

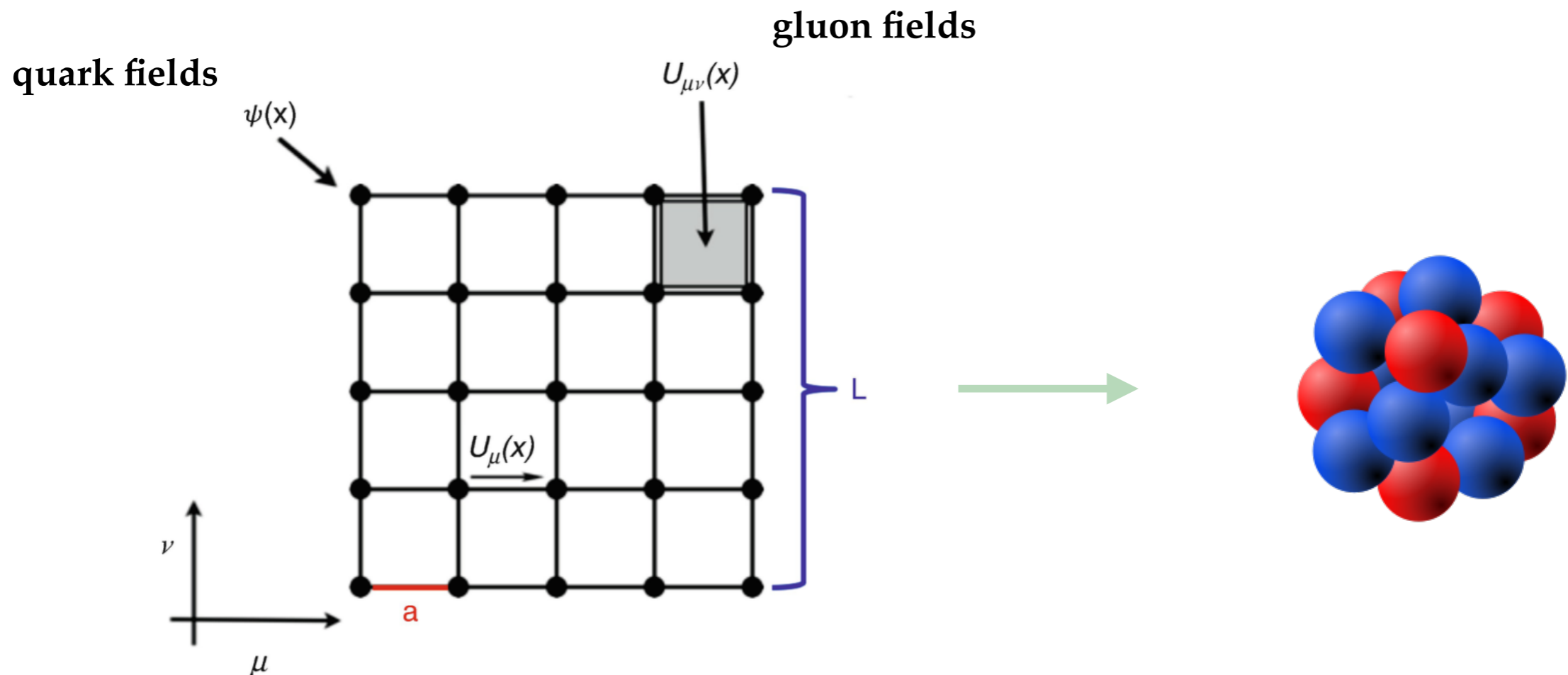
Nuclei from lattice QCD

◎ Strong + EW forces → Nuclear interactions

- Solving quantum chromodynamics (QCD) should give direct access to properties of nuclei
- Unfortunately, QCD too complex to be solved at low energies (non-perturbative)

◎ Only known solution: solve QCD on a lattice

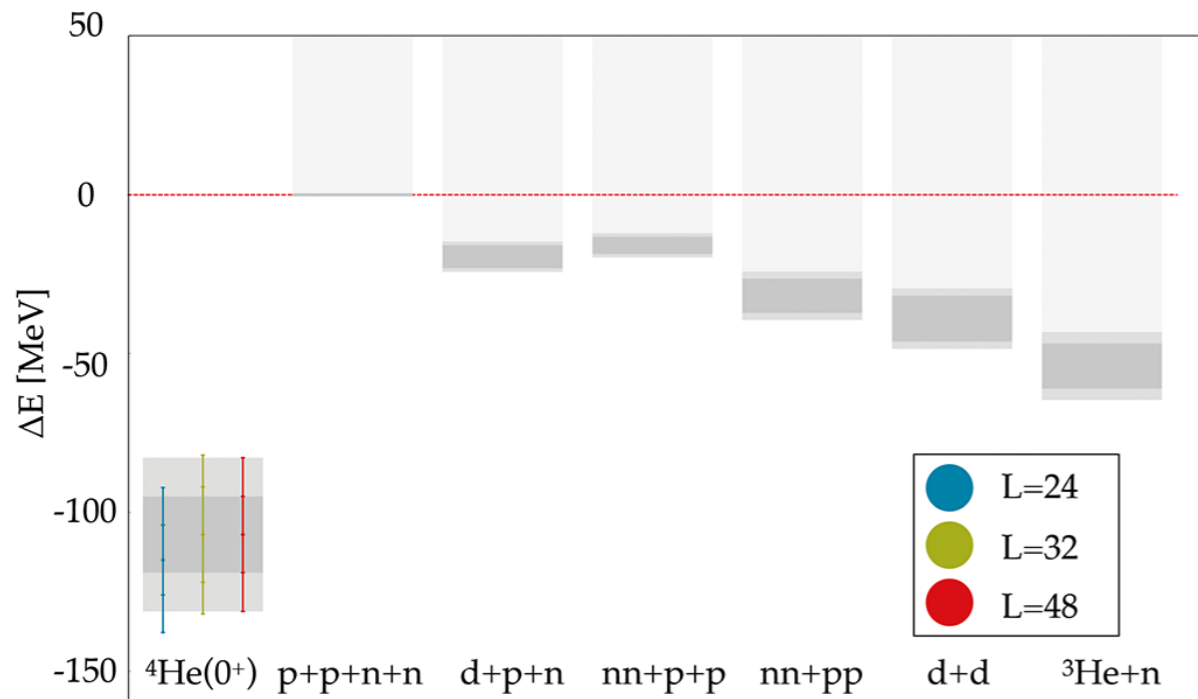
- Discretise space-time in a finite volume & evaluate path integrals over the fields numerically
- Artefacts due to lattice spacing & finite volume should be systematically removed



Nuclei from lattice QCD

⊙ First option: compute directly nuclear observables

- ✗ Unphysical pion masses
- ✗ Noise-to-signal ratio of A -nucleon correlation functions scales as $e^{A(M_N - \frac{3}{2}m_\pi)t}$
- ✓ Could provide highly useful benchmarks



⊙ Second option: compute NN (& NNN) potential

- ✗ Unphysical pion masses
- ✗ Difficult to extend to 3-body forces
- ✓ Extremely useful if extended to hyperons

[Ishii *et al.* 2007]

