Modeling Neutron Backgrounds

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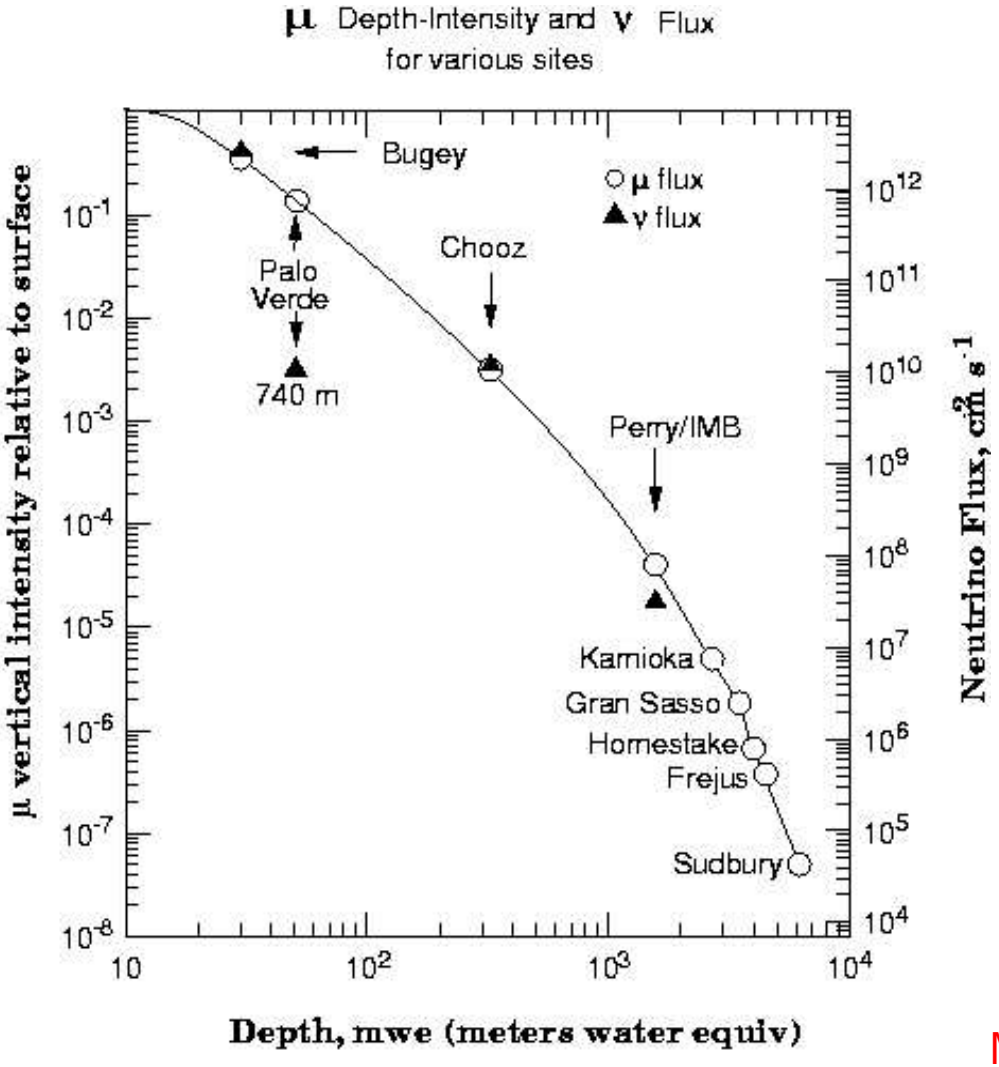
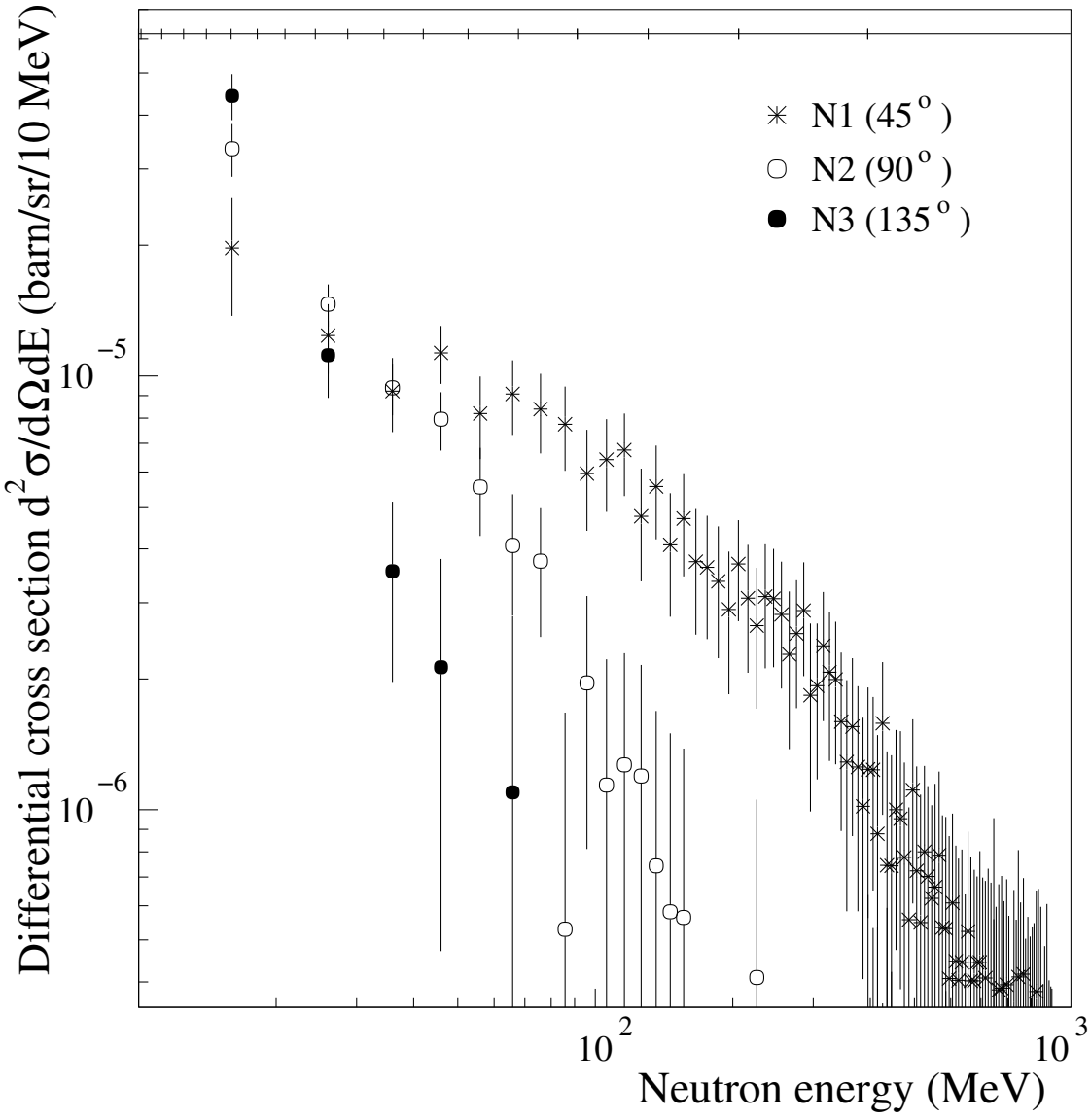
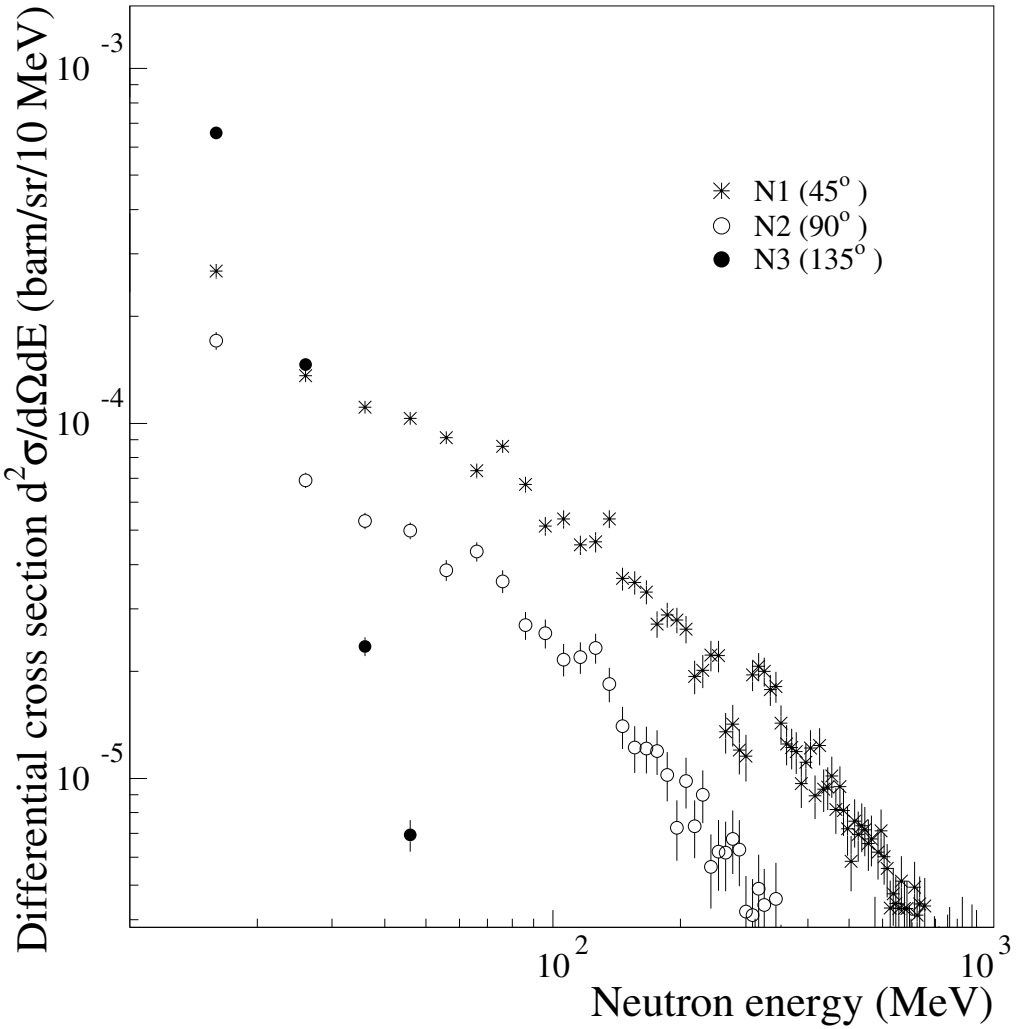
Neutron Events



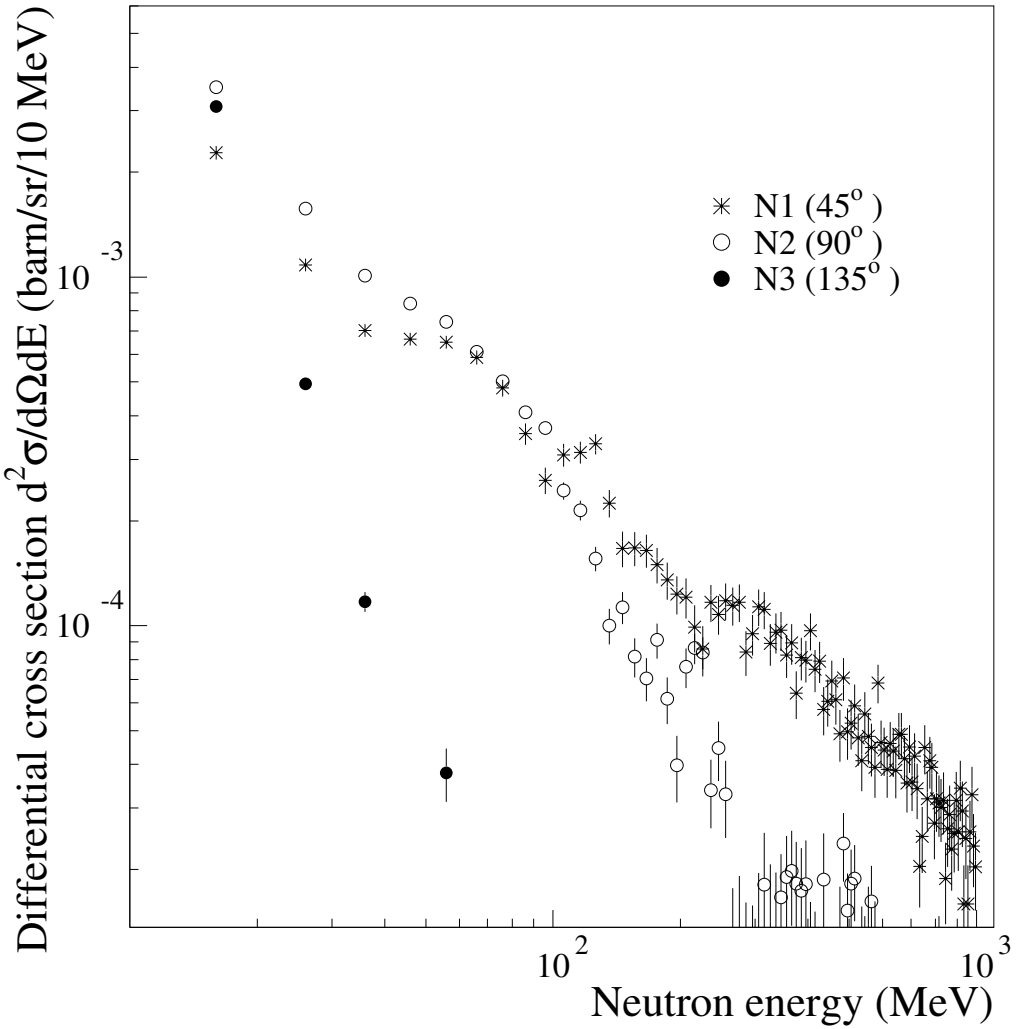
Muon flux with depth



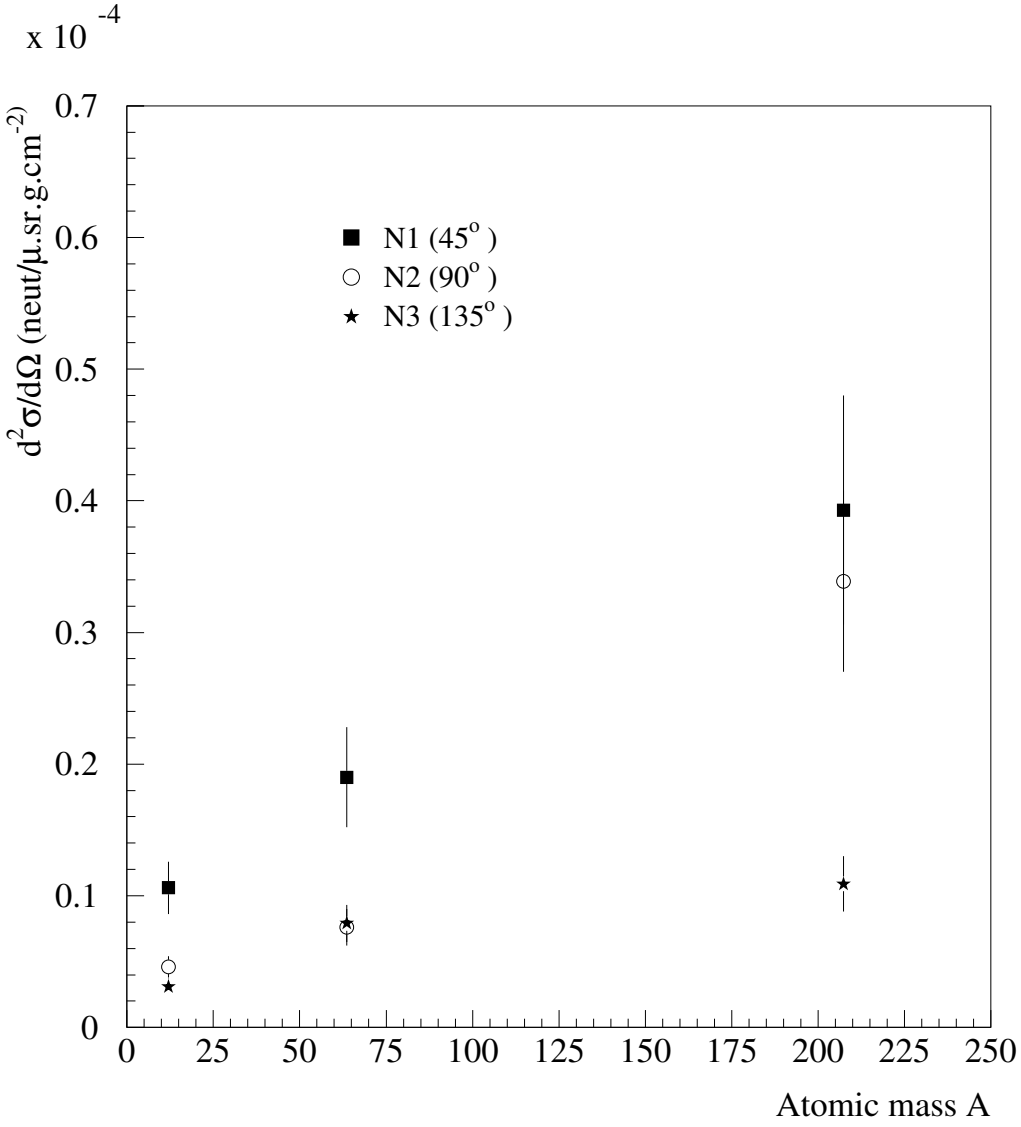
Muon induced neutrons on carbon



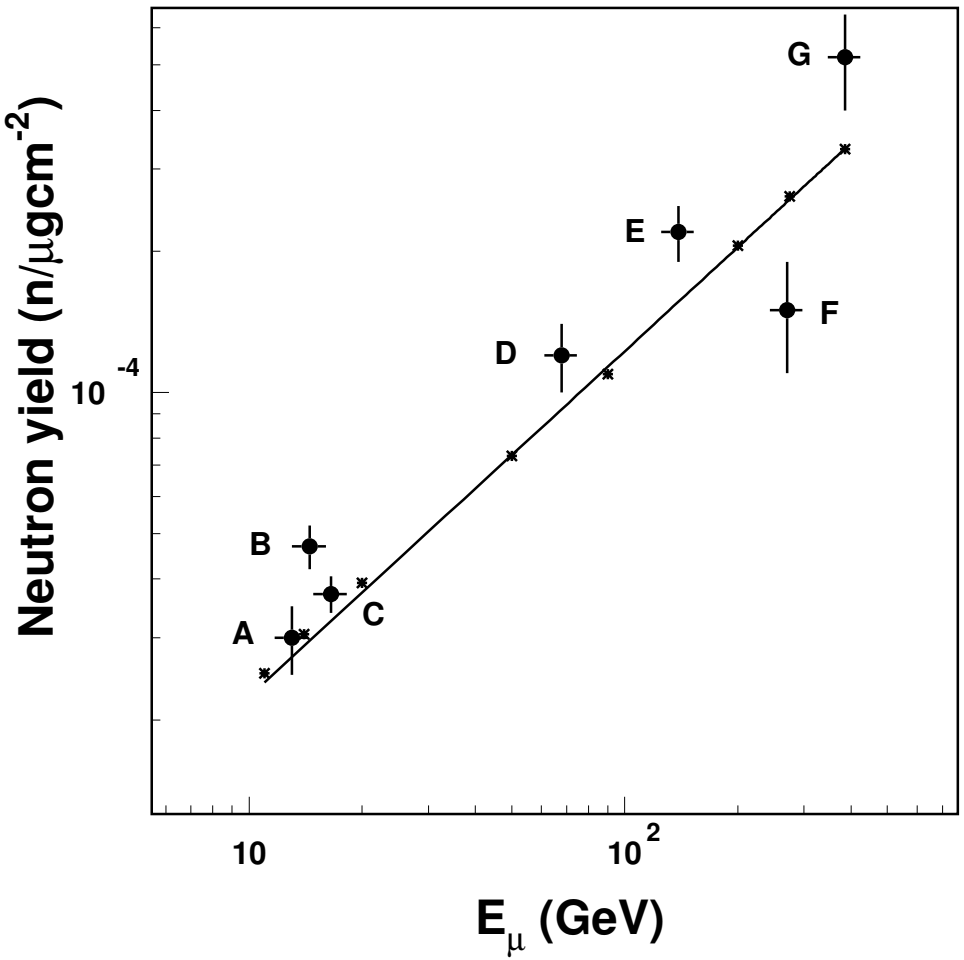
Muon induced neutrons on copper



Muon induced neutrons on lead



Muon induced neutron Atomic Mass dependence



Neutron production as function of energy points are at different depths with appropriate average energy

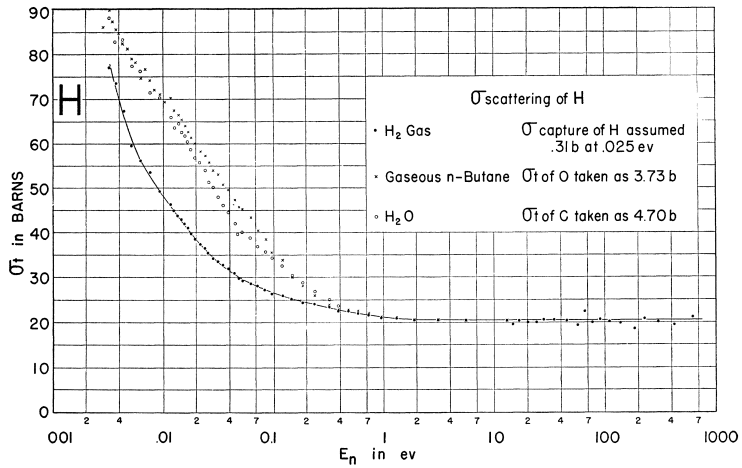


FIG. 1. Edward Melkonian,. Phys. Rev. **76**, 1750 (1949). Also see W. B. Jones, Jr., Phys. Rev. **74**, 364 (1948).

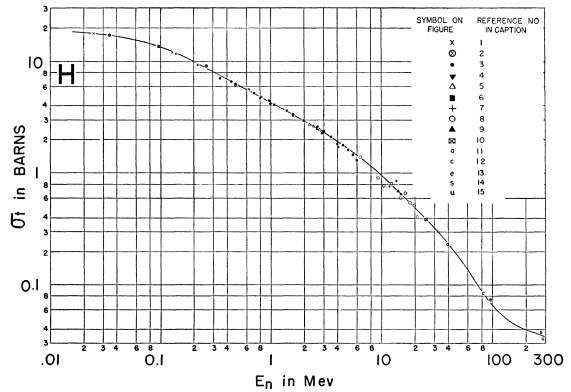


FIG. 2. (1) A. Wattenberg, Phys. Rev. **71**, 497 (1947). (2) D. H. Frisch, Phys. Rev. **70**, 589 (1946). (3) Bailey, Bennett, Bergstralh, Nuckolls, Richards, and Williams, Phys. Rev. **70**, 583 (1946). (4) Lampi, Freier, and Williams, Phys. Rev. **76**, 188 (1949). (5) H. Aoki, Proc. Phys. Math. Soc. Japan **21**, 232 (1939). (6) Zinn, Seely, and Cohen, Phys. Rev. **56**, 260 (1939). (7) Ageno, Amaldi, Bocciarelli, and Trabacchi, Phys. Rev. **71**, 20 (1947). (8) W. Sleator, Jr., Phys. Rev. **72**, 207 (1947). (9) E. O. Salant and N. F. Ramsey, Phys. Rev. **57**, 1075 (1940). (10) R. Sherr, Phys. Rev. **68**, 240 (1945). (11) R. H. Hildebrand and C. E. Leith, Phys. Rev. **76**, 587 (1949). (12) Cook, McMillan, Peterson, and Sewell, Phys. Rev. **75**, 7 (1949). (13) J. DeJuren and N. Knable, Phys. Rev. **77**, 606 (1950). (14) DeJuren, Knable, and Moyer, Phys. Rev. **76**, 589 (1949). (15) Fox, Leith, McKenzie, and Wouters, Phys. Rev. **76**, 590 (1949).

Neutron proton cross section for active and passive shielding

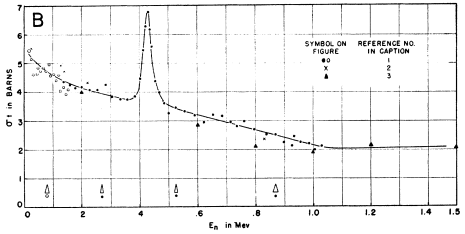


FIG. 14. (1) C. K. Bockelman (unpublished). (2) Fields, Russell, Sachs, and Wattenberg, Phys. Rev. **71**, 508 (1947). (3) Barschall, Battat, and Bright, Phys. Rev. **70**, 458 (1946).

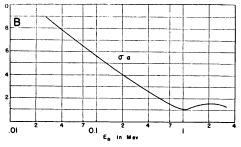


FIG. 15. C. L. Bailey *et al.* (unpublished).

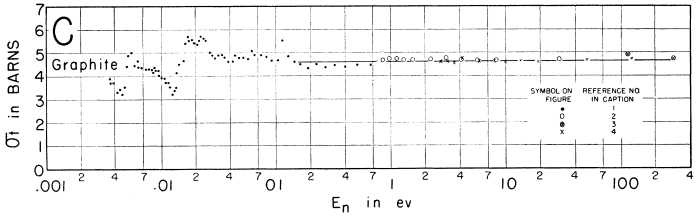


FIG. 16. (1) Columbia Velocity Selector (unpublished). (2) W. W. Havens, Jr. and L. J. Rainwater, Phys. Rev. **75**, 1296 (1949). (3) C. T. Hibdon and C. O. Muehlhause, Phys. Rev. **76**, 100 (1949). (4) W. B. Jones, Jr., Phys, Rev. **74**, 364 (1948).

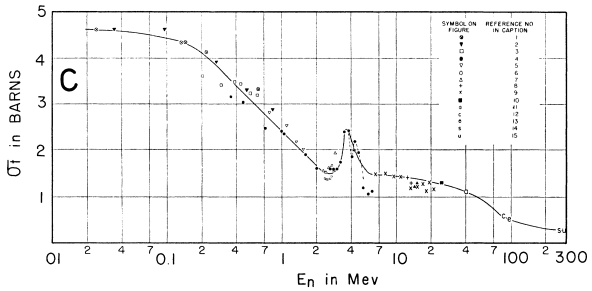
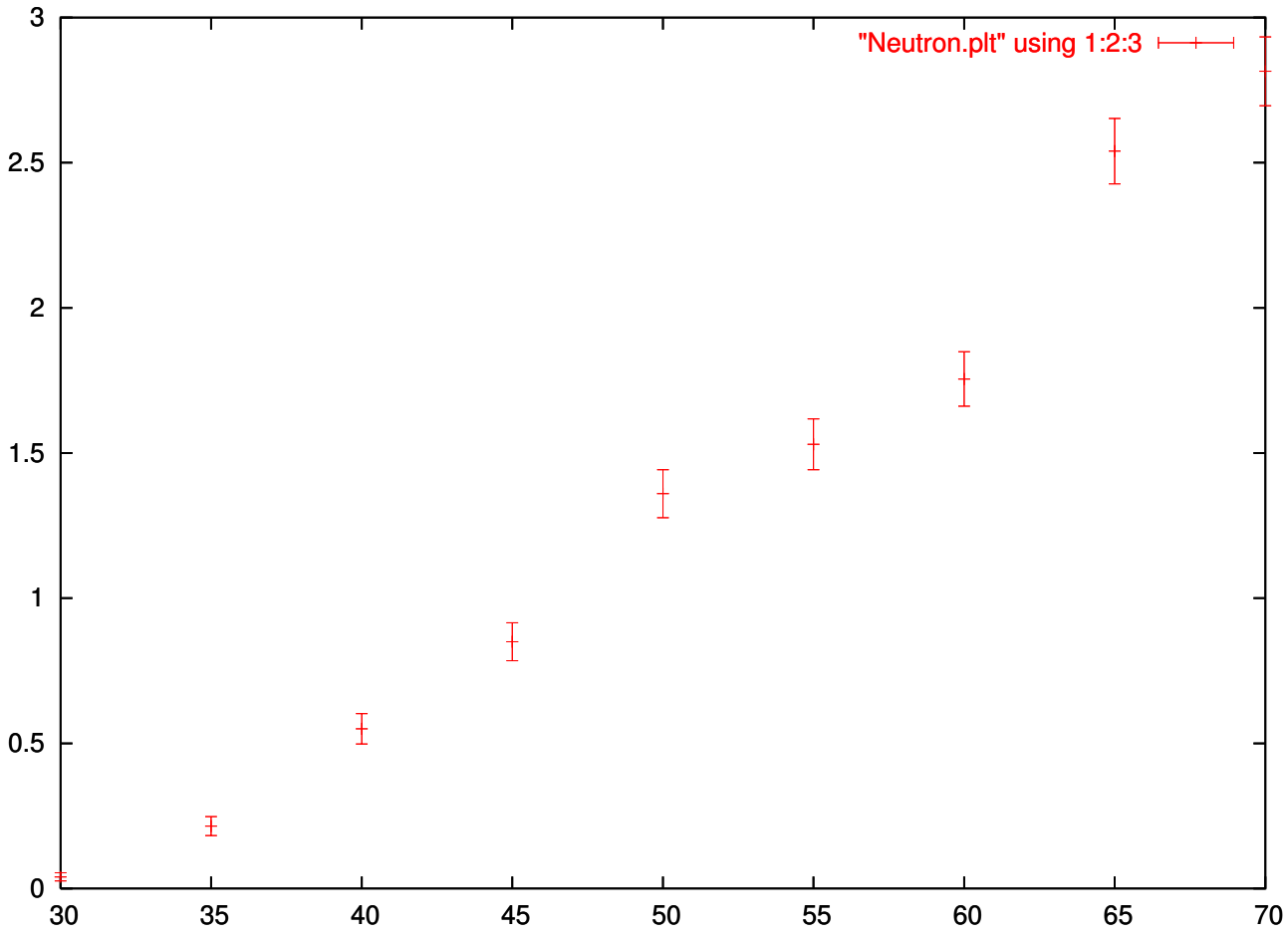
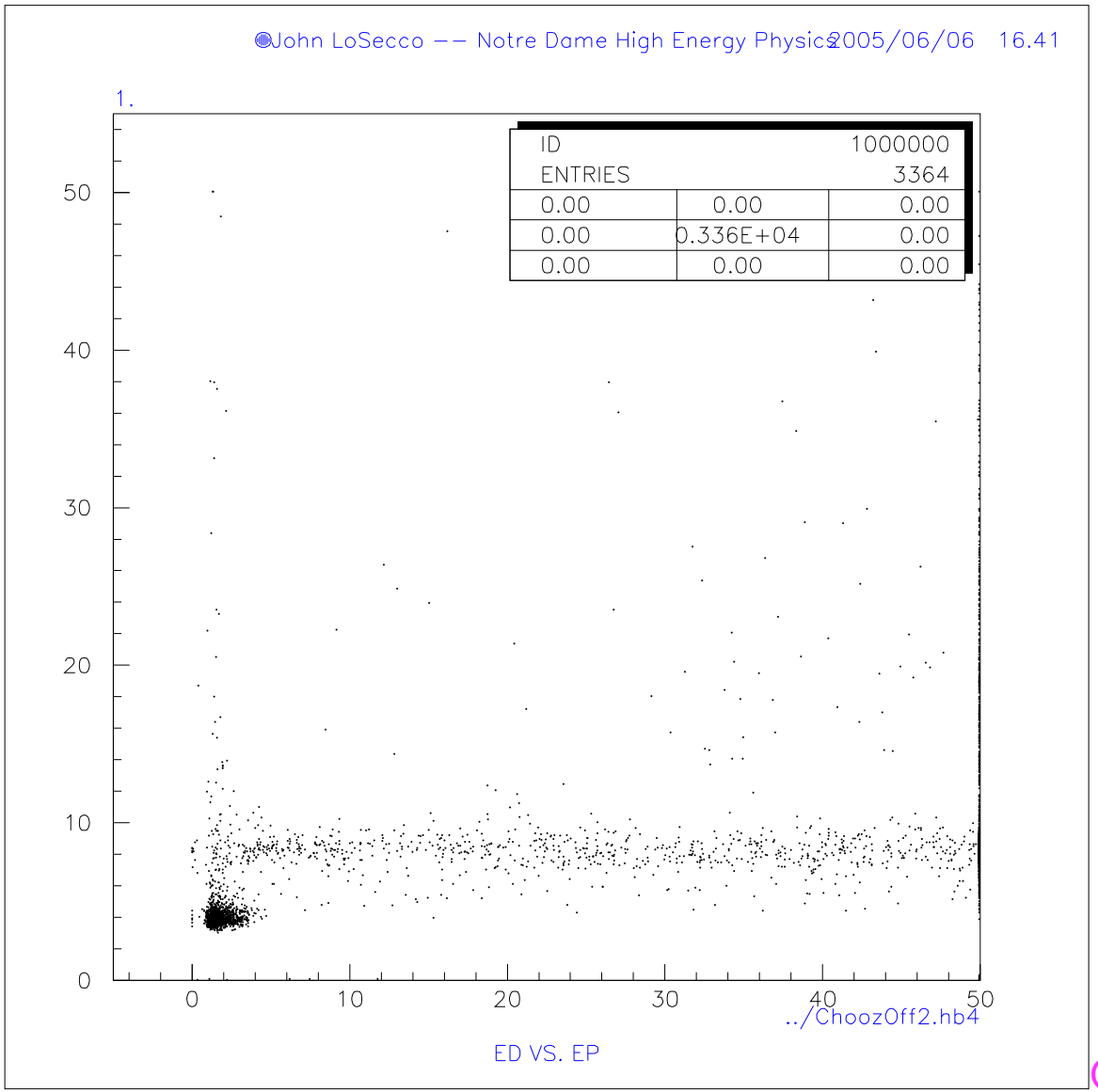


FIG. 17. (1) A. Wattenberg, Phys. Rev. **71**, 497 (1947). (2) D. H. Frisch, Phys. Rev. **70**, 589 (1946). (3) E. Bretscher and E. B. Martin, Helv. Phys. Acta **23**, 15 (1950). (4) Bailey, Bennett, Bergstralh, Nuckolls, Richards, and Williams, Phys. Rev. **70**, 583 (1946). (5) Lampi, Freier, and Williams, Phys. Rev. **76**, 188 (1949). (6) M. R. MacPhail, Phys. Rev. **57**, 669 (1940). (7) H. Aoki, Proc. Phys. Math. Soc. Japan **21**, 232 (1939). (8) Ageno, Amaldi, Bocciarelli, and Trabacchi, Phys. Rev. **71**, 20 (1947). (9) W. Sleator, Jr., Phys. Rev. **72**, 207 (1947). (10) R. Sherr, Phys. Rev. **68**, 240 (1945). (11) R. H. Hildebrand and C. E. Leith, Phys. Rev. **76**, 587 (1949). (12) Cook, McMillan, Peterson, and Sewell, Phys. Rev. **75**, 7 (1949). (13) J. DeJuren and N. Knable, Phys. Rev. **77**, 606 (1950). (14) DeJuren, Knable, and Moyer, Phys. Rev. **76**, 589 (1949). (15) Fox, Leith, McKenzie, and Wouters, Phys. Rev. **76**, 590 (1949). Also see Freier, Fulk, Lampi, and Williams, Phys. Rev. **78**, 508 (1950); L. L. Green and W. M. Gibson, Proc. Phys. Soc. **62**, 296 (1949) (disintegration cross section); D. W. Miller, Phys. Rev. **78**, 806 (1950).

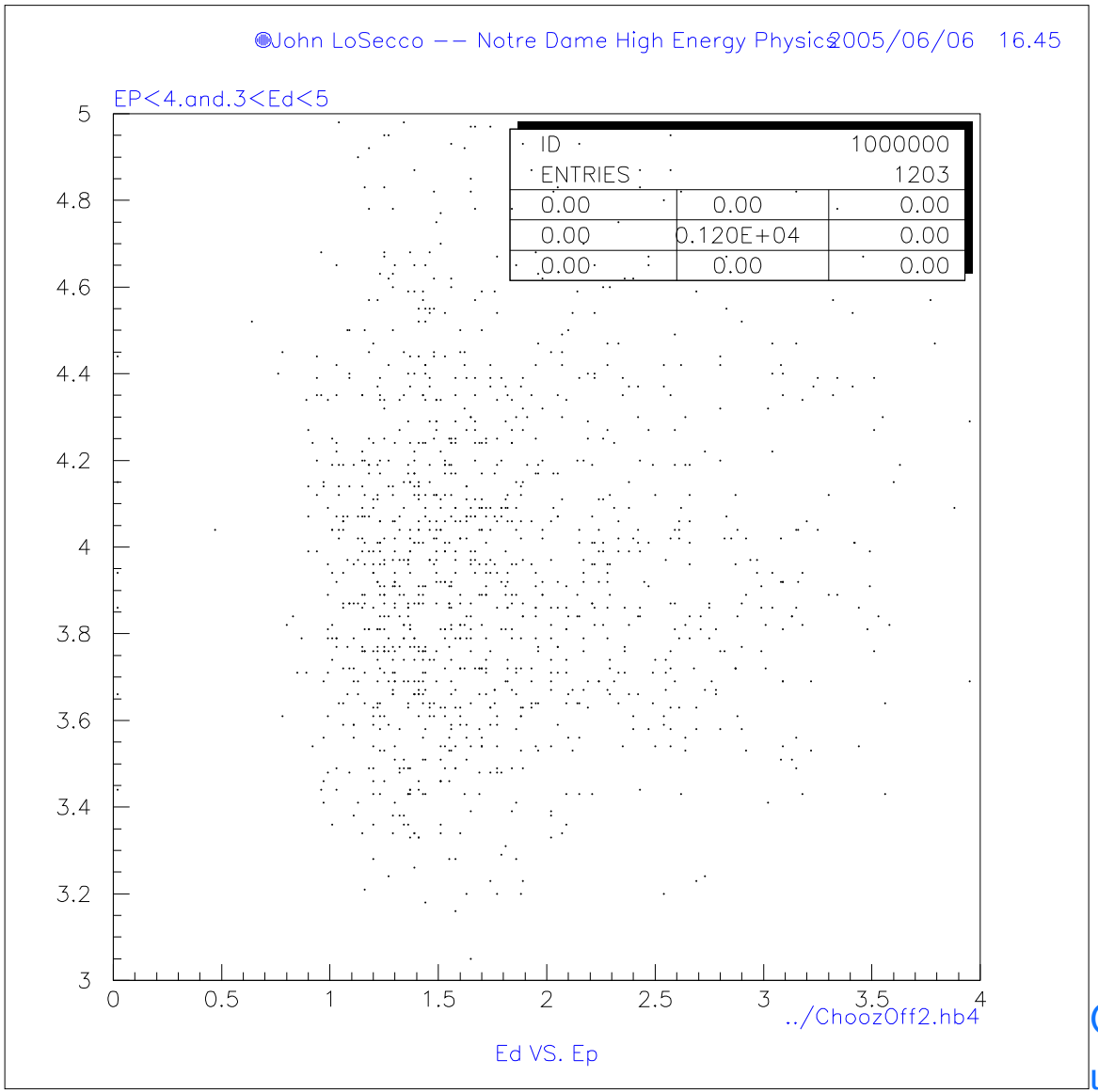
Neutron carbon cross section for active and passive shielding



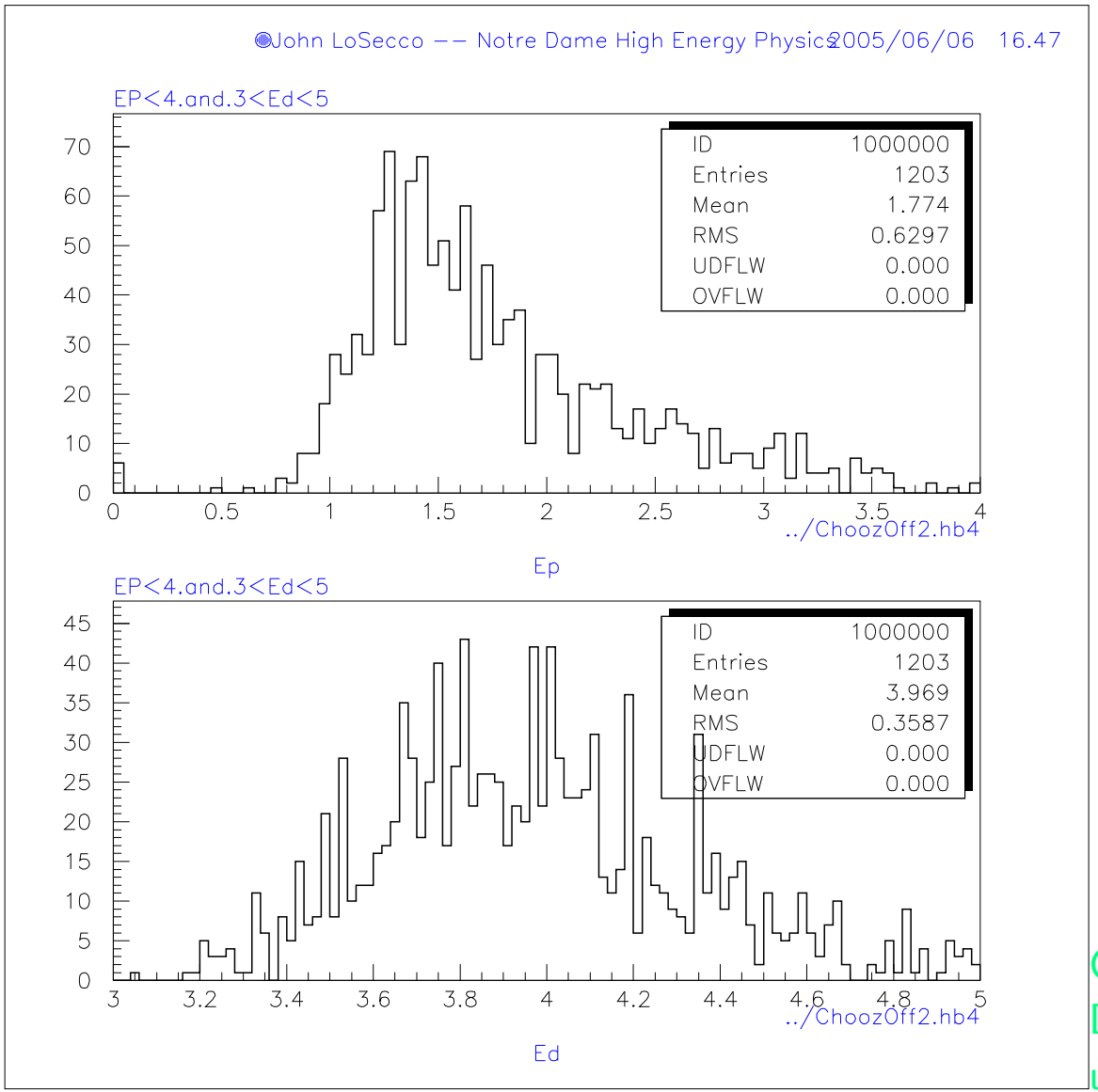
Entering neutrons that fake a neutrino interaction, as a function of neutron energy



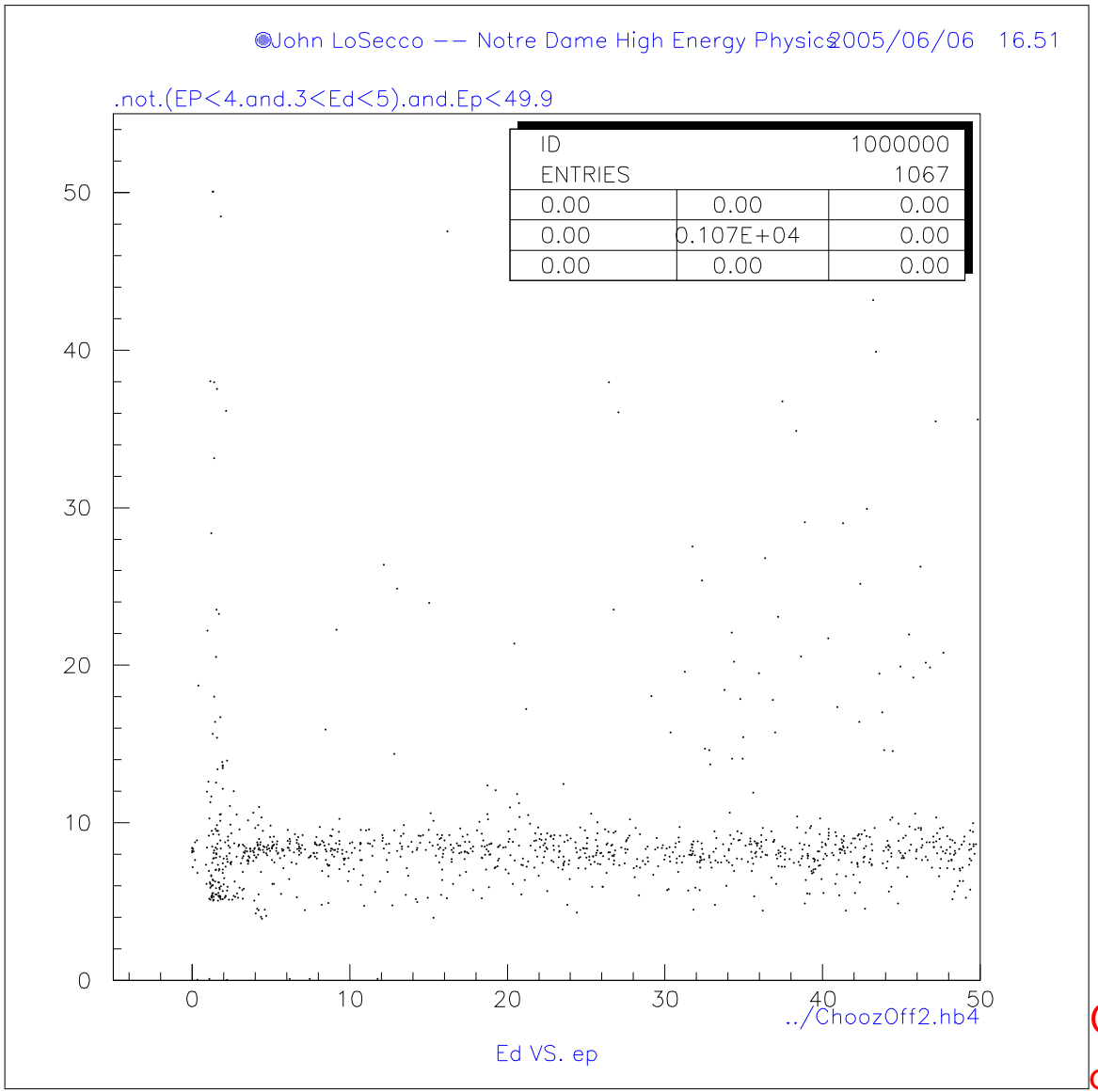
Chooz Reactor Off Data



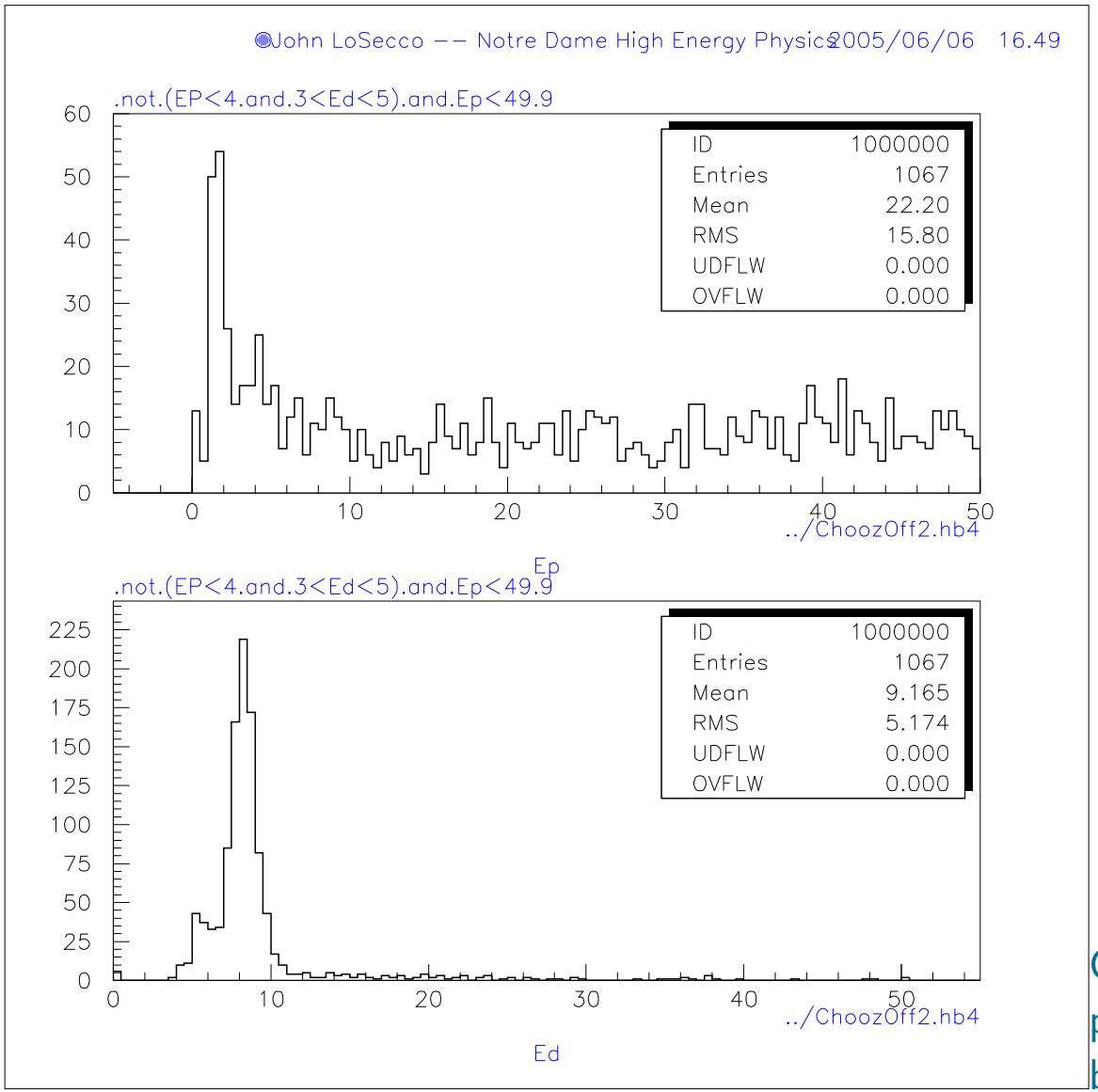
Chooz Reactor Off Data
uncorrelated background



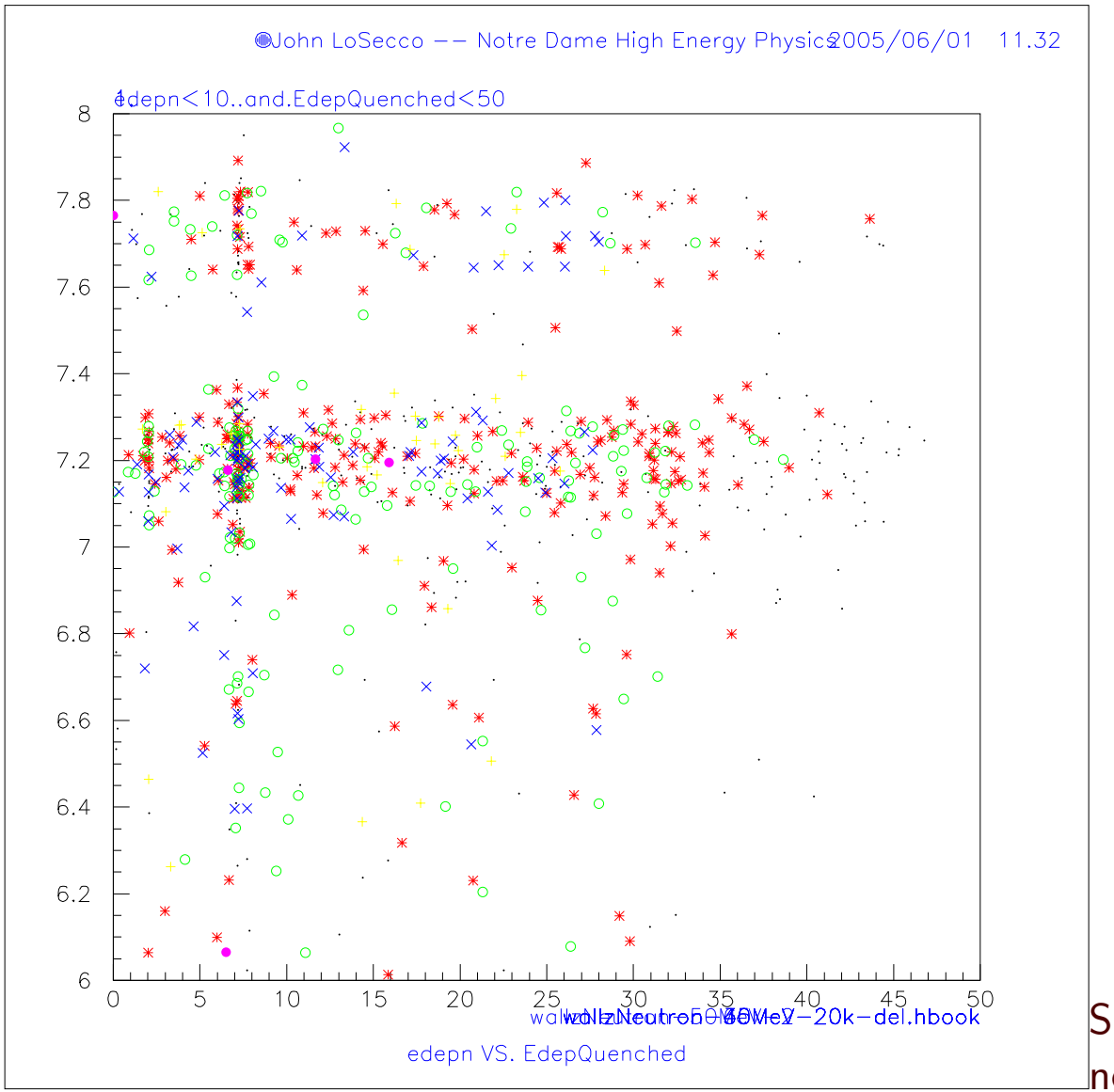
Chooz Reactor Off Data projections of uncorrelated background



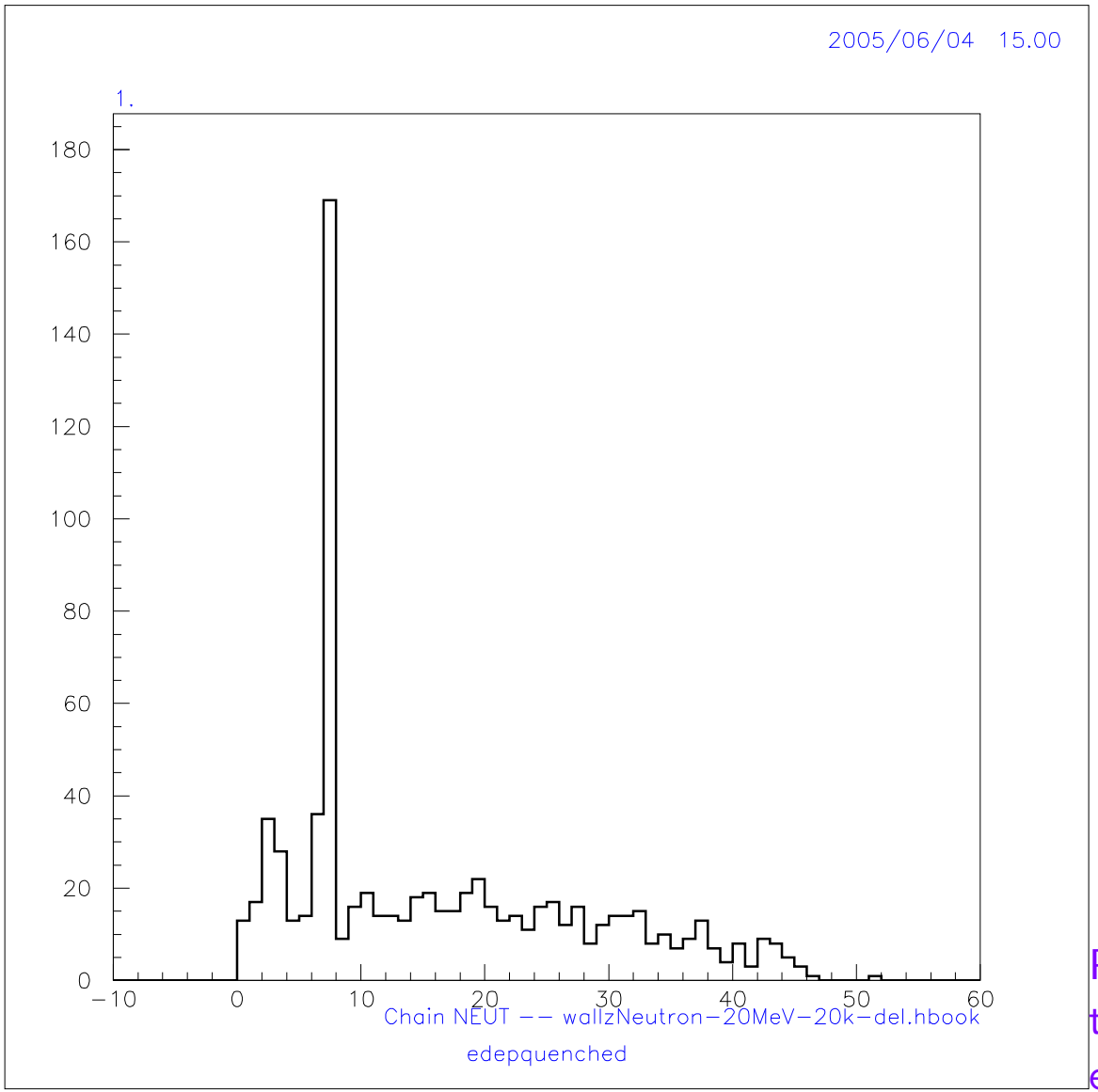
Chooz Reactor Off Data
correlated background



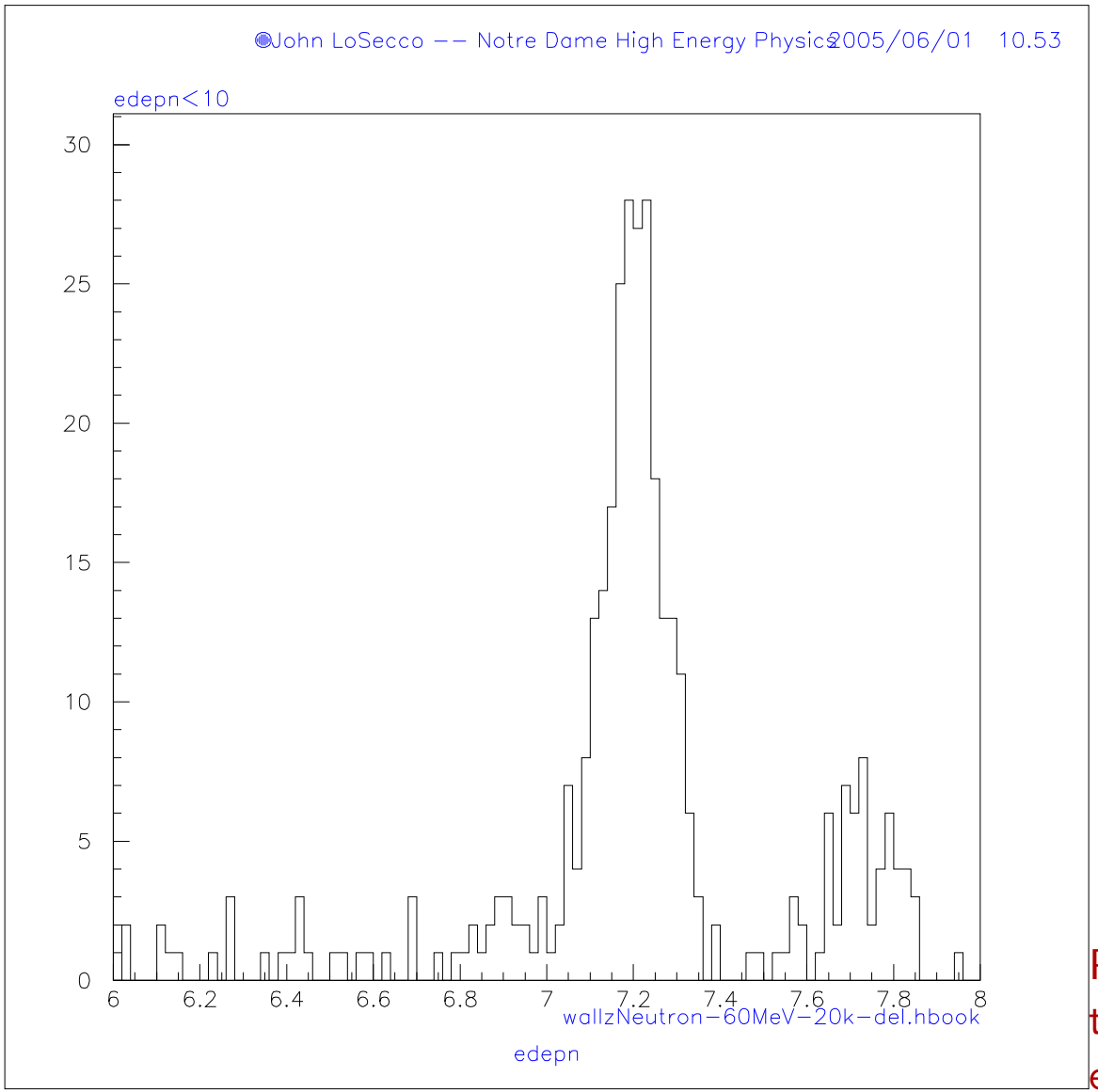
Chooz Reactor Off Data projections correlated background



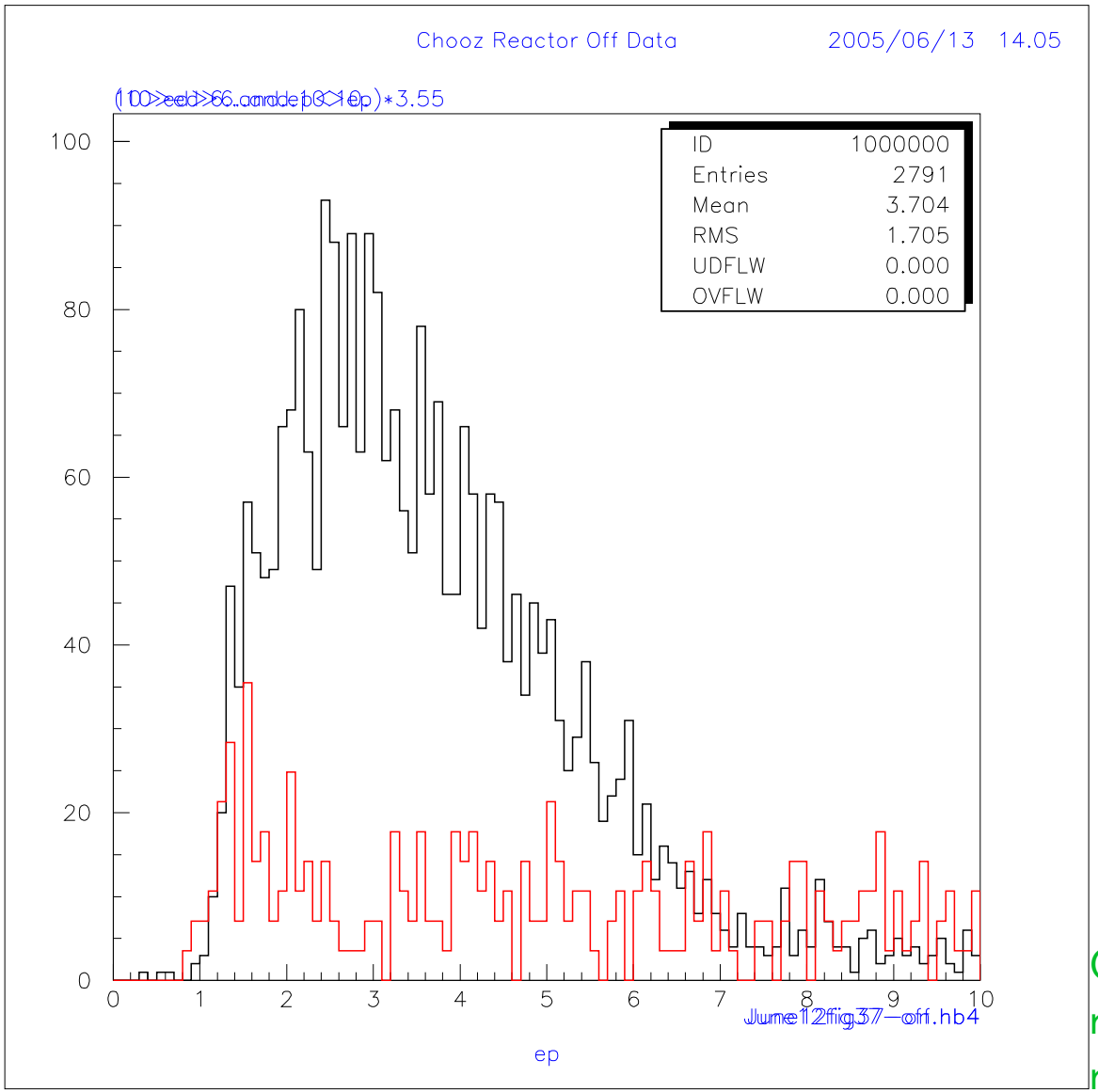
Simulated entering neutron induced fakes



Projection of the early time energy for simulated events



Projection of the late time energy for simulated events



Chooz Data - Red is reactor off scaled to reactor on tail

Background should not be a

Chooz

stopper