

Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

The correlation of nucleon mass to nuclear stability is investigated EUGENE PAMFILOFF, UGA, Dept. of Physics and Astronomy, Optigon R&D, retired — The decay chains and series of unstable isotopes are studied with particular detailed analysis of nuclei masses and the change in mass experienced by individual nucleons of parent, daughter and product isotopes or other emissions. The data shows a direct correlation between the nucleon mass of a stable product nucleus and that of an unstable parent or daughter nucleon during the transition. This suggests that in addition to proton and neutron quantities, nuclear stability is dependent upon specific nucleon mass benchmarks. It also indicates the probability that ^{238}U is the parent of a series of stable and unstable isotopes situated below the Pb threshold with an unambiguous connection to stable ^{56}Fe nucleons. To confirm these conclusions, the natural and artificial alpha emitter isotopes were also evaluated by the meticulous analysis of all nucleon masses relative to the 1H proton. The developed database and system of evaluation allow those decay chain products of uncertain origin to be traced from unstable or stable nuclei back to the immediate source isotope in the series and then to the most probable origin. Often, more than one possible transition source isotope is identified. The system provided good results when tested against the incident and product particles of high and low energy interactions, including events of nuclear transmutation. Every transition to a stable product demonstrates a strong correlation with a specific mass per nucleon benchmark as a third condition of nuclear stability.

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Date submitted: 19 Jan 2006

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