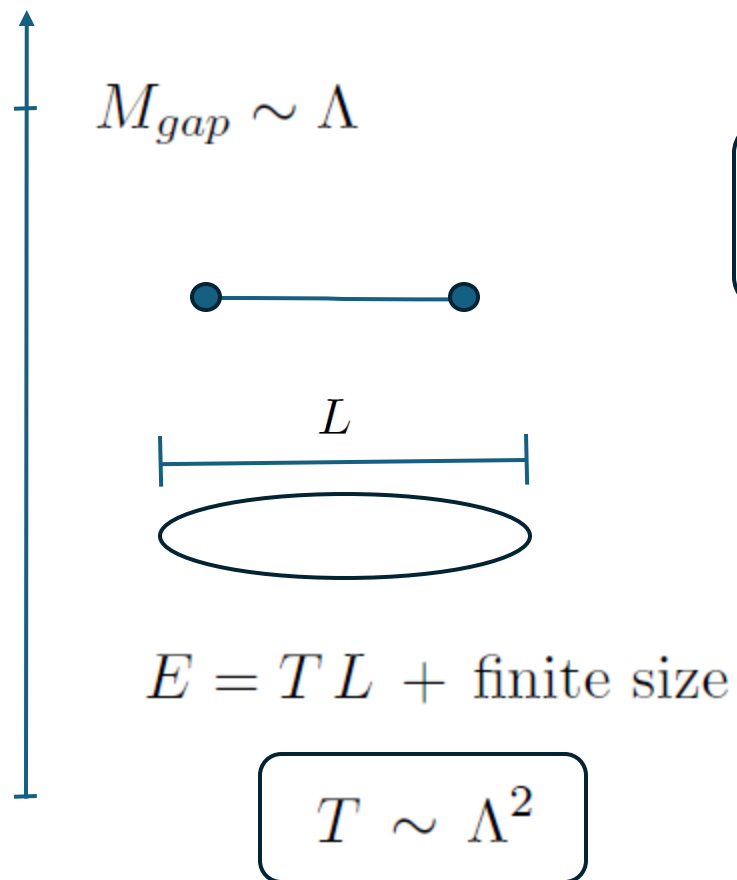


Confining Flux Tubes in a Gapless Phase (part 1)

Based on arxiv: 2602.17758 [hep-th]
w/ G. Galati and G. Rizi

“Defects and Extended Excitations in Quantum Field Theory, Quantum Matter
and Statistical Models”
Galileo Galilei Institute, Firenze, Italy

Confinement in a gapped phase: the case of YM



Effective String
Theory

$$\sqrt{T} \gg \frac{1}{L}$$

- IR dof's ?

Massless vs Massive

- EFT ?



Symmetries

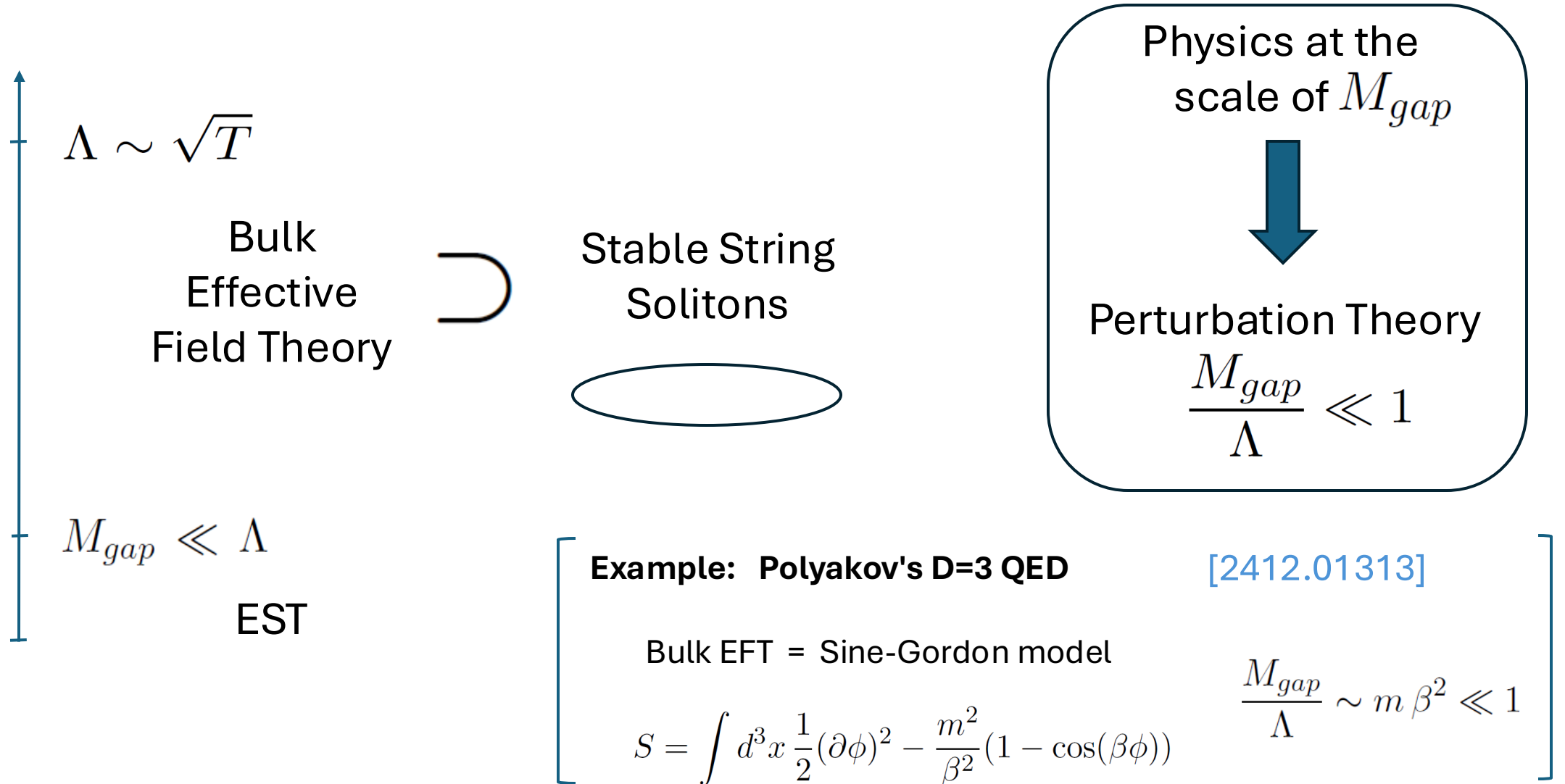


Observables
e.g.
Finite Volume
Spectrum,
Width, etc

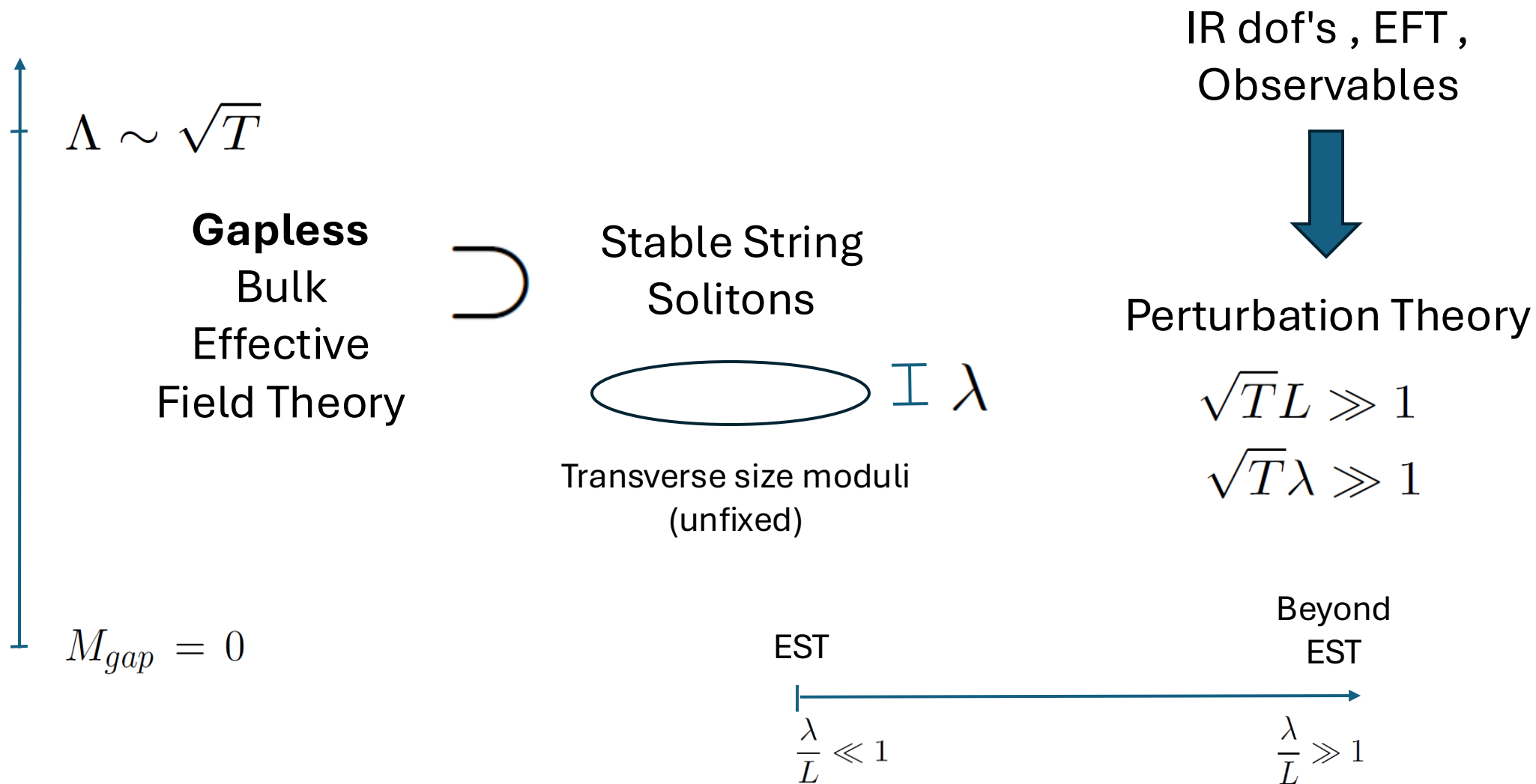


Lattice

Confinement in a "less gapped" phase: "top-down" approach



Confinement in a gapless phase: moving beyond EST

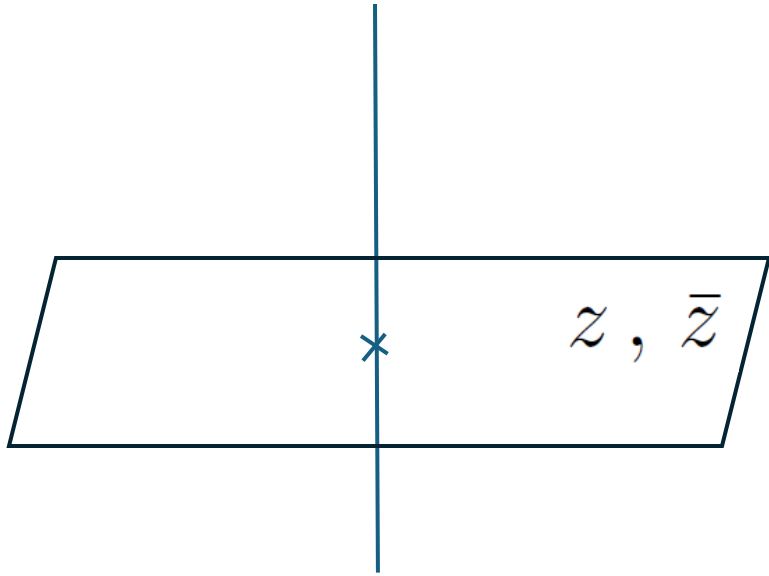


The model:

$d = 4 \mathbb{CP}^1$ NLSM

UV completions:
Nf=2 Adj QCD , Abelian Higgs Model

$$SU(2) \rightarrow U(1) \quad S = \frac{2}{g^2} \int d^4x \frac{\partial_\mu \omega \partial^\mu \bar{\omega}}{(1 + |\omega|^2)^2} + \dots \quad g^{-1} \sim \Lambda$$



Finite tension string solutions:

$$\omega_{cl}(z) = \frac{P(z)}{Q(z)} \xrightarrow{n=1} \omega_{cl}(z) = \frac{\lambda}{z - z_0}$$

Zero modes

$$T = \frac{S_{cl}}{\text{Area}} = \frac{4\pi n}{g^2}$$

$$n = \frac{1}{2\pi} \int_{z, \bar{z}} \frac{d\omega \wedge d\bar{\omega}}{(1 + |\omega|^2)^2} \in \mathbb{Z}$$

TO BE CONTINUED ...