Title: Universality at large transverse spin in defect CFTs

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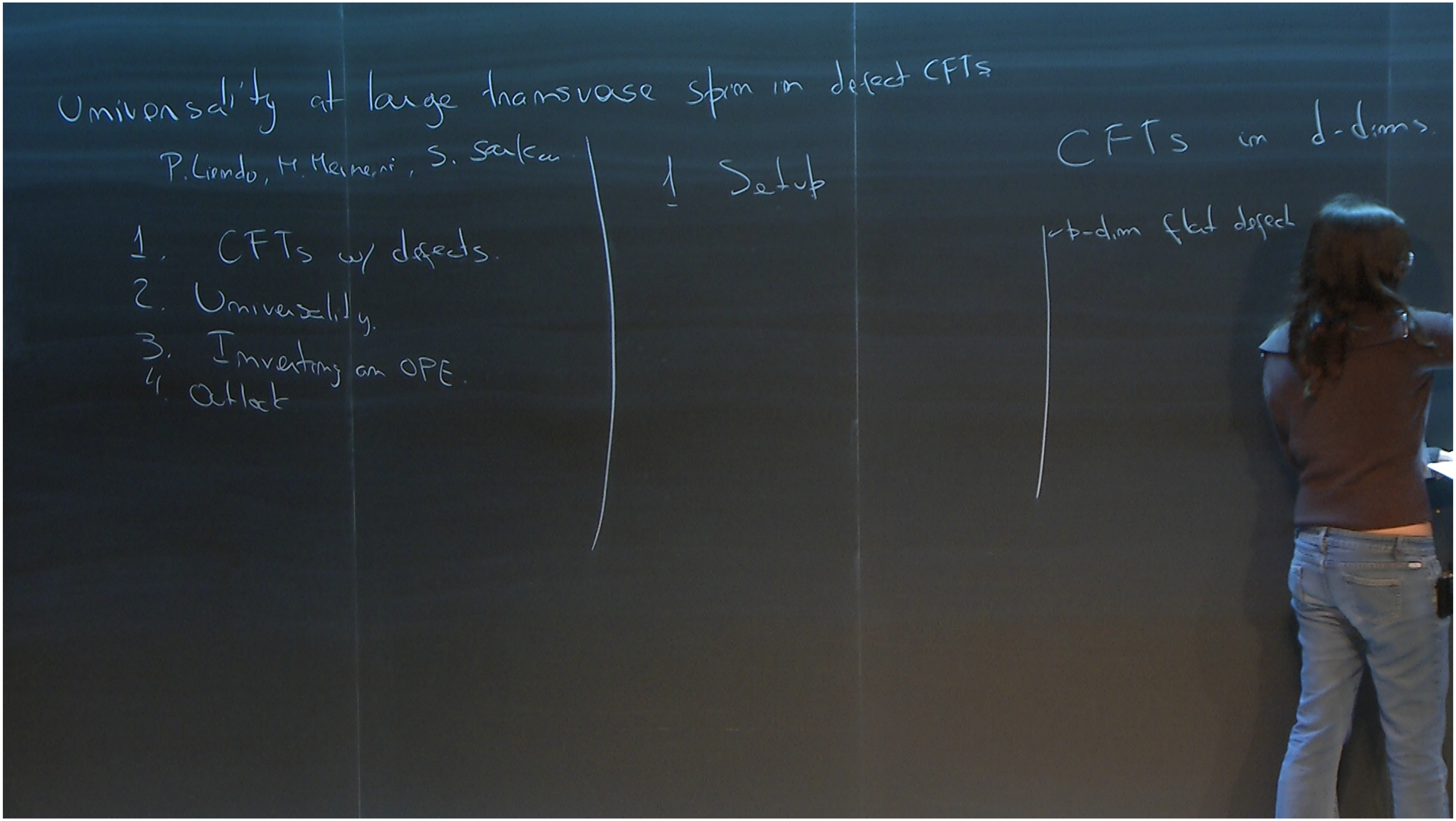
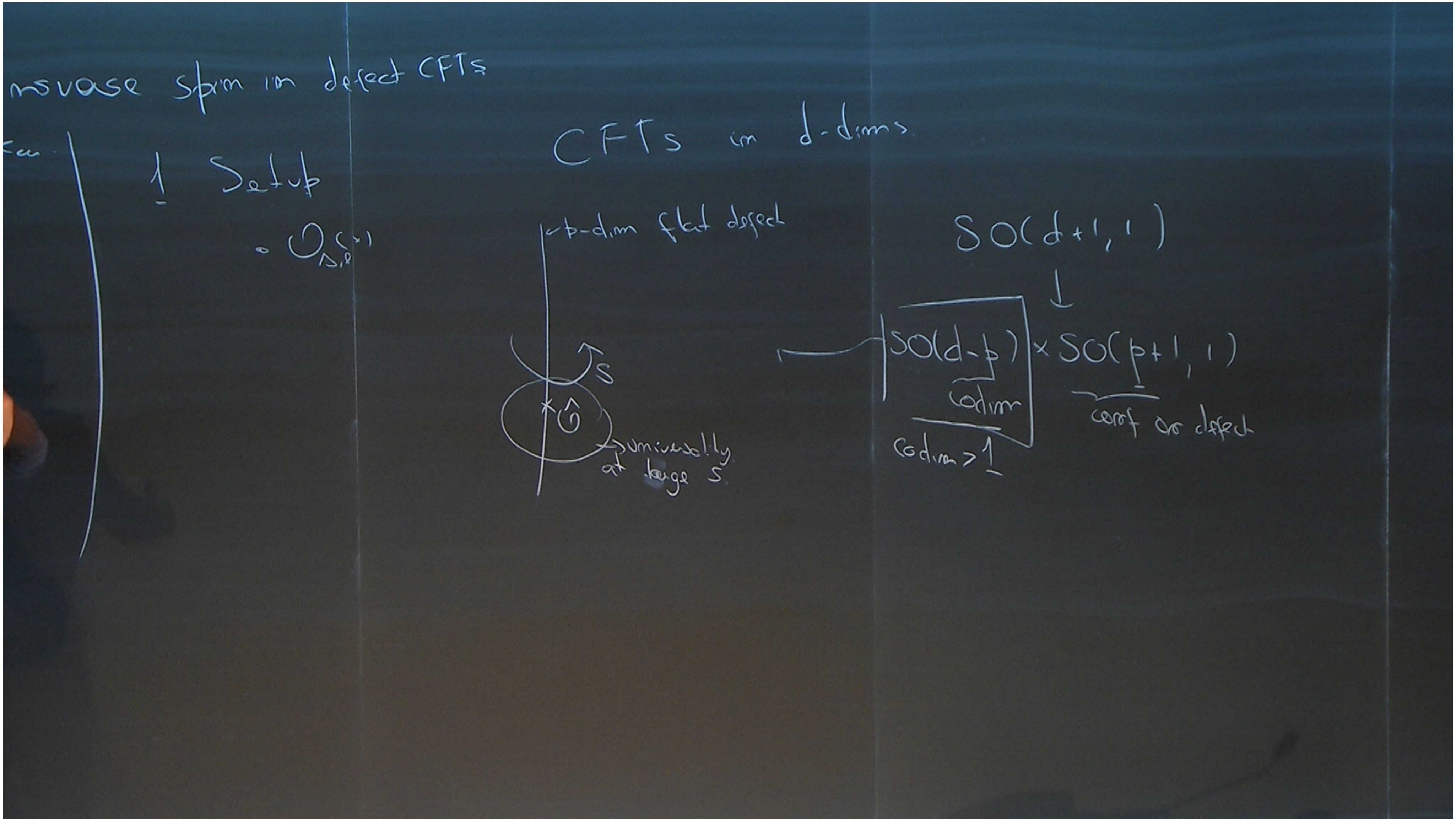
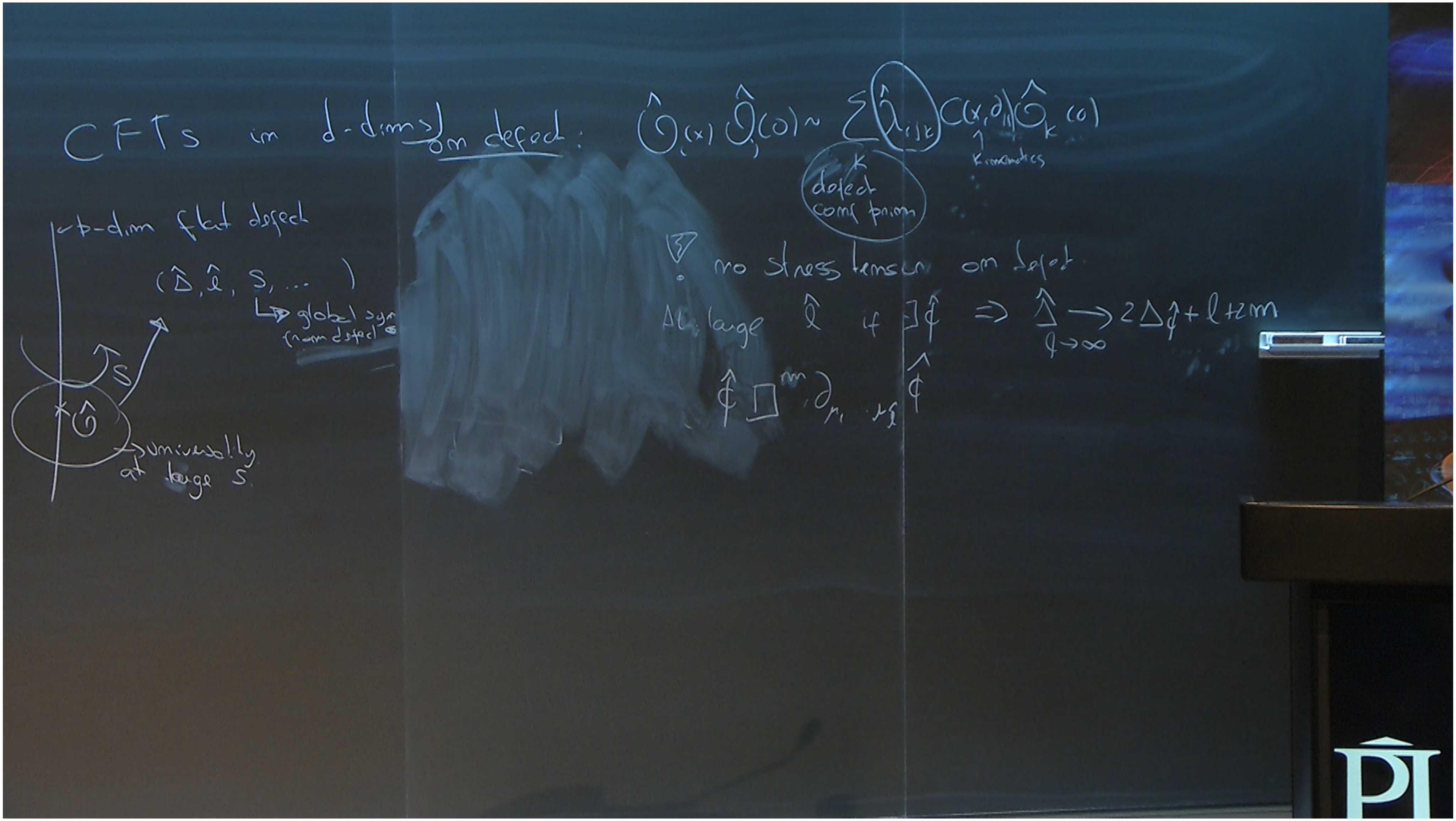
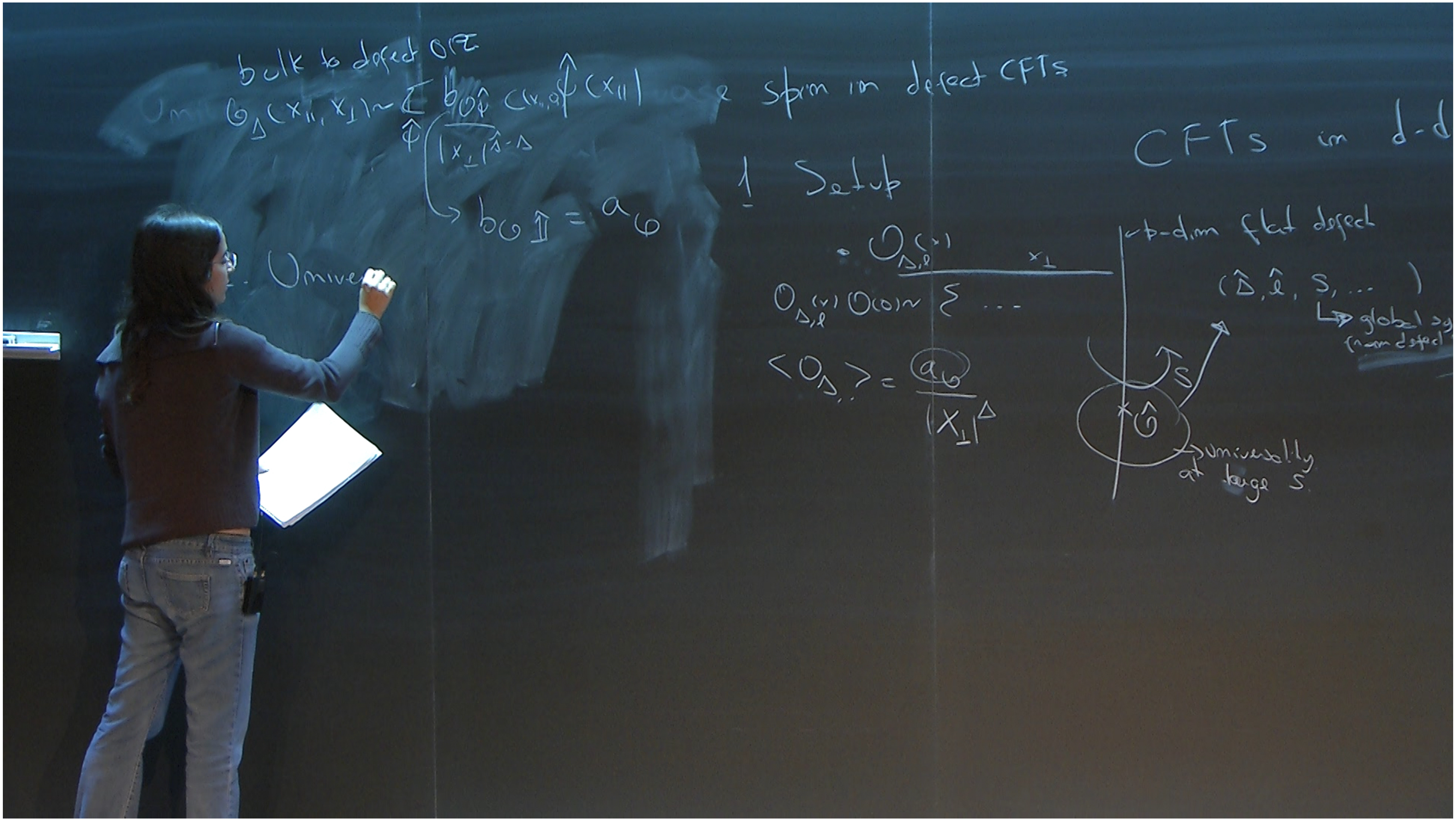
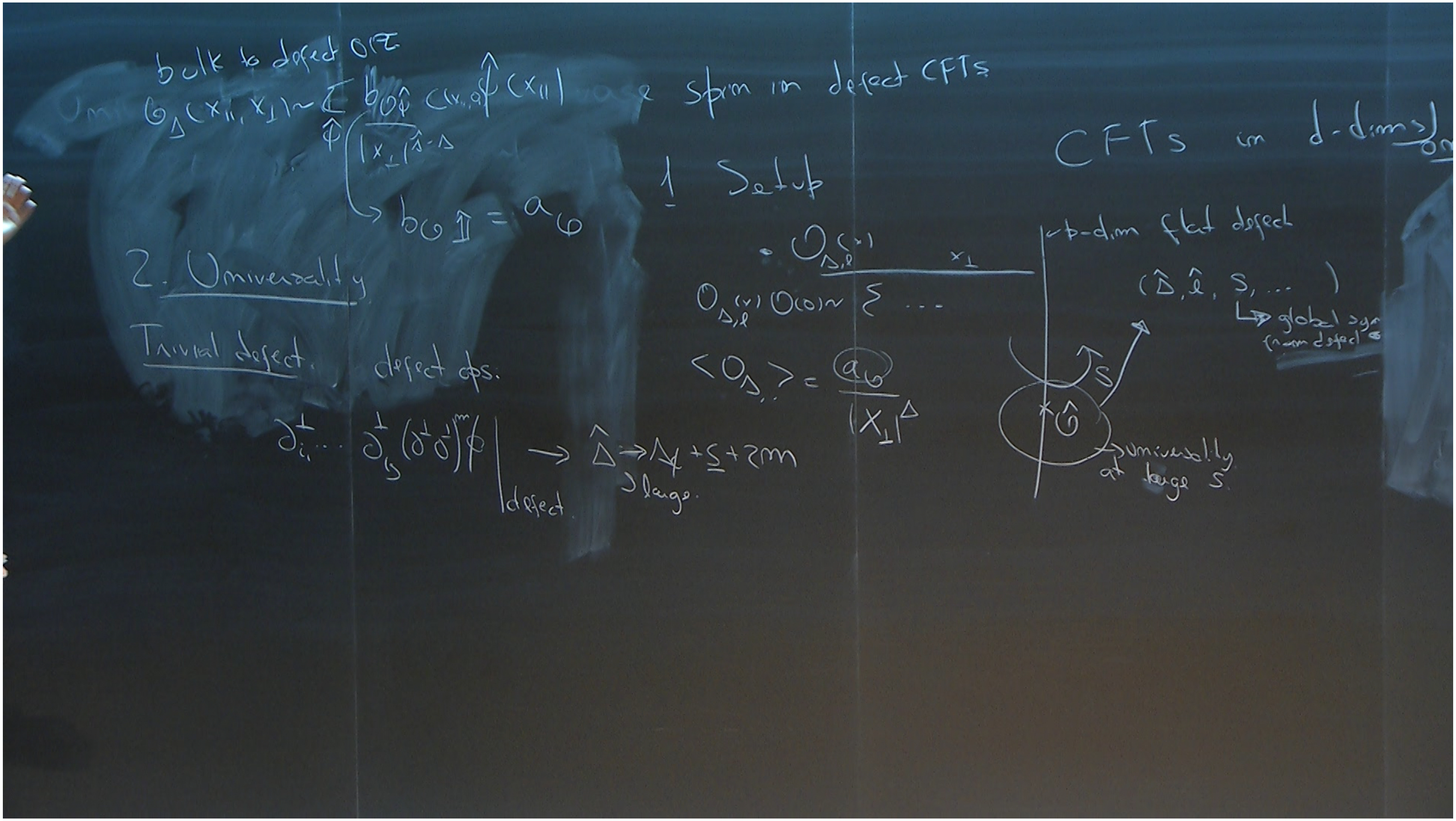
Abstract: We study the spectrum of defect conformal field theories (CFTs), and show the existence of universal accumulation points in the defect spectrum. This is achieved by obtaining an inversion formula for the bulk to defect OPE, akin to the Lorentzian inversion formula of Caron-Huot for CFTs without defects. We conclude by applying the result in examples and with an outlook.

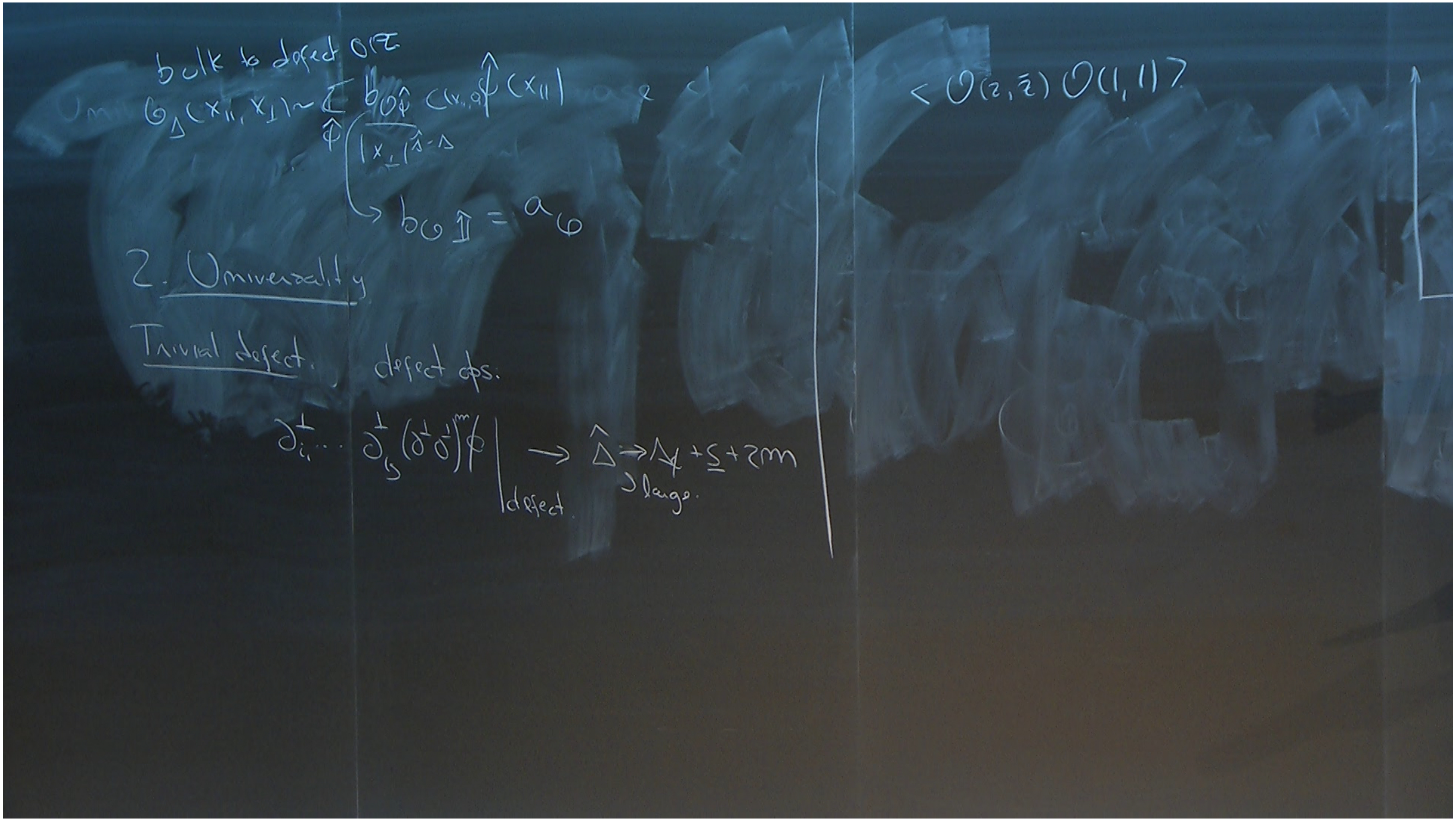

Universality at large transverse spin in defect CFTs
P. Liendo, M. Meineri, S. Sarkar
1. CFTs w/ defects.
2. Universality.
3. Inverting an OPE.
4. Outlook
1 Setup
CFTs in d-dims.
p-dim flat defect

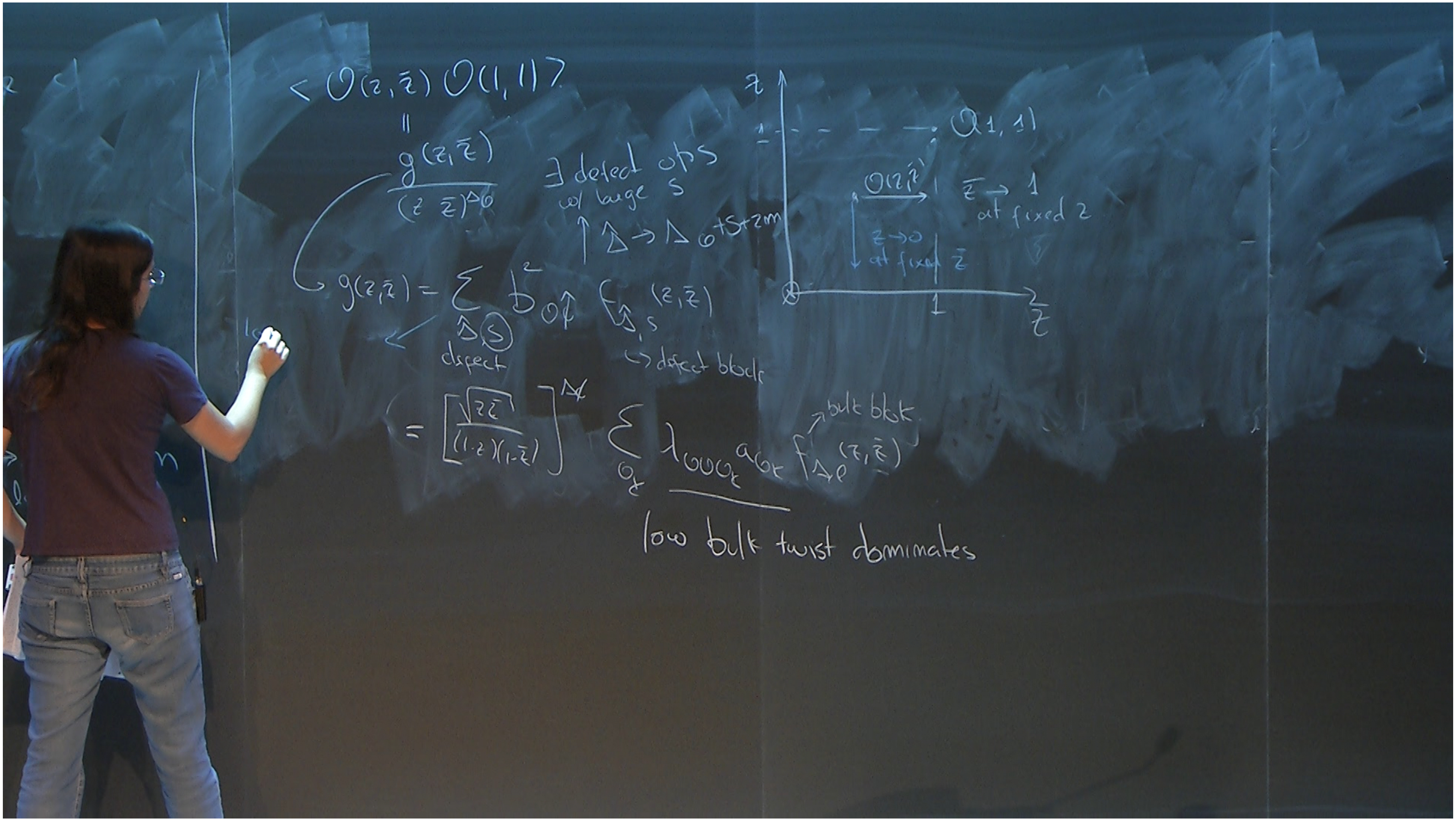

nsverse spin in defect CFTs
1 Setup
CFTs in d-dims.
p-dim flat defect
SO(d+1,1)
SO(d-p) × SO(p+1,1)
codim
conf on defect
codim > 1
s
universality at large s


CFTs in d-dims, on defect:
Ô_i(x) Ô_j(0) ~ Σ λ̂_ijk C(x,∂) Ô_k(0)
k
kinematics
defect conf prim
p-dim flat defect
(Δ̂, l̂, s, ...)
global sym (from defect)
s
Ô
universality at large s
no stress tensor on defect
At large l̂ if ∃ φ̂ ⇒ Δ̂ → 2Δφ̂ + l + 2m
l → ∞
φ̂ □^m ∂_μ1 ... μl φ̂


bulk to defect OPE
spin in defect CFTs
CFTs in d-d
1 Setup
p-dim flat defect
universality at large s
global sy


bulk to defect OPE
spin in defect CFTs
CFTs in d-dims
1. Setup
p-dim flat defect
2. Universality
Trivial defect.
defect ops.
global sym
defect
large
universality
at large s


bulk to defect OPE
$O_\Delta(x_\parallel, x_\perp) \sim \sum_{\hat{\phi}} b_{O\hat{\phi}} \frac{\hat{\phi}(x_\parallel)}{|x_\perp|^{\hat{\Delta}-\Delta}}$
$b_{O\mathbb{1}} = a_O$
2. Universality
Trivial defect.
defect ops.
$\partial^\perp_{i_1} \cdots \partial^\perp_{i_s} (\partial^\perp \partial^\perp)^m \phi \big|_{\text{defect}} \rightarrow \hat{\Delta} \rightarrow \Delta_\phi + s + 2m$
s large.
$\langle O(z,\bar{z})\, O(1,1) \rangle$


∃ defect ops
w/ large s
Δ → Δ_O + s + 2m
Δ̂, s
defect block
bulk block
low bulk twist dominates
at fixed z
at fixed z̄

$\to \Delta_\phi + \underline{s} + 2m$

large.

$$\langle \mathcal{O}(z,\bar z)\,\mathcal{O}(1,1)\rangle = \frac{g(z,\bar z)}{(z\bar z)^{\Delta_\phi}}$$

$\exists$ defect ops w/ large s

$\uparrow \hat\Delta \to \Delta_\phi + s + 2m$

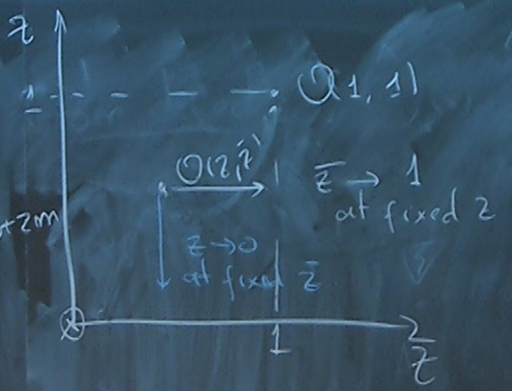
$$g(z,\bar z) = \sum_{\hat\Delta, s} b^2_{\mathcal{O}\hat{\mathcal{O}}}\, \hat f_{\hat\Delta, s}(z,\bar z)$$

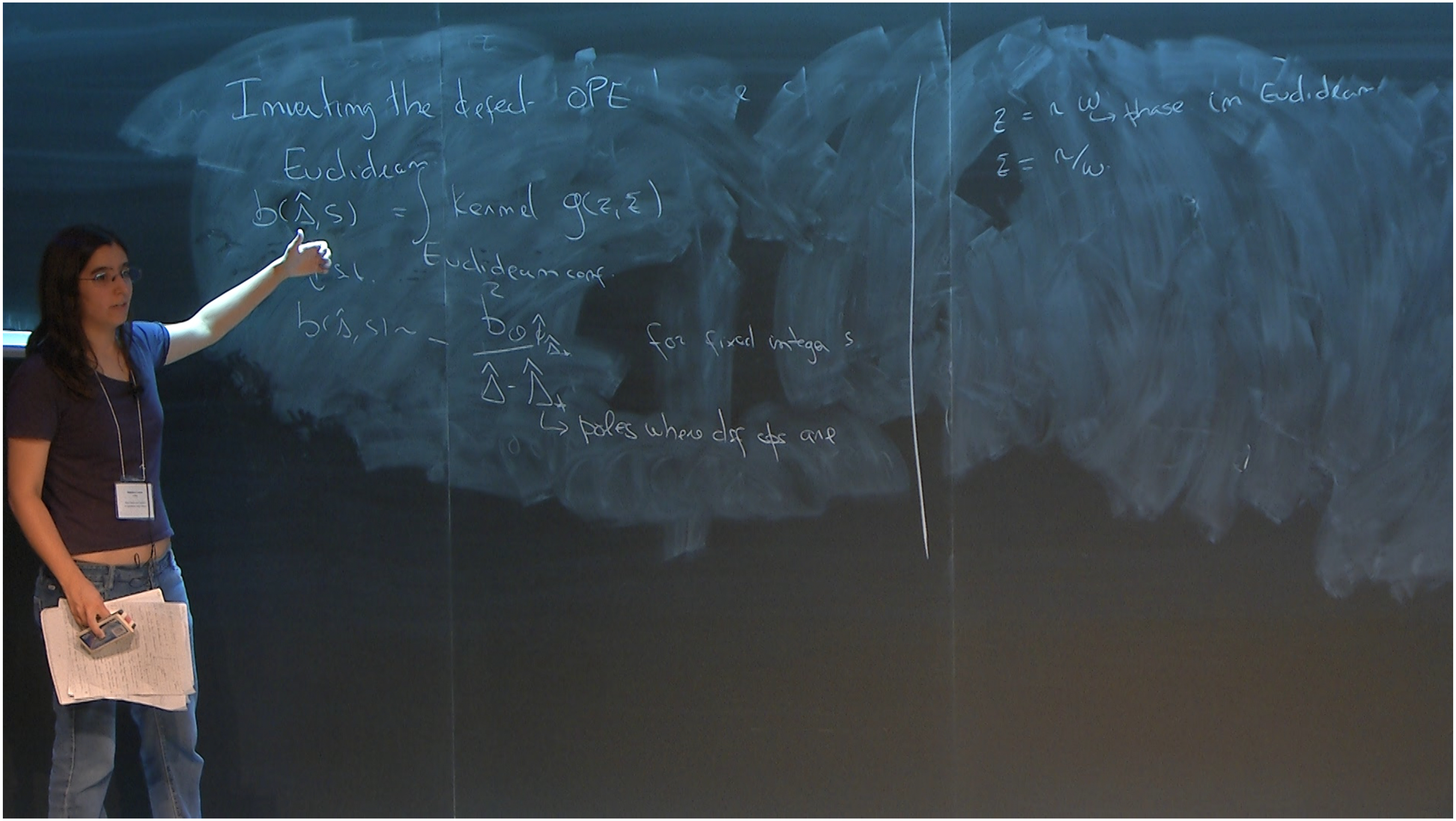
low $\hat\Delta - s$ $\leftarrow$ dspect

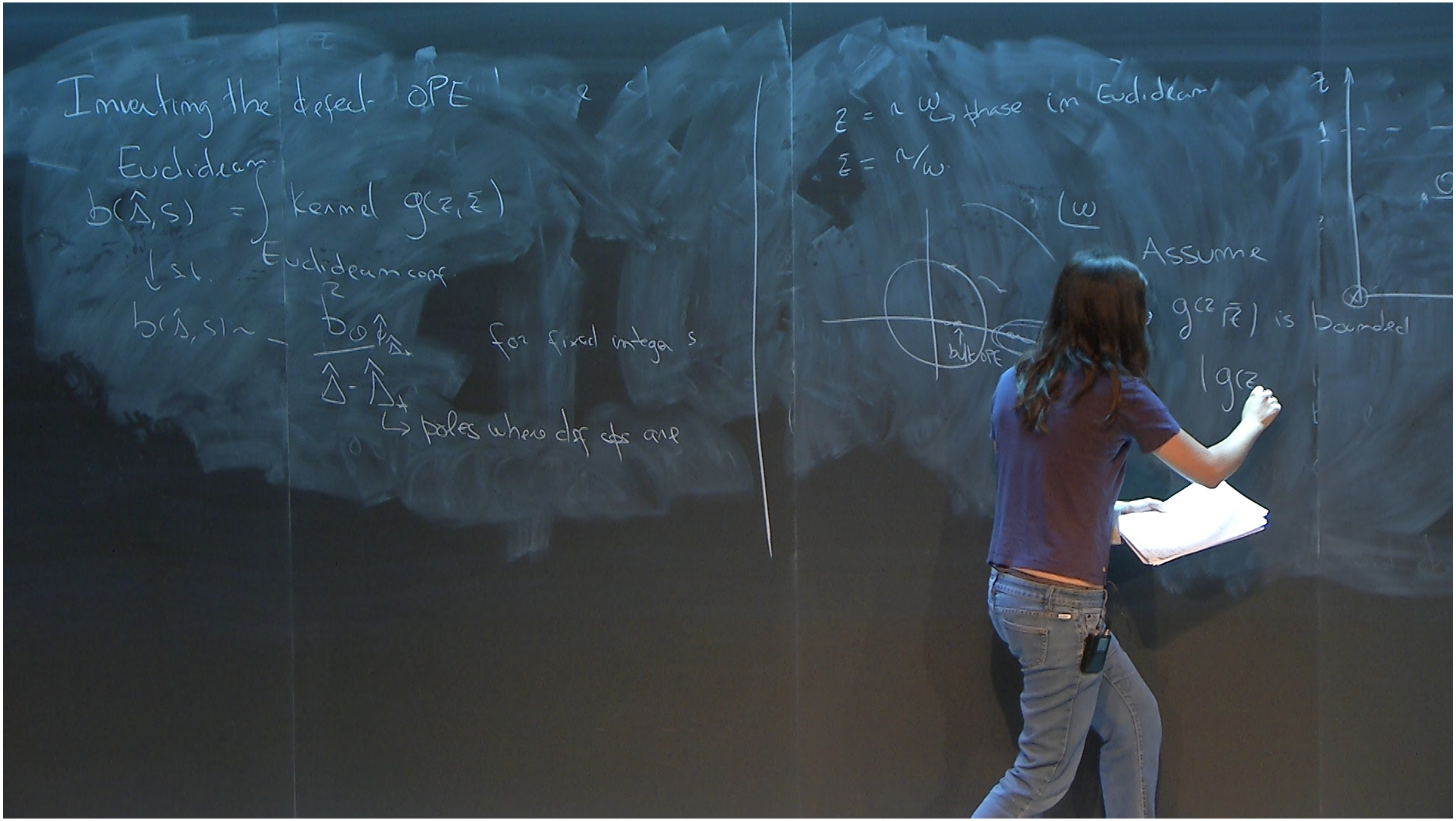
$\hookrightarrow$ defect block

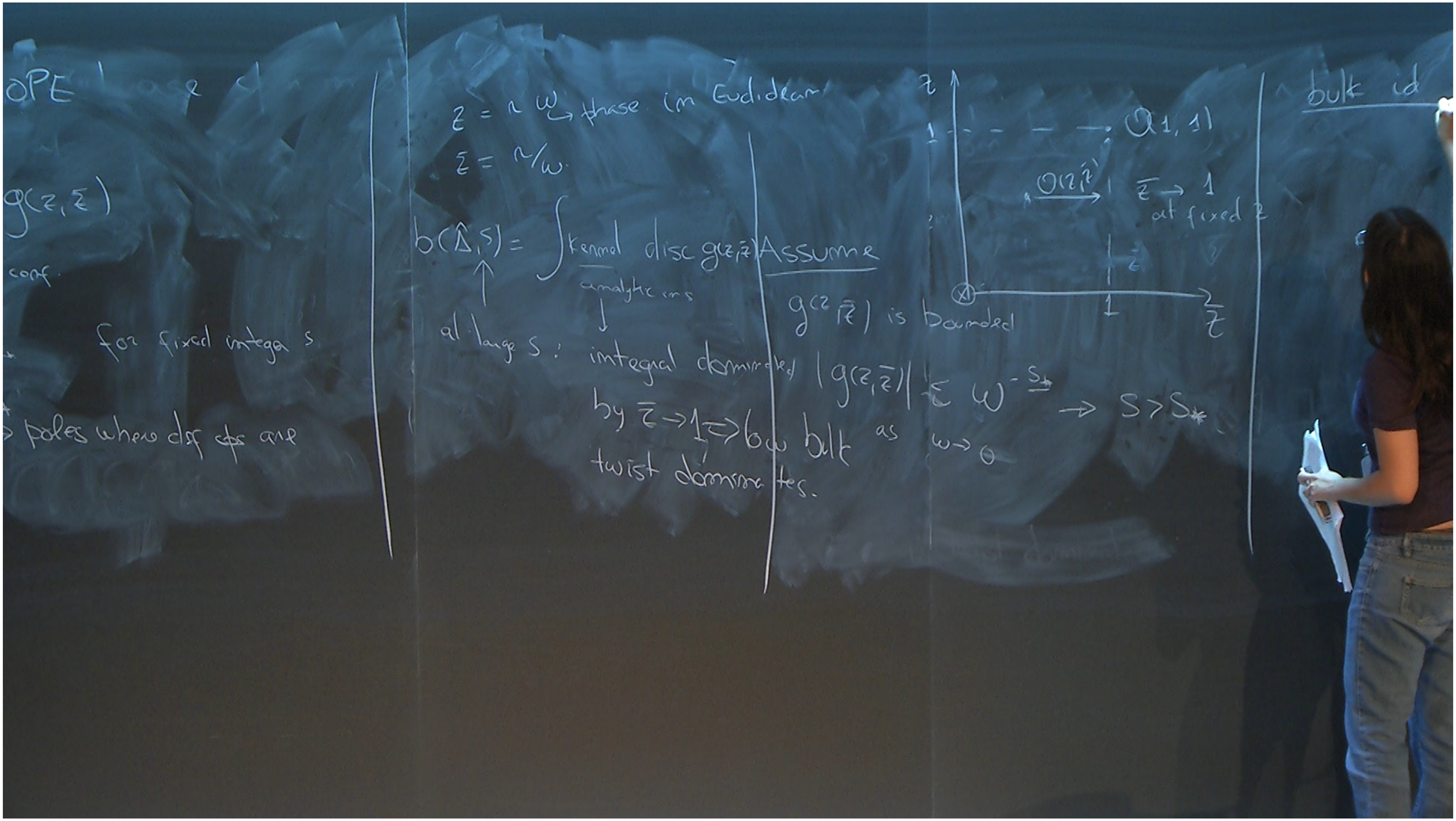
$$= \left[\frac{\sqrt{z\bar z}}{(1-z)(1-\bar z)}\right]^{\Delta_\phi} \sum_{\mathcal{O}_\ell} \underbrace{\lambda_{\mathcal{O}\mathcal{O}\mathcal{O}_\ell}\, a_{\mathcal{O}_\ell}}_{\text{low bulk twist dominates}}\, f_{\Delta, \ell}(z,\bar z)$$

$\to$ large bulk ℓ $\nearrow$ bulk block




Inverting the defect OPE
Euclidean
b(Δ̂, s) = ∫ kernel g(z, z̄)
Euclidean conf.
for fixed integer s
poles when dcf ops are
z̄ = r w
z̄ = r/w


Inverting the defect OPE
Euclidean
b(Δ̂, s) = ∫ kernel g(z, z̄)
Euclidean conf.
b(Δ̂, s) ~
for fixed integer s
poles where dcf ops are
z = r w
phases in Euclidean
z̄ = r/w
Assume
g(z z̄) is bounded
bulk OPE


OPE
g(z, z̄)
conf.
for fixed integer s
poles when dsf ops are
z = r ω phase in Euclidean
z̄ = r/ω
b(Δ, s) = ∫ kernel disc g(z,z̄)
analytic cont
at large s: integral dominated
by z̄ → 1 ⇒ bdy bulk
twist dominates.
Assume
g(z, z̄) is bounded
|g(z,z̄)| ≲ ω^-s*
as ω → 0
→ s > s*
(1, 1)
z̄ → 1
at fixed z
bulk id