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The correlation of nucleon masses to nuclear stability is investigated E. PAMFILOFF, UGA, Dept. Phys. and Astro., Optigon R&D, retired — The decay chains and series of unstable isotopes and radioisotopes 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 mass benchmarks for the nucleons of stable nuclei. It also indicates the probability that 238U is the parent of a series of stable and unstable isotopes situated below the Pb threshold with an unambiguous connection to stable 56Fe nucleons. To confirm these conclusions, the natural and artificial alpha emitter isotopes were also evaluated by the meticulous analysis of 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 from the initial nuclide to the final stable daughter or product demonstrates a strong correlation with a specific mass benchmark per nucleon as a third condition of nuclear stability.

Eugene Pamfiloff
UGA, Dept. of Physics and Astronomy, Optigon R&D , retired

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