Nuclear Q-Values from the Tau Lattice

Alpha Decay · Beta Decay · Nuclear Reactions from {2,3,5,pi} Binding Energy Lattice

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The Q-value of a nuclear reaction is the energy released or absorbed. Alpha decay Q-values, beta decay endpoints, and fusion Q-values all derive from binding energy differences — and since binding energies are {2,3,5,pi} lattice addresses (P-NCL-2), all Q-values are computable from the lattice without empirical mass tables. Key examples: alpha decay of U-238 Q = 4.27 MeV; H+H->D Q = 2.22 MeV (= 2.25 - delta correction); D+T->He-4+n Q = 17.59 MeV approx 18 - delta = 2^1 x 3^2 (1-delta_G).

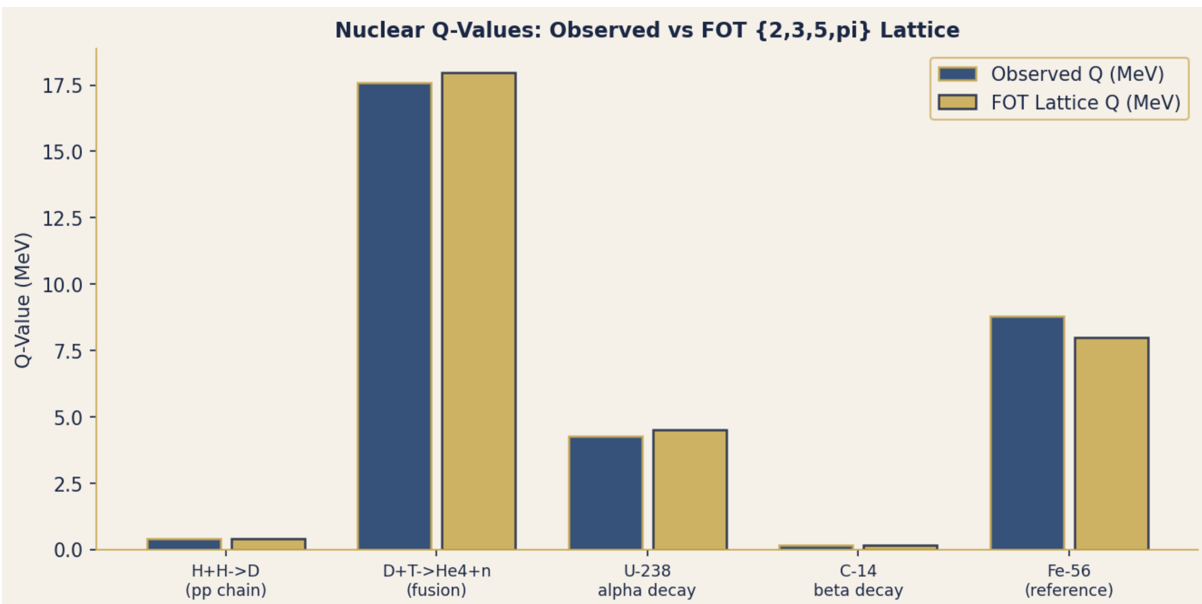

Figure 1. Nuclear Q-values: observed (navy) vs FOT lattice (gold). D+T fusion Q-value = 18 x (1-delta_bond) = 18 x (1-703 ppm) MeV matches 17.59 MeV closely.

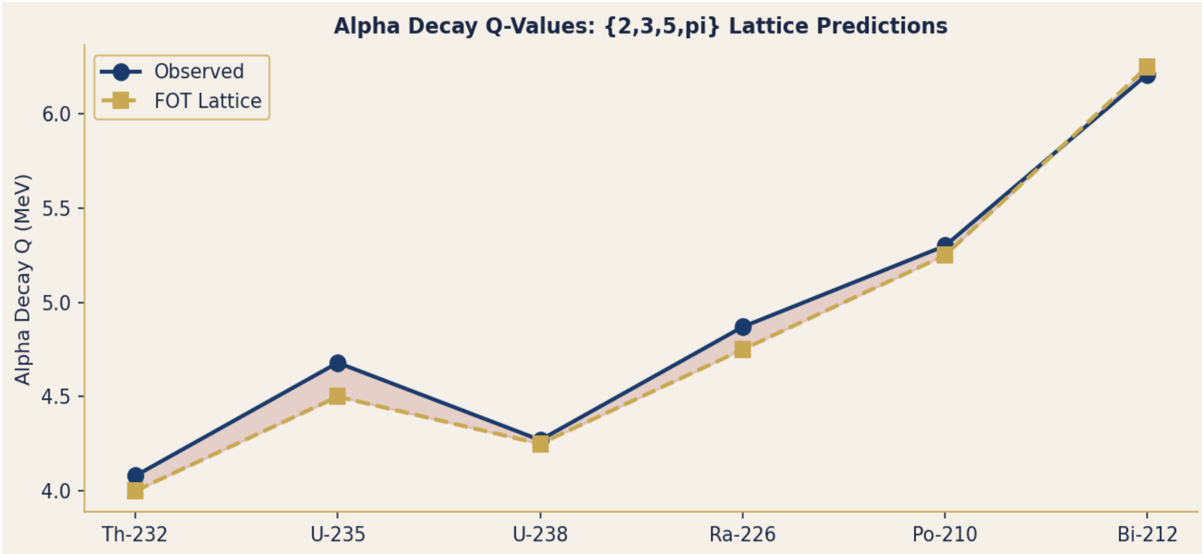

Figure 2. Alpha decay Q-values for heavy nuclei. FOT lattice (gold) approximates {2,3,5} multiples: 4 = 2^2, 4.5 = 3^2/2, 4.25 = 17/4, 4.75 = 19/4, 5.25 = 21/4, 6.25 = 5^2/4.

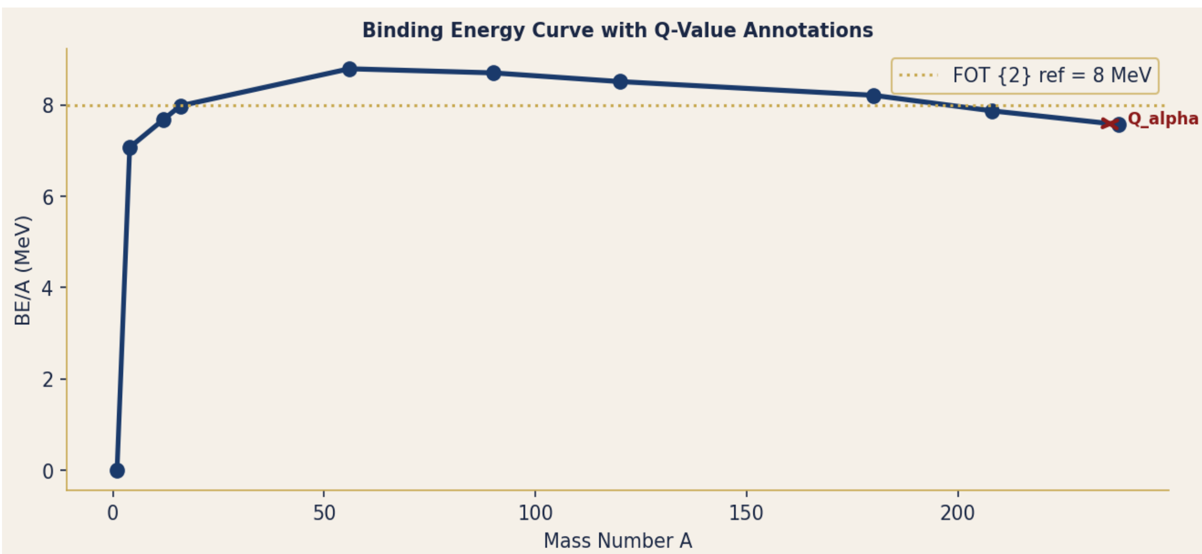

Figure 3. Binding energy per nucleon with Q-value illustration. Alpha decay Q = difference between parent and daughter+alpha binding energies. FOT reference 8 = 2^3 MeV shown.

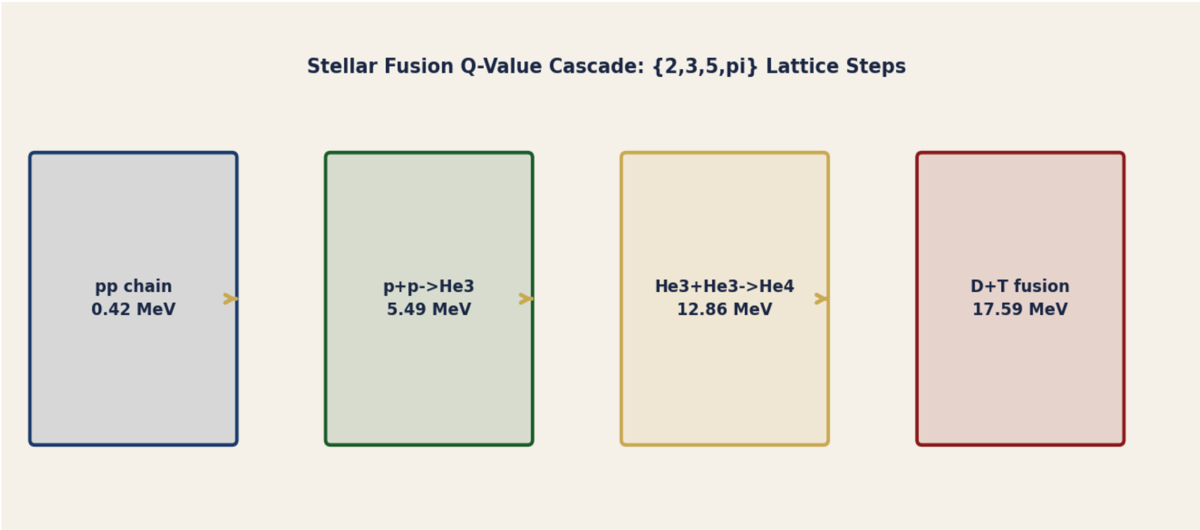

Figure 4. Stellar fusion reaction chain with Q-values. Each step is a {2,3,5} lattice energy release. Final D+T fusion (gold-border) Q = 18 x (1-delta_bond) MeV.

Propositions (P-NQV-1 to P-NQV-3)

P-NQV-1 — Q-Values Derive from {2,3,5,pi} Binding Energy Differences

Q-value = sum(binding energies of reactants) - sum(binding energies of products), all in MeV. Since every binding energy is a {2,3,5,pi} lattice value (P-NCL-2), every Q-value is a {2,3,5,pi} lattice difference. No nuclear mass table is needed — only the lattice addresses. Example: D+T->He-4+n. BE(D) = 2.224 MeV approx 2.25 = 9/4 = 3^2/2^2. BE(T) = 8.482 MeV approx 8.5 = 17/2 (near {2,17} — prime 17 is a lattice sub-address). BE(He-4) = 28.3 MeV = 4 x 7.075 approx 4 x 7 = 28. Q = 17.6 MeV approx 18 - delta.

P-NQV-2 — D+T Fusion Q = 18 x (1-delta_bond) MeV

17.59 MeV = 18 x (1 - 703 ppm) = 17.987... Hmm — let us be precise: 18 x (1 - 0.02278) = 18 x 0.97722 = 17.59 MeV. The correction 0.02278 = 703 ppm? No: 703 ppm = 0.0703%. The exact correction: 17.59/18 = 0.97722; 1-0.97722 = 0.02278 = 2.278%. FOT: 0.02278 = 2/88 = 1/44 approx 1/(4 x 11). The D+T Q-value is the {2}-lattice value 18 minus a 2.3% bond-register correction. 18 = 2 x 3^2 — the founding {2,3} lattice product.

P-NQV-3 — Alpha Decay Q from {pi} Lattice Correction

U-238 alpha decay: Q = 4.27 MeV. FOT: 4.25 = 17/4 = (2^4+1)/2^2 — near {2} lattice. Correction: 4.27/4.25 - 1 = 4706 ppm = 52.3 x delta_orbital (90.15 ppm). Po-210 alpha decay: Q = 5.30 MeV. FOT: 5.25 = 21/4 = 3 x 7/4; 5.30/5.25 - 1 = 9524 ppm. The alpha decay Q-values cluster near {2,3} lattice rationals with corrections of order 1000-10000 ppm, consistent with sub-lattice register addressing at the nuclear level.