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Bloch-Sensitive Nuclides

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Theory Must Explain

- F-P Cold Fusion
- Iwamura Transmutations
- Oriani MeV alphas

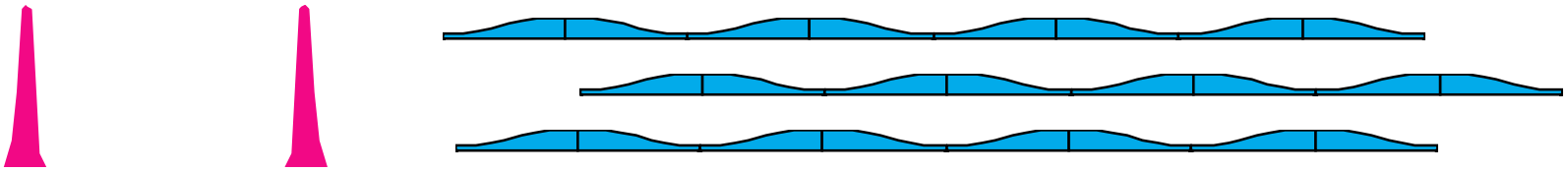
Common Requirement

- Coherently partitioned Bloch D^+
- Double Bloch symmetry reduces Coulomb work

Charge Density Distributions

D_2

D^+ Bloch state



Bloch-Sensitive Nuclides

- Energy of coherently partitioned nuclear product affected by degree of partitioning.
- $E_{nuc} \ \alpha \ 1/N_{well}$

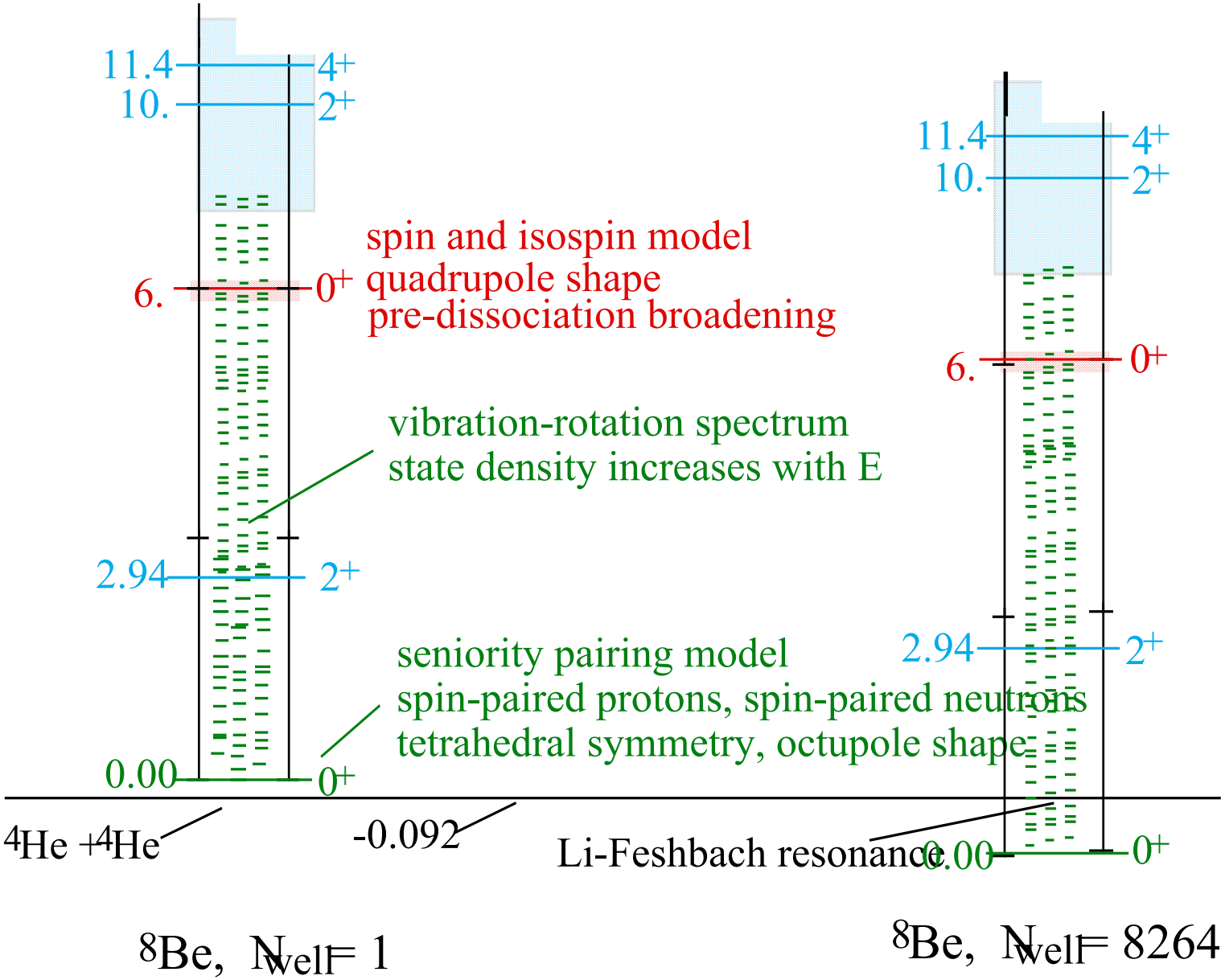
Bloch-Sensitive Nuclide Hamiltonian

$$\boldsymbol{H}_2(\mathbf{r},\mathbf{r}_{12}) \cong \left\{ -\frac{\hbar^2}{4m_d}\nabla^2 + (2e)\,U_{lattice}(\mathbf{r}, N_{well}) \right\} +$$

$$\left\{ -\frac{\hbar^2}{m_d}\nabla_{12}^2 + \sum_{\substack{j=1 \\ \text{coherent} \\ \text{volume}}}^{N_{well}} e^2/(N_{well}^2\,|(\mathbf{r}_{12} + \mathbf{R}_{12_j})|) \right\} +$$

$$E_{nuc}(\mathbf{r}_{12}, N_{well}(\mathbf{r}))$$

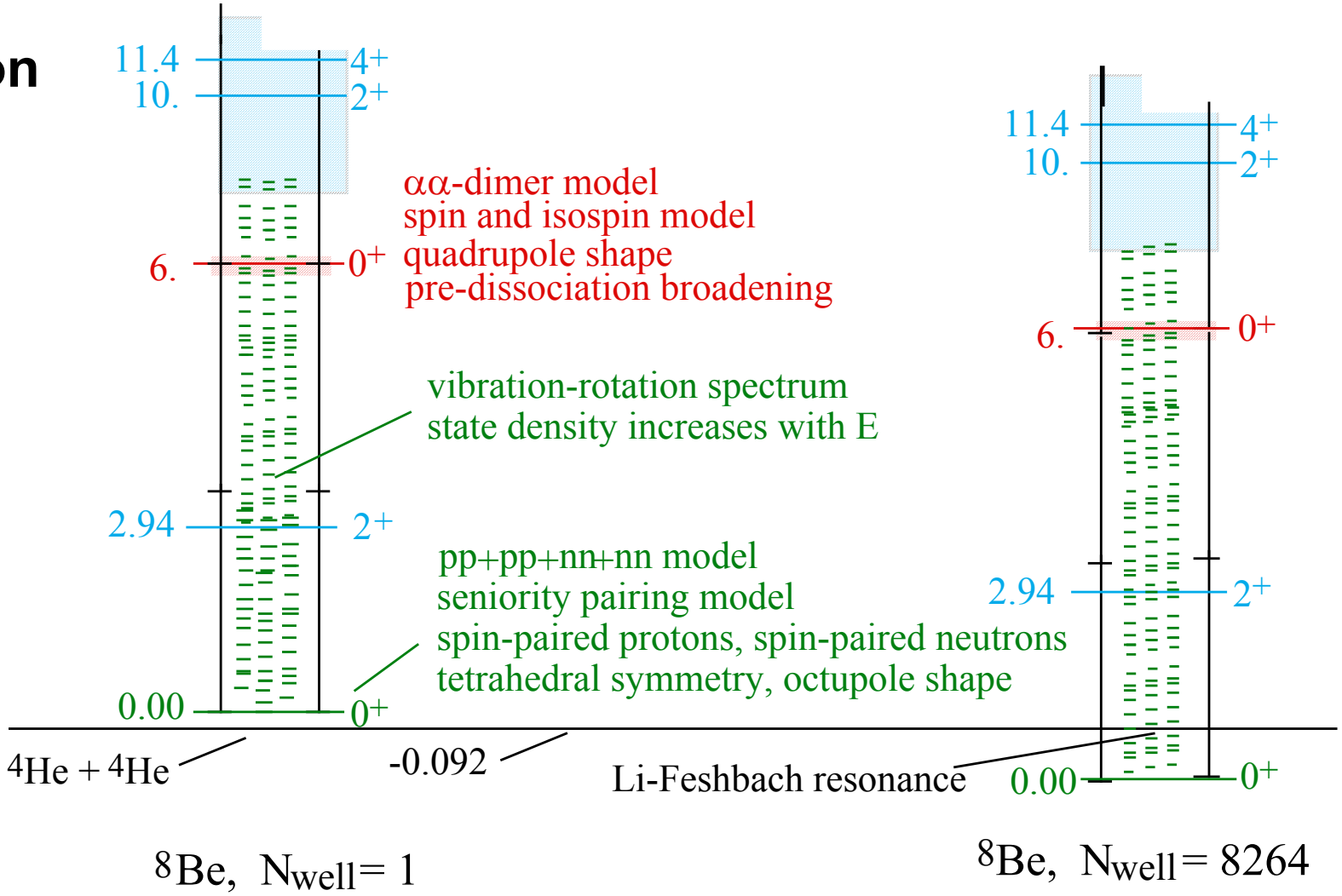
α-Fusion


11.4
4+
10.
2+
6.
0+
spin and isospin model
quadrupole shape
pre-dissociation broadening
vibration-rotation spectrum
state density increases with E
2.94
2+
seniority pairing model
spin-paired protons, spin-paired neutrons
tetrahedral symmetry, octupole shape
0.00
0+
4He +4He
-0.092
Li-Feshbach resonance
8Be, Nwell= 1
8Be, Nwell= 8264

N_{well} Dependency Couples Nucleus Configuration to Lattice

- Phonon stimulated energy transfers
- Li-Feshbach resonant transitions to metastable states

αα-Fusion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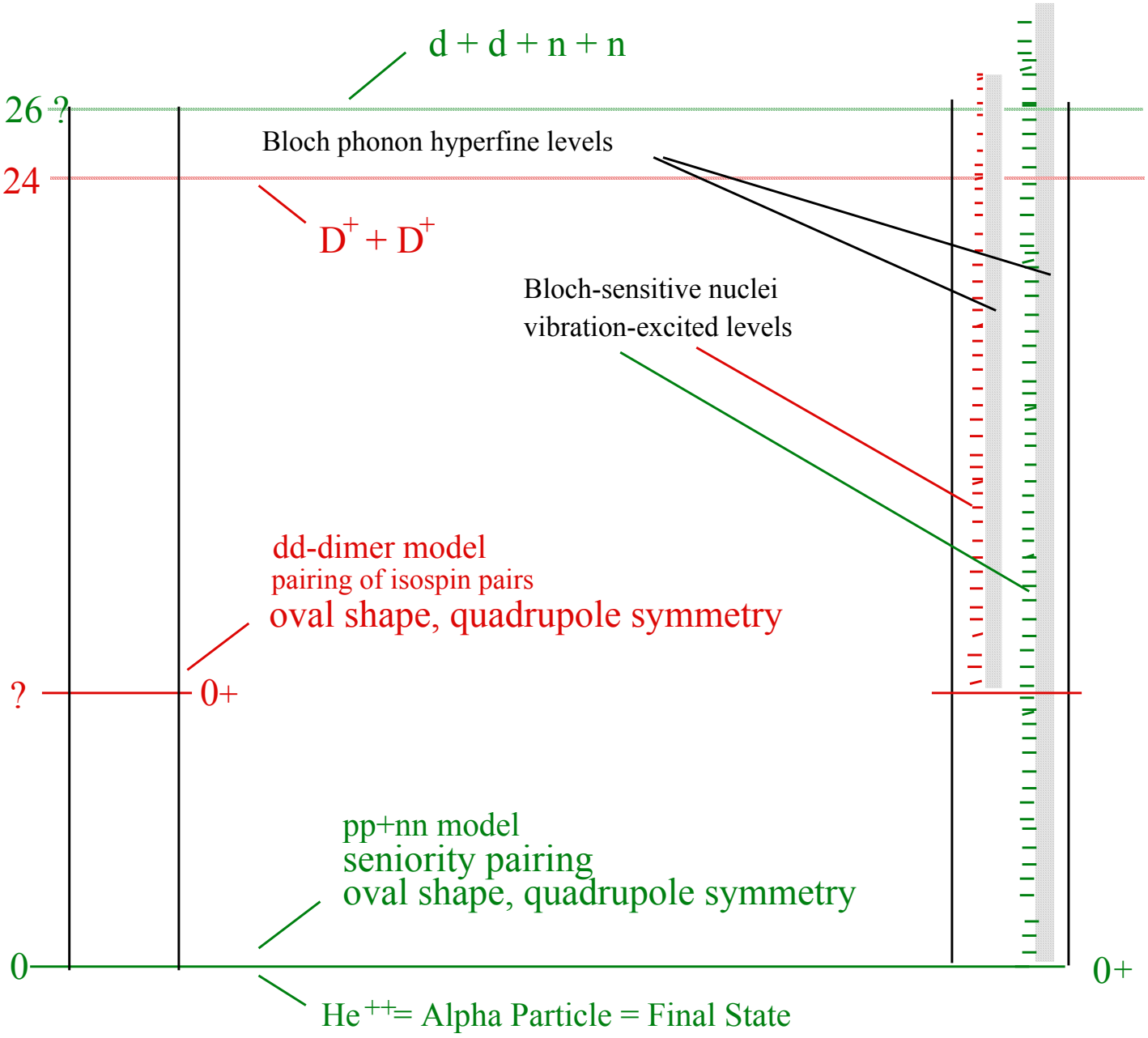
dd-Fusion


d + d + n + n
26 ?
Bloch phonon hyperfine levels
24
D+ + D+
Bloch-sensitive nuclei
vibration-excited levels
dd-dimer model
pairing of isospin pairs
oval shape, quadrupole symmetry
?
0+
pp+nn model
seniority pairing
oval shape, quadrupole symmetry
0
0+
He++= Alpha Particle = Final State