Photoproduction of mesons on nuclei: preliminary GRAAL results

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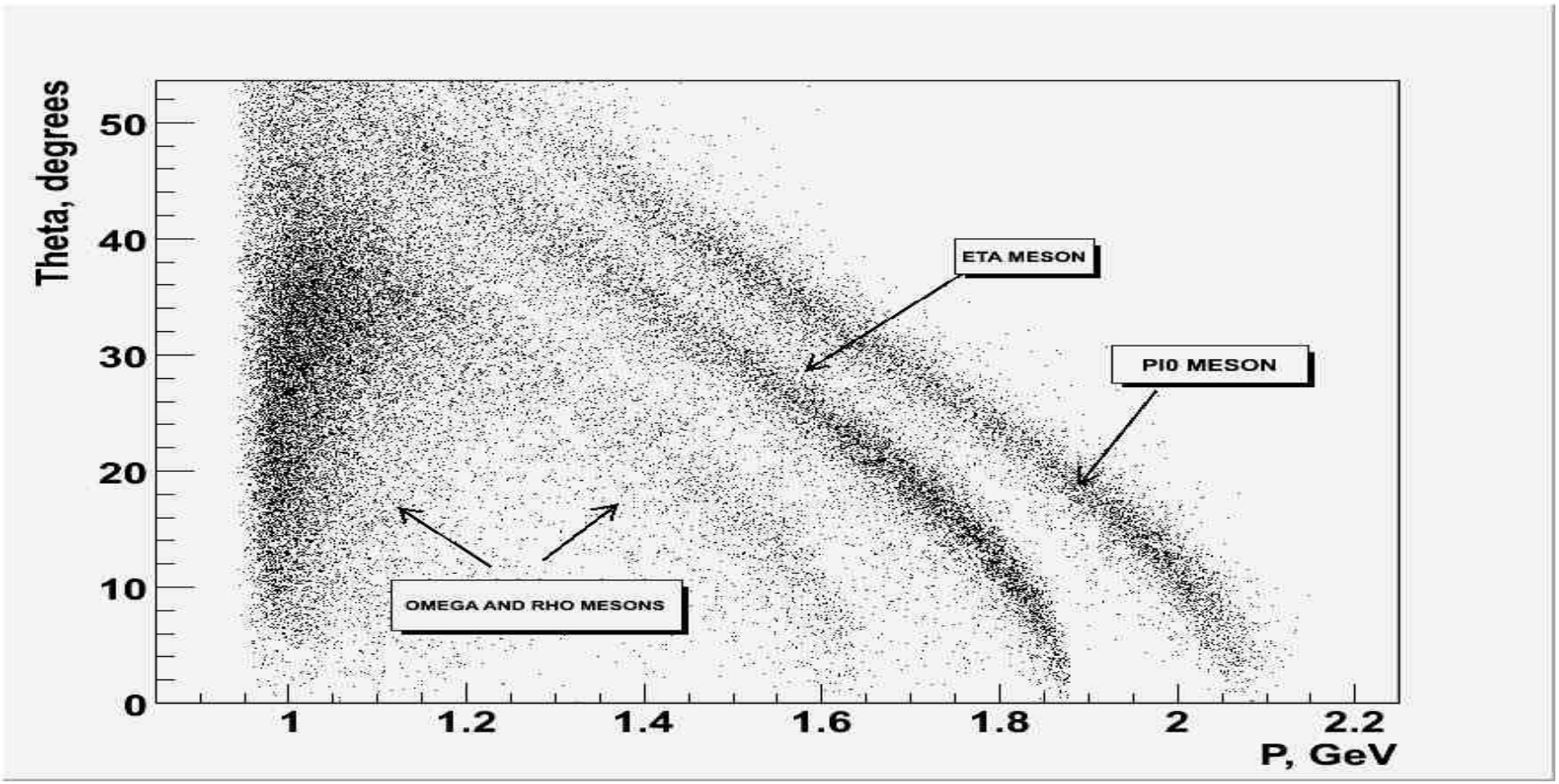
The aim:

- Verification of possibility of studying meson photoproduction on nuclei using GRAAL setup.

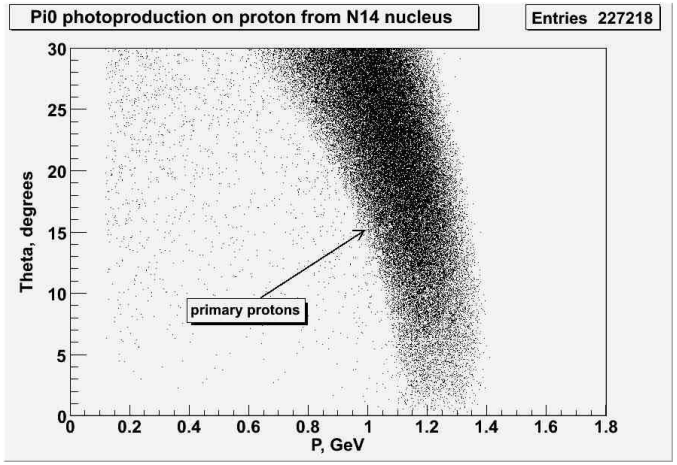
Motivations:

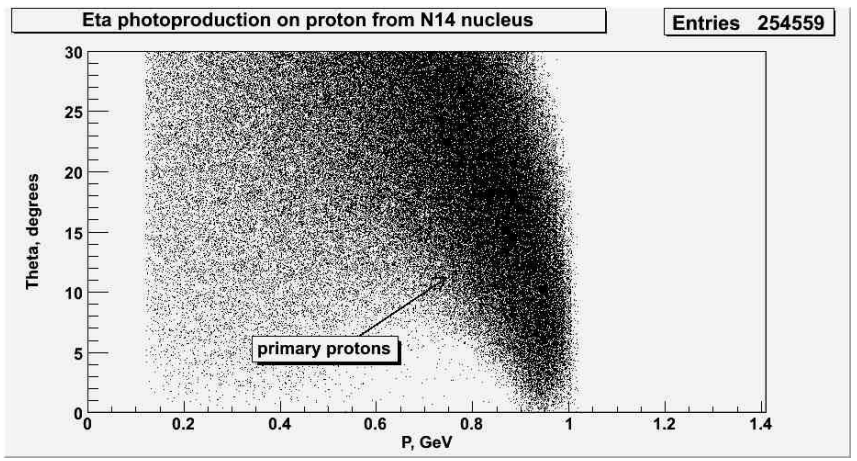
- Possibility of studying eta-mesic nuclei
- Possibility of studying resonance interaction with nuclear medium

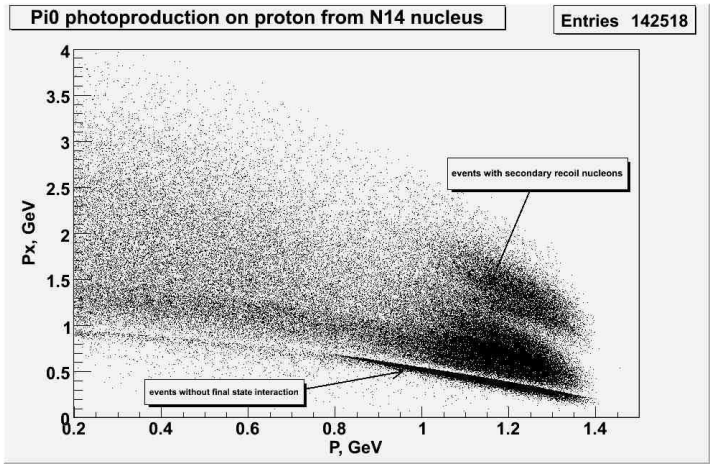
The correlation between momentum and angle of primary proton. The mass difference of neighbour mesons is greater than Fermi motion broadening factor.

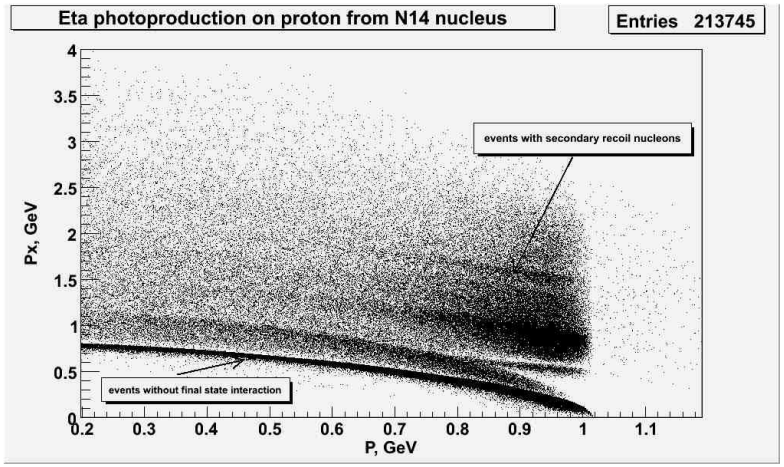


Simulations done with INC code. First 2 figures show the possibility to divide primary recoil protons from pi0 and eta photoproduction reactions. Others show the correlation between momentum of primary proton and all other particles.

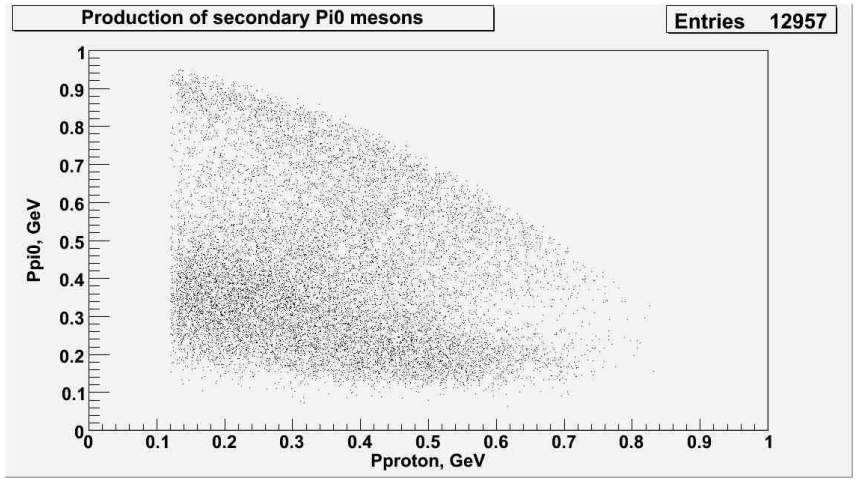


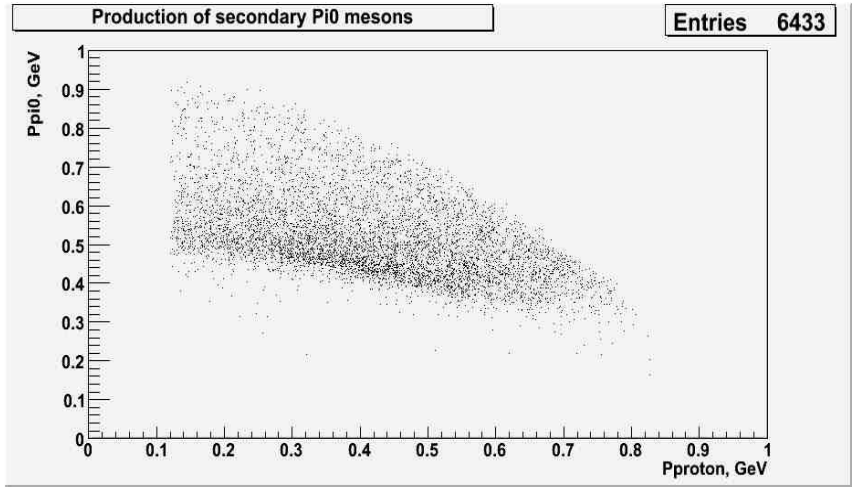




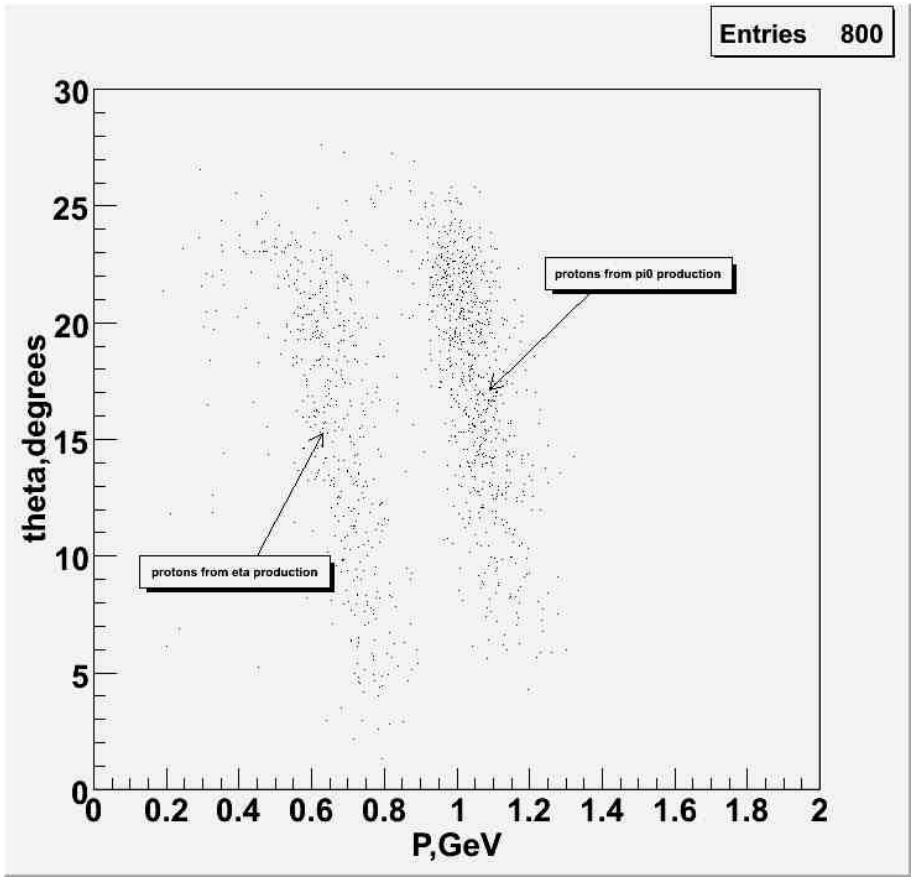


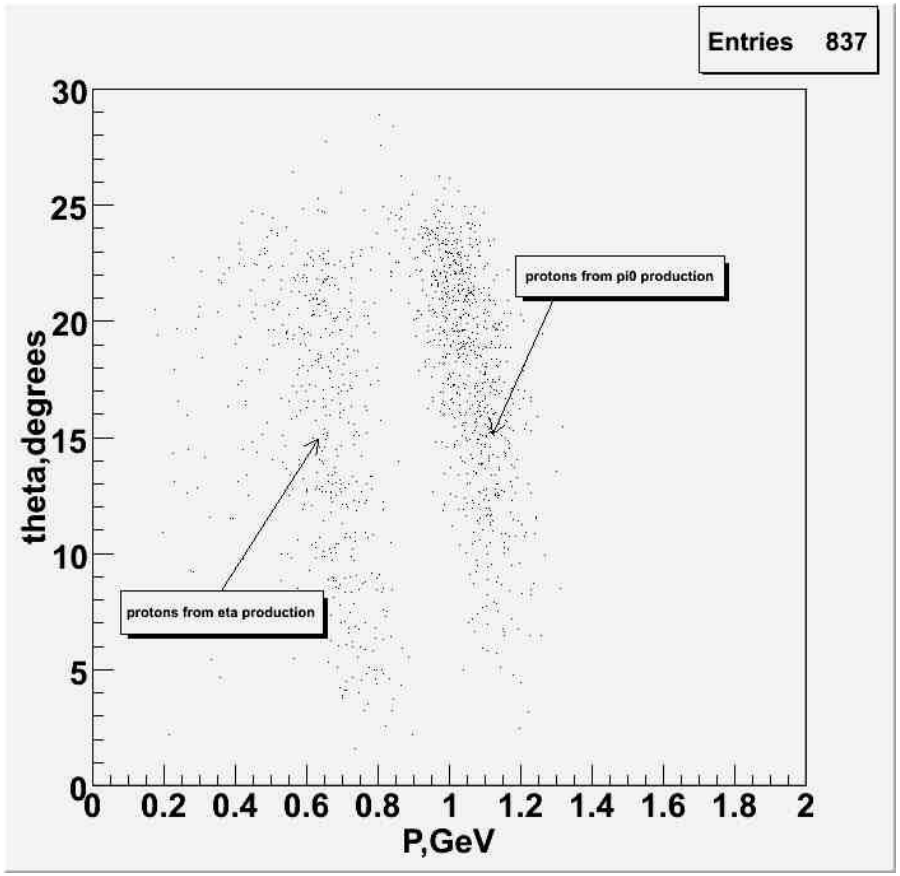
Correlation between momentum of the secondary proton and momentum of pi0-meson from two different initial steps of reaction - pi0-meson production on the left and eta-meson production on the right





Preliminary calculations done on experimental data with hydrogen and deuterium targets. Correlation between momentum and angle of the proton from pi0 and eta production off proton (on the left) and deuterium (on the right). Primary protons from different reactions can be easily separated





Conclusion:

- Simulations predict that GRAAL setup can be used to study meson photoproduction on nuclei. Primary protons from pi0 and eta photoproduction, registered in forward direction, can be kinematically divided

- Calculations from experimental data are preliminary and lack good statistics, but show possibility to achieve wanted results with increased statistics and improved algorithm