-1}$. If the fitting function is $dN/dQ/Q^2 = a_0 + a_2 * Q^2$ then $a_2/a_0 = (-1.5 \cdot 10^{-5} \pm 2.0 \cdot 10^{-6})(MeV/c)^{-2}$.*

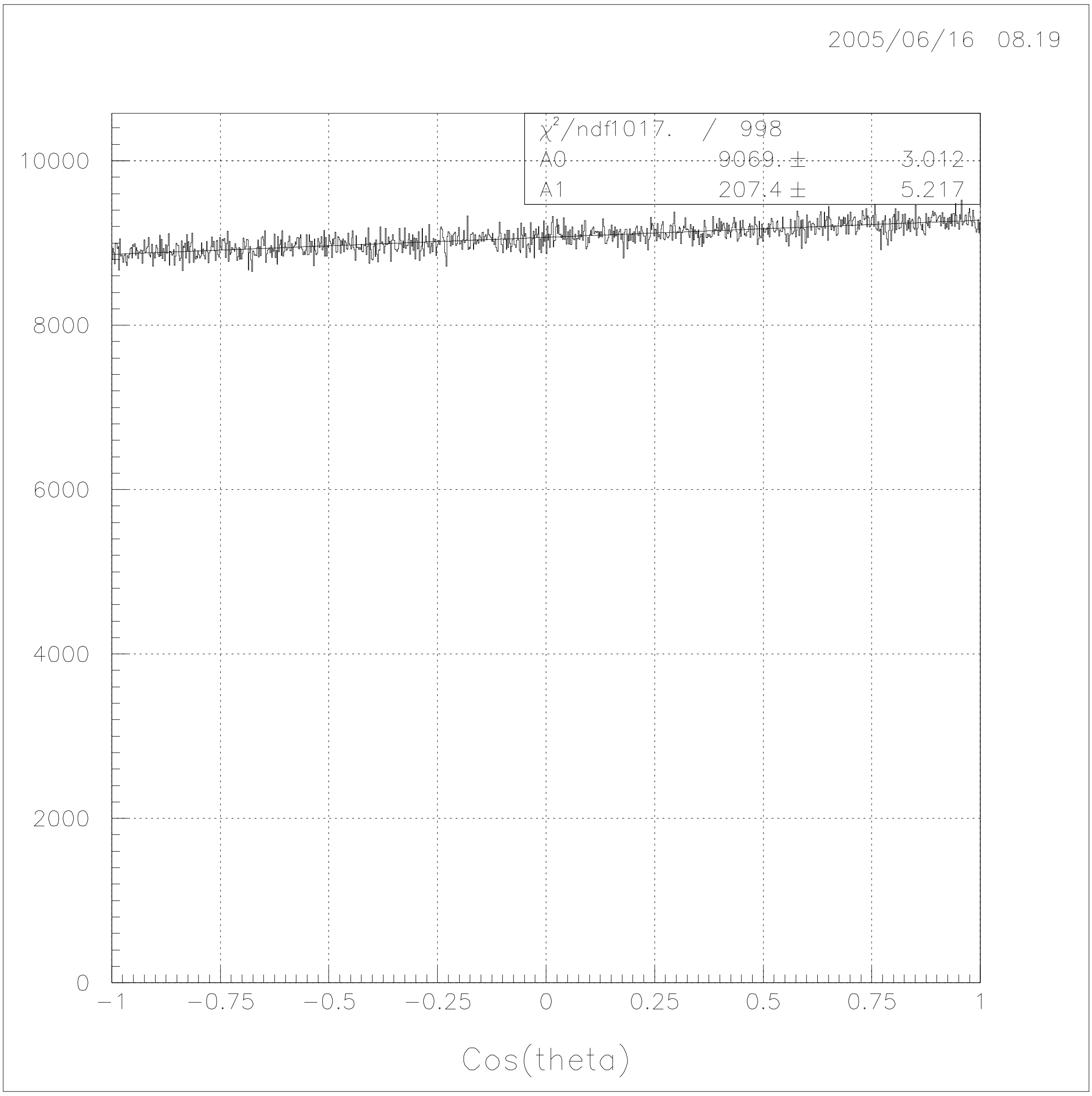

Figure 12: *The distribution of long lived pion pairs on cosθ. Q < 25 MeV/c. The fitting function is* $dN/dcos\theta = a_0 + a_1 * cos\theta$ *and* $a_1/a_0 = 2.3 \cdot 10^{-2} \pm 5.7 \cdot 10^{-4}$.

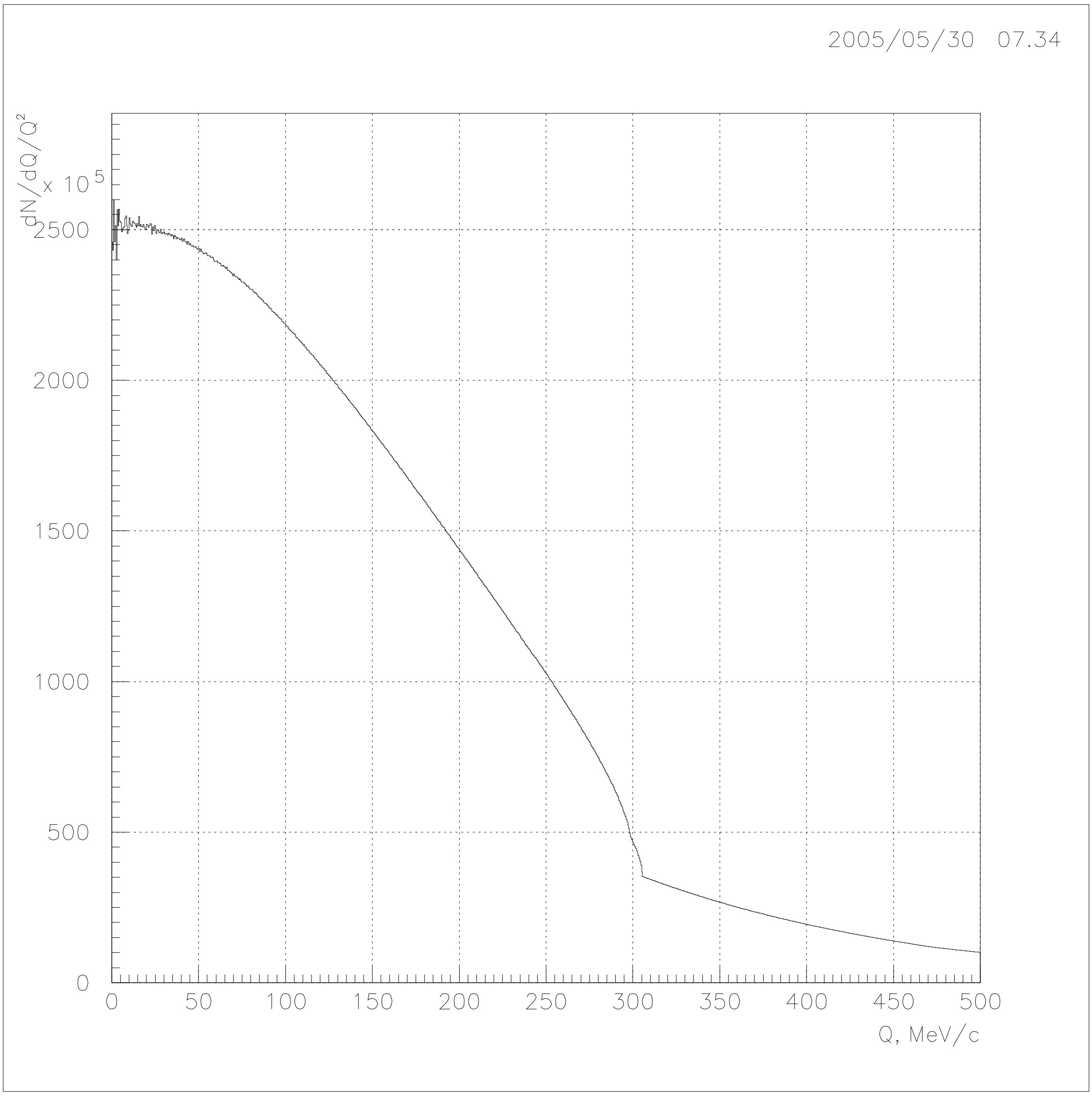

Figure 13: *The $dN/dQ/Q^2$ distribution of long lived pion pairs.*

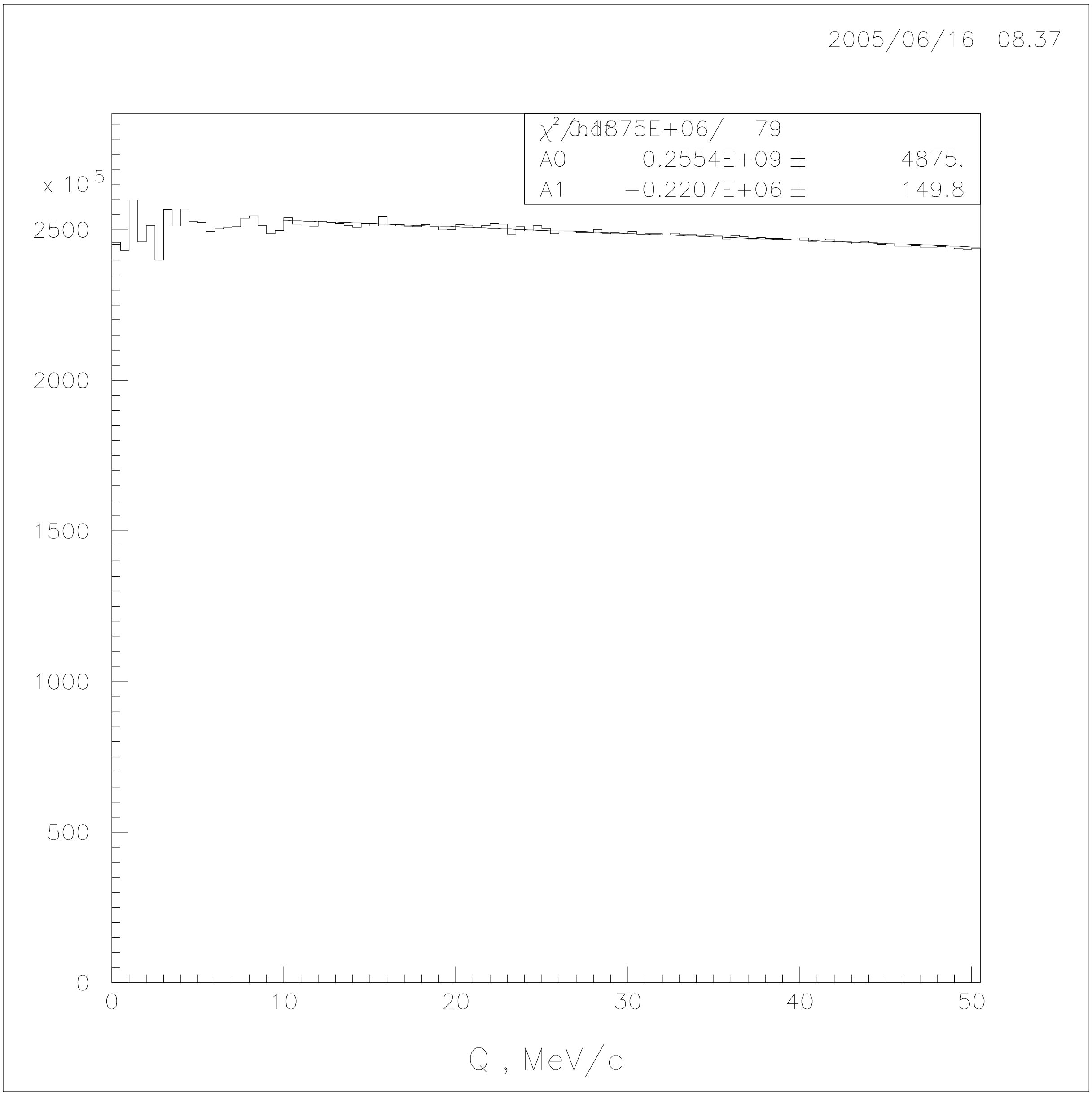

Figure 14: *The $dN/dQ/Q^2$ distribution of long lived pion pairs. The fitting function is* $dN/dQ/Q^2 = a_0 + a_1 * Q$ *(at $Q > 10 MeV/c$) and* $a_1/a_0 = (-8.6 \cdot 10^{-4} \pm 5.9 \cdot 10^{-7})(MeV/c)^{-1}$.

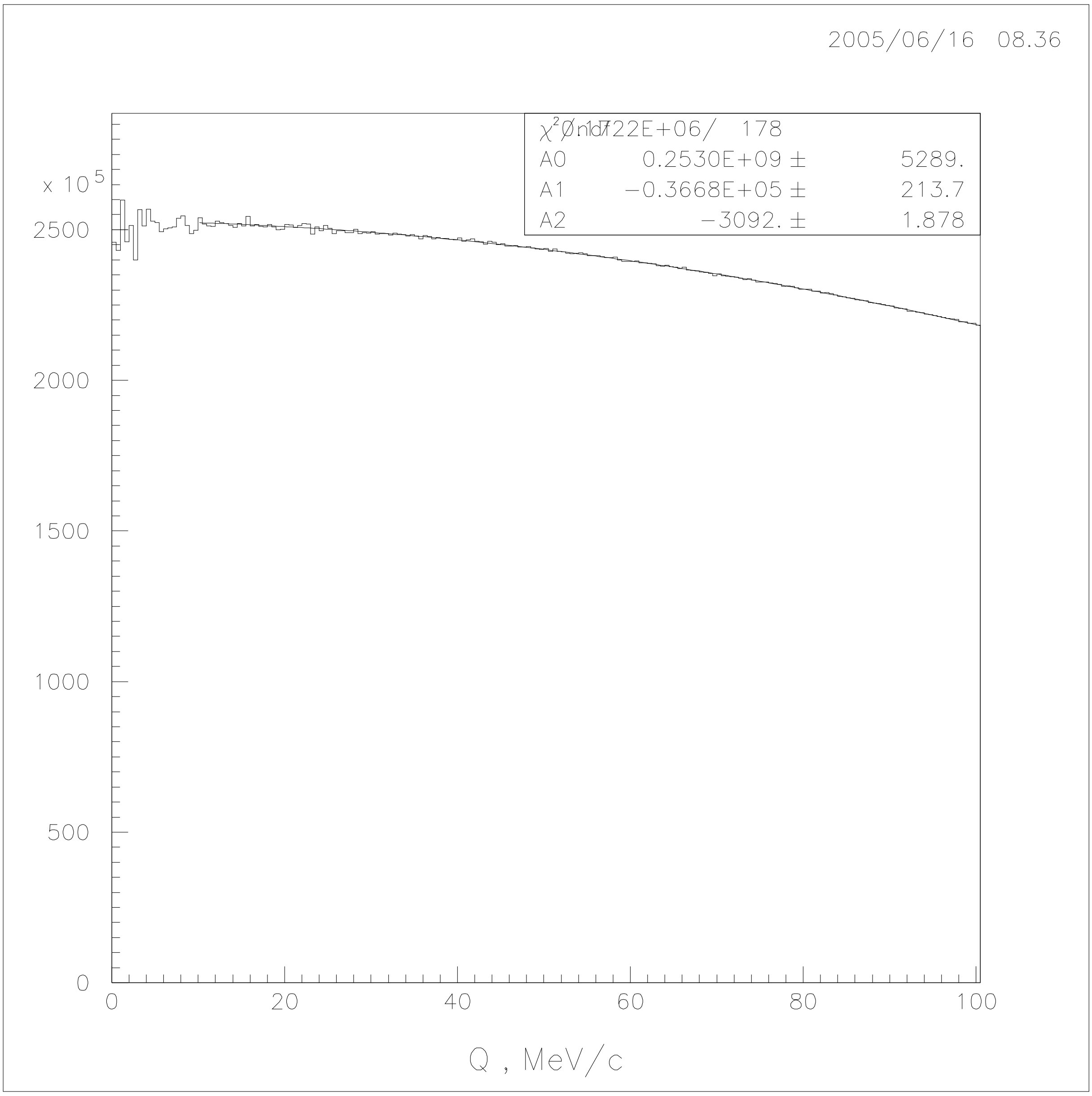

Figure 15: *The $dN/dQ/Q^2$ distribution of long lived pion pairs. The fitting function is* $dN/dQ/Q^2 = a_0 + a_1 * Q + a_2 * Q^2$ *(at $Q > 10 MeV/c$) and* $a_1/a_0 = (-1.5 \cdot 10^{-4} \pm 8.5 \cdot 10^{-7})(MeV/c)^{-1}$, $a_2/a_0 = (-1.2 \cdot 10^{-5} \pm 7.5 \cdot 10^{-9})(MeV/c)^{-2}$.

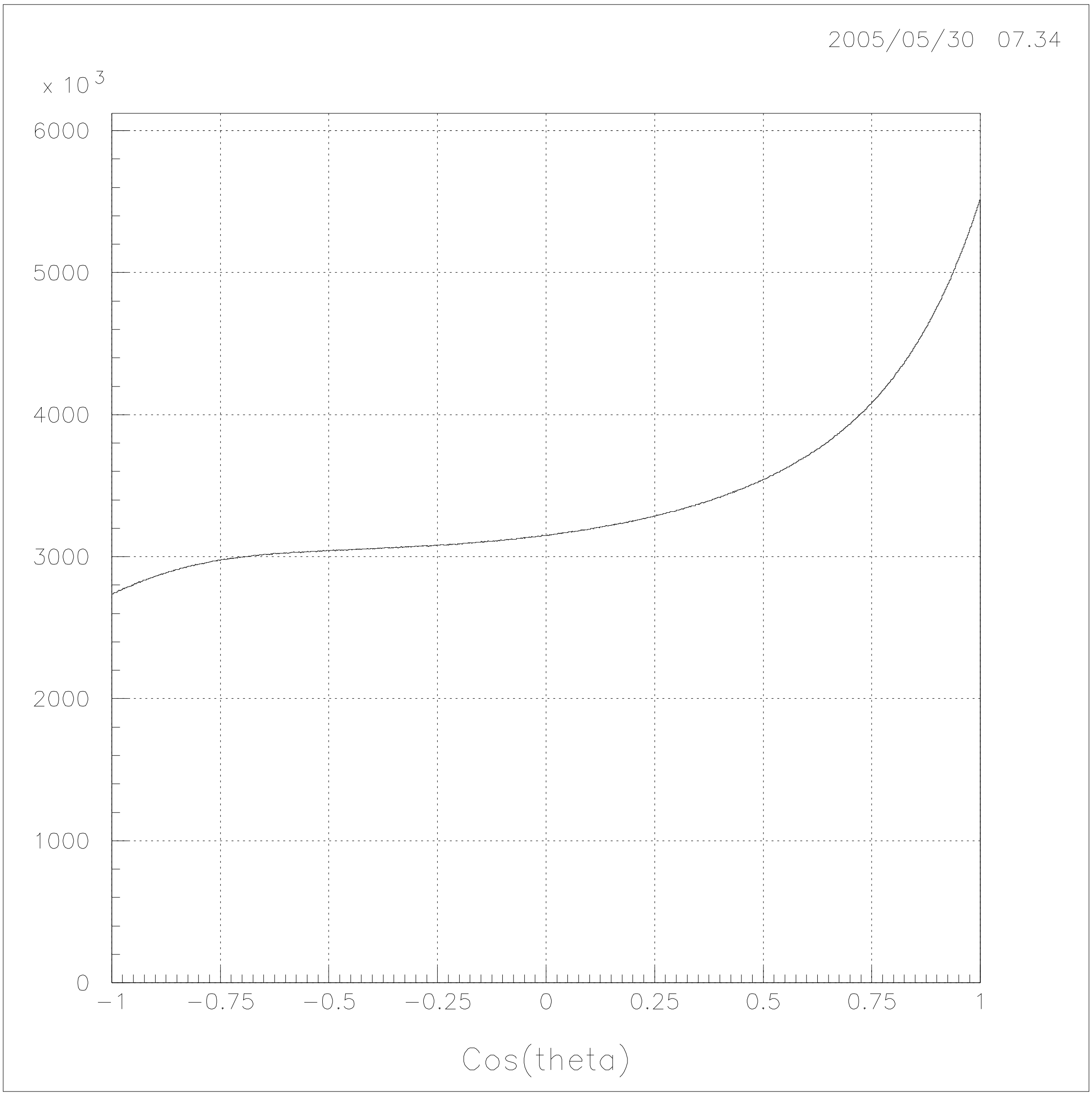

Figure 16: *The distribution of long lived pion pairs on* $cos\theta$. $Q < 500$ *MeV/c.*