Lattice QCD

- Lattice QCD is the numerical simulation of QCD
  - The QCD action, which expresses the strong interaction between quarks mediated by gluons:

$$S_{Dirac} = \overline{\psi}(\not{D} + m)\psi$$

    where the Dirac operator ("*dslash*") is given by

$$\not{D}\psi = \sum_{\mu} \gamma_{\mu}(\partial_{\mu} + igA_{\mu}(x))\psi(x)$$

  - Lattice QCD uses discretized space and time
  - A very simple discretized form of the Dirac operator is

$$\not{D}\psi(x) = \frac{1}{2a}\sum_{\mu} \gamma_{\mu}[U_{\mu}(x)\psi(x + a\hat{\mu}) - U_{\mu}^{\dagger}(x - a\hat{\mu})\psi(x - a\hat{\mu})]$$

    where *a* is the lattice spacing