Lattice field theory on a single site

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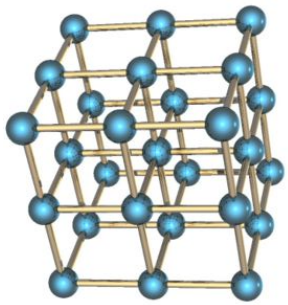
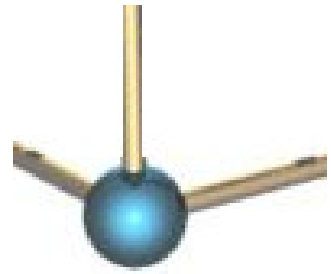
Large N Twisted Volume Reduction

Lattice field theory:



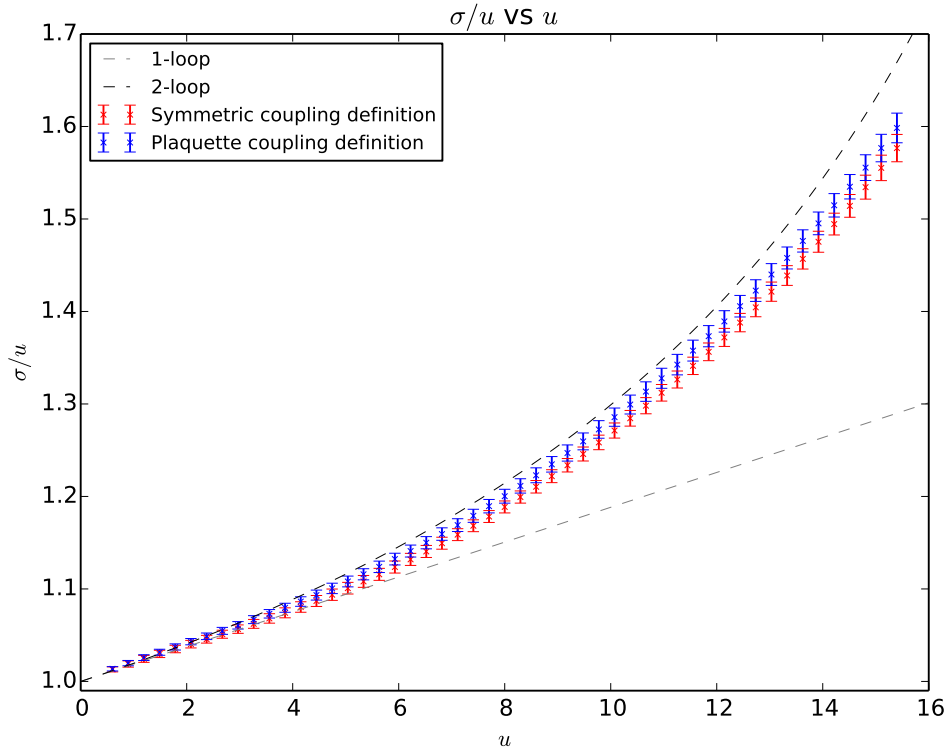
- $\hat{L}^4$ points, lattice spacing a
- Physical volume $L^4 = (\hat{L}a)^4$
- UV cut–off: $1/a$
- IR cut–off: $1/L$

Twisted reduction: $\hat{L} \to \sqrt{N}$



- Single site lattice, lattice spacing a
- Physical volume $L^4 = (\sqrt{N}a)^4$
- UV cut–off: $1/a$
- IR cut–off: $1/\sqrt{N}a$

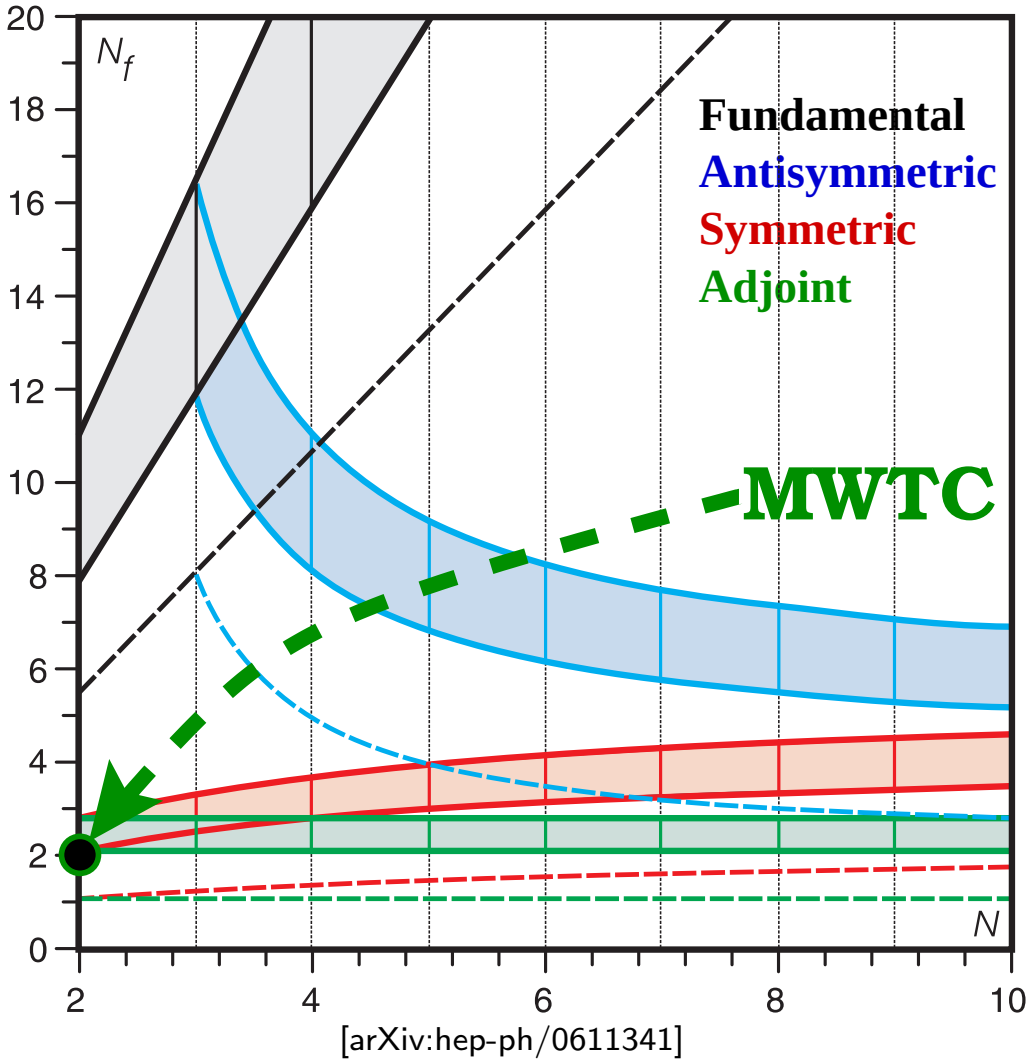
Running Coupling



[Margarita García Peréz, Antonio González-Arroyo, Masanori Okawa]

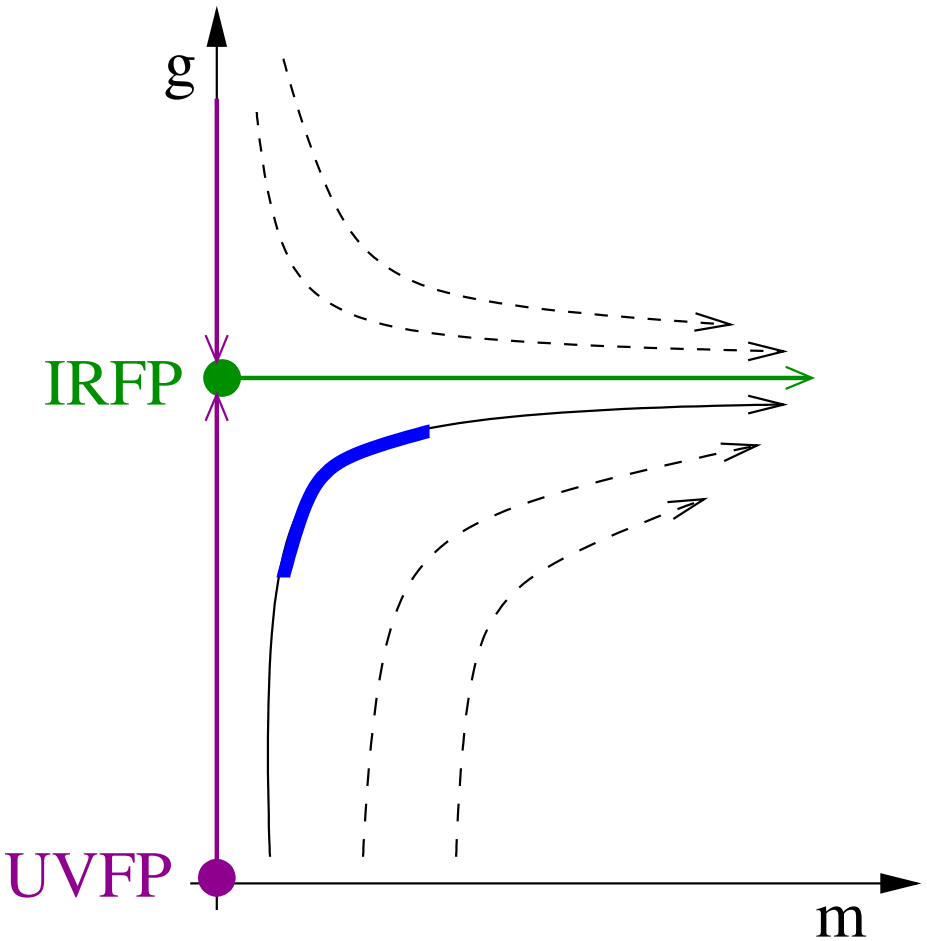
- SU($N = \infty$) running coupling from 1^4 lattice
- N from 64 to 324
- Different discretizations consistent with each other
- Agrees with 2–loop perturbation theory

Walking/Conformal Gauge Theories



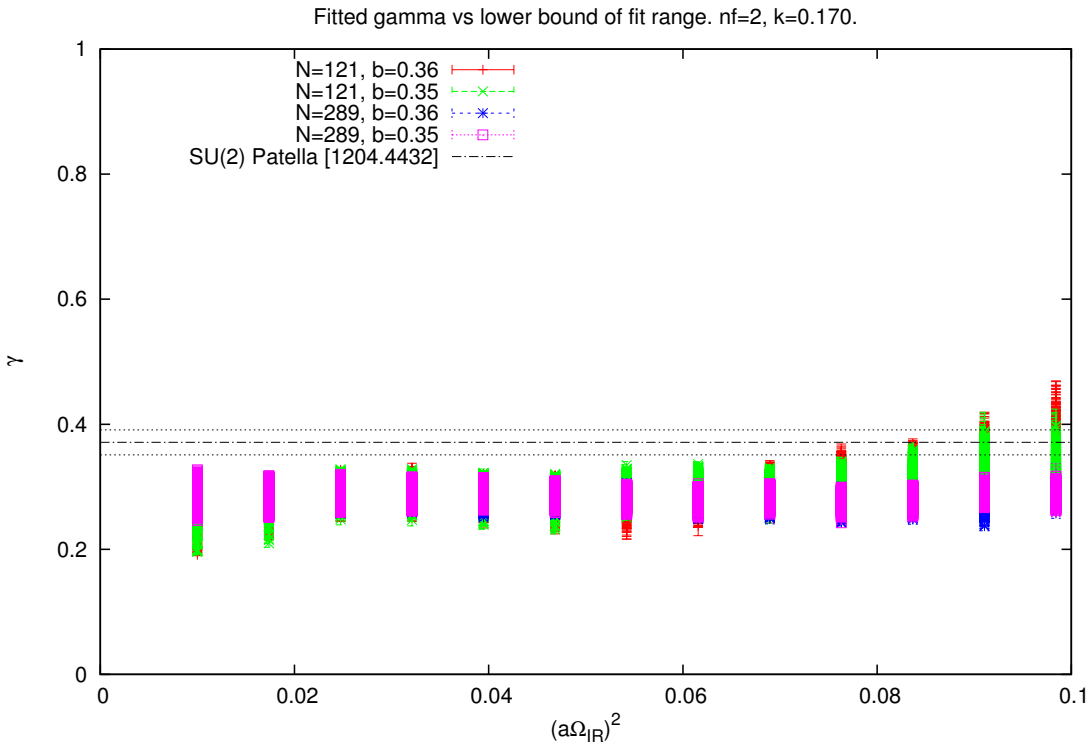
- Perturbative phase diagram of SU(N) gauge theories with N_f fermions
- Shaded region shows conformal window
- Can be very different to QCD

RG flows in mass-deformed CFT



- Flow from UV to IR
- Finite mass drives us away from FP in the IR
- Interested in intermediate blue region
- $\frac{1}{L} \ll m \ll \textit{blue} \ll \frac{1}{a}$

Mass Anomalous Dimension at IRFP γ_*



[Margarita García Peréz, Antonio González-Arroyo, Masanori Okawa]

- SU(N) + 2 adjoint Dirac fermions
- γ_* determined from fit to the Dirac mode number
- data points: SU(N) with N=289 (single site)
- dotted line: SU(2) (32^4 lattice) [Patella 1204.4432]