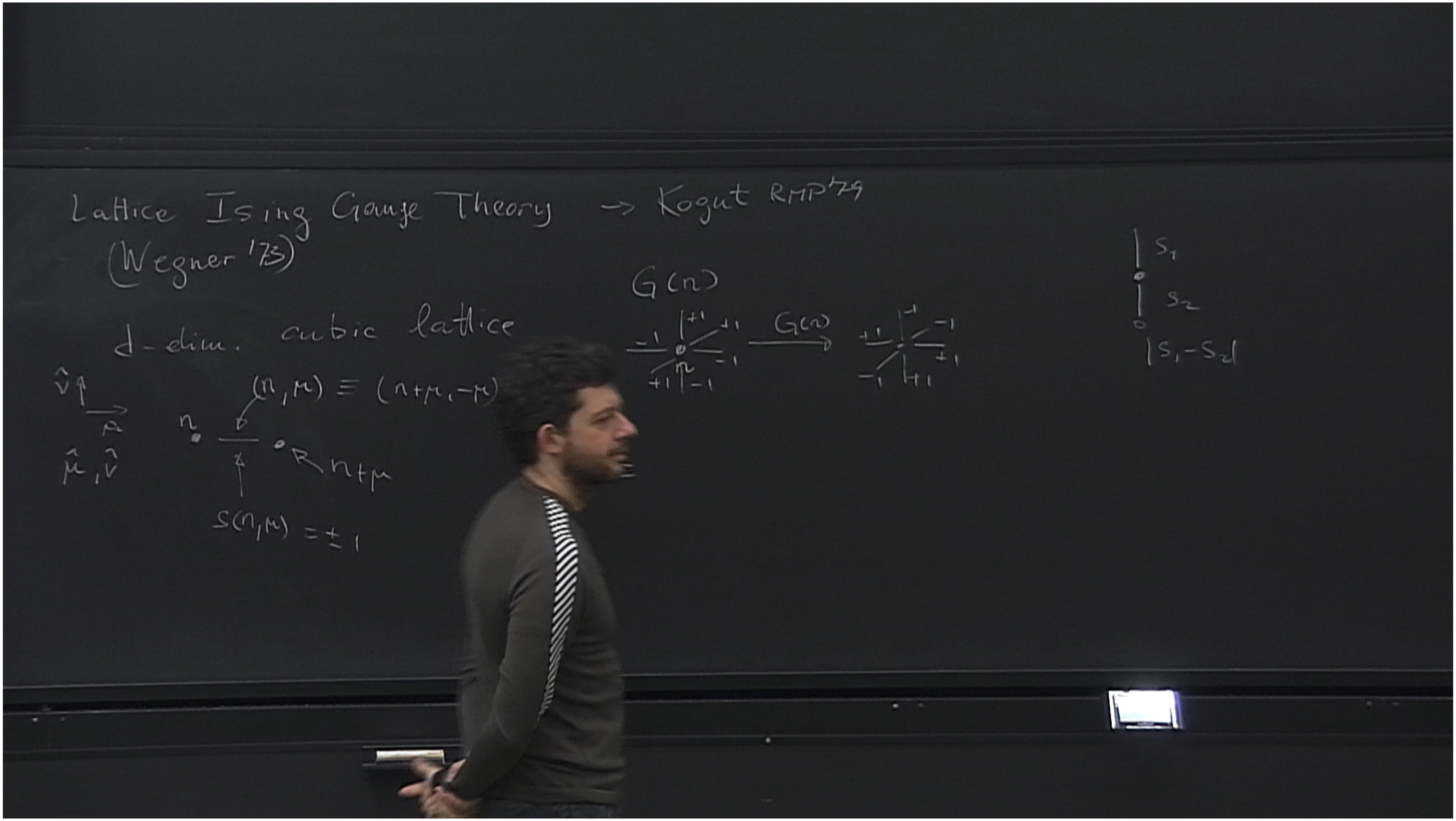
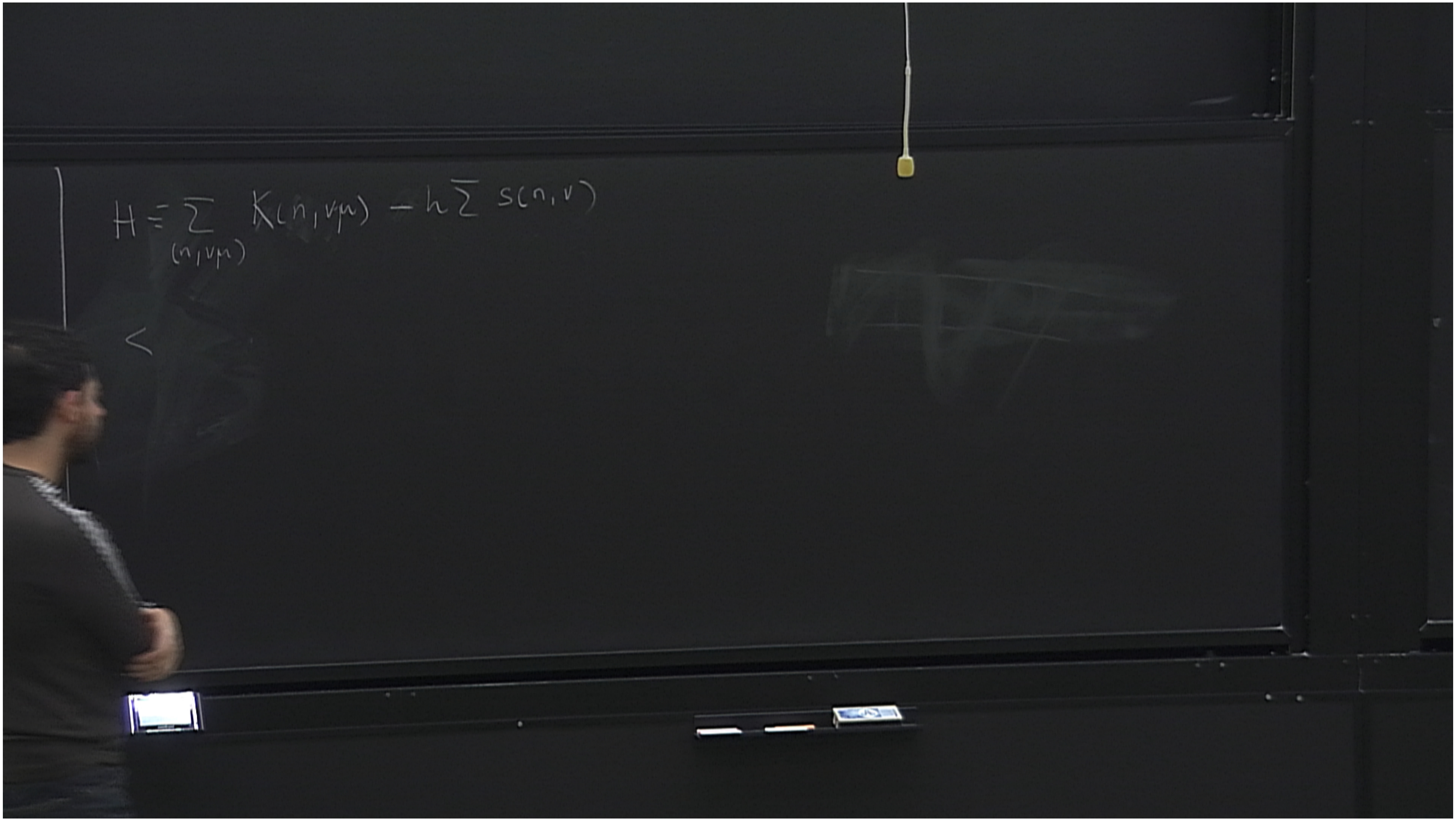
Title: Condensed Matter Review-8

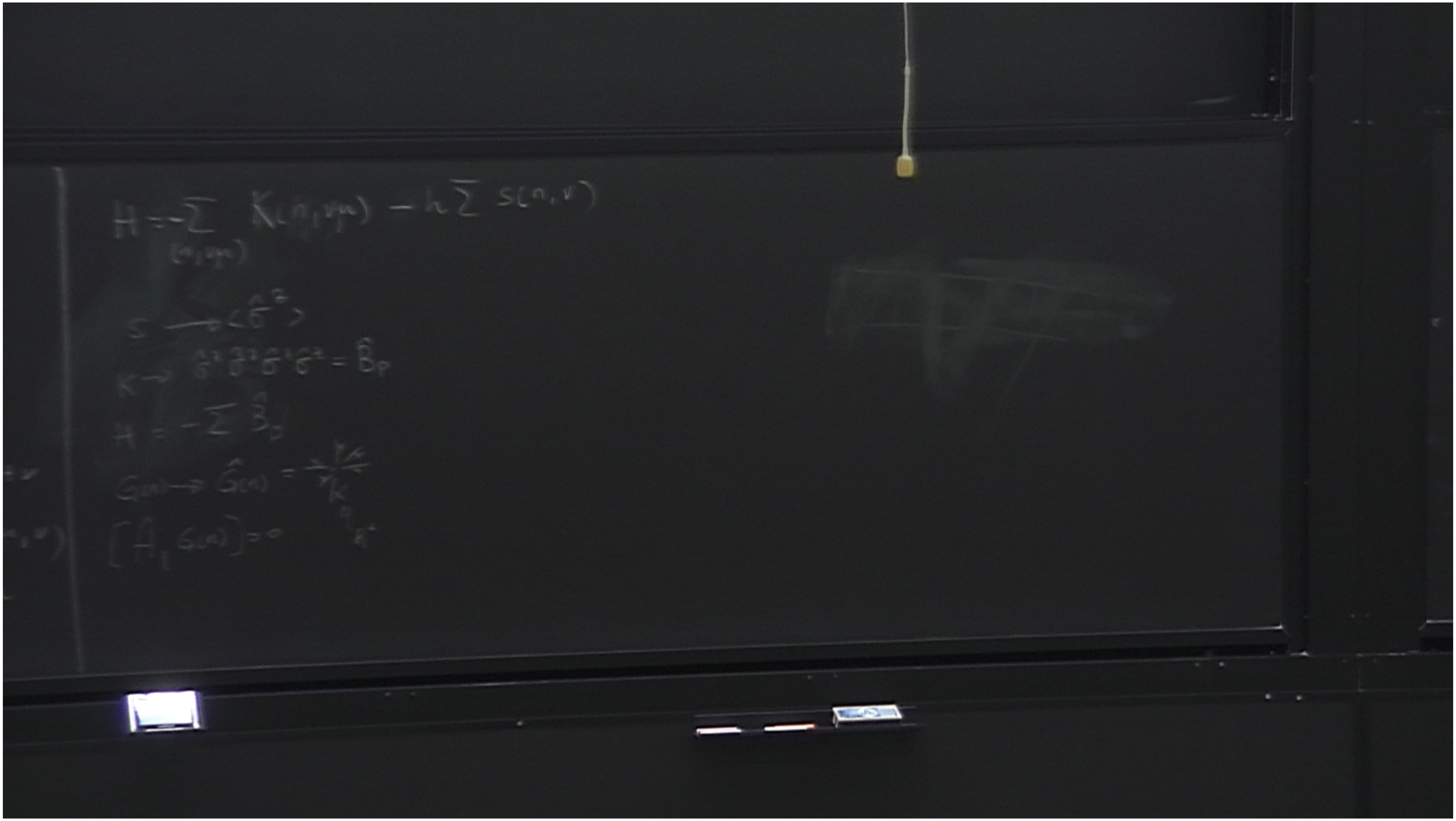
Date: Feb 04, 2015 09:00 AM

URL: http://pirsa.org/15020003

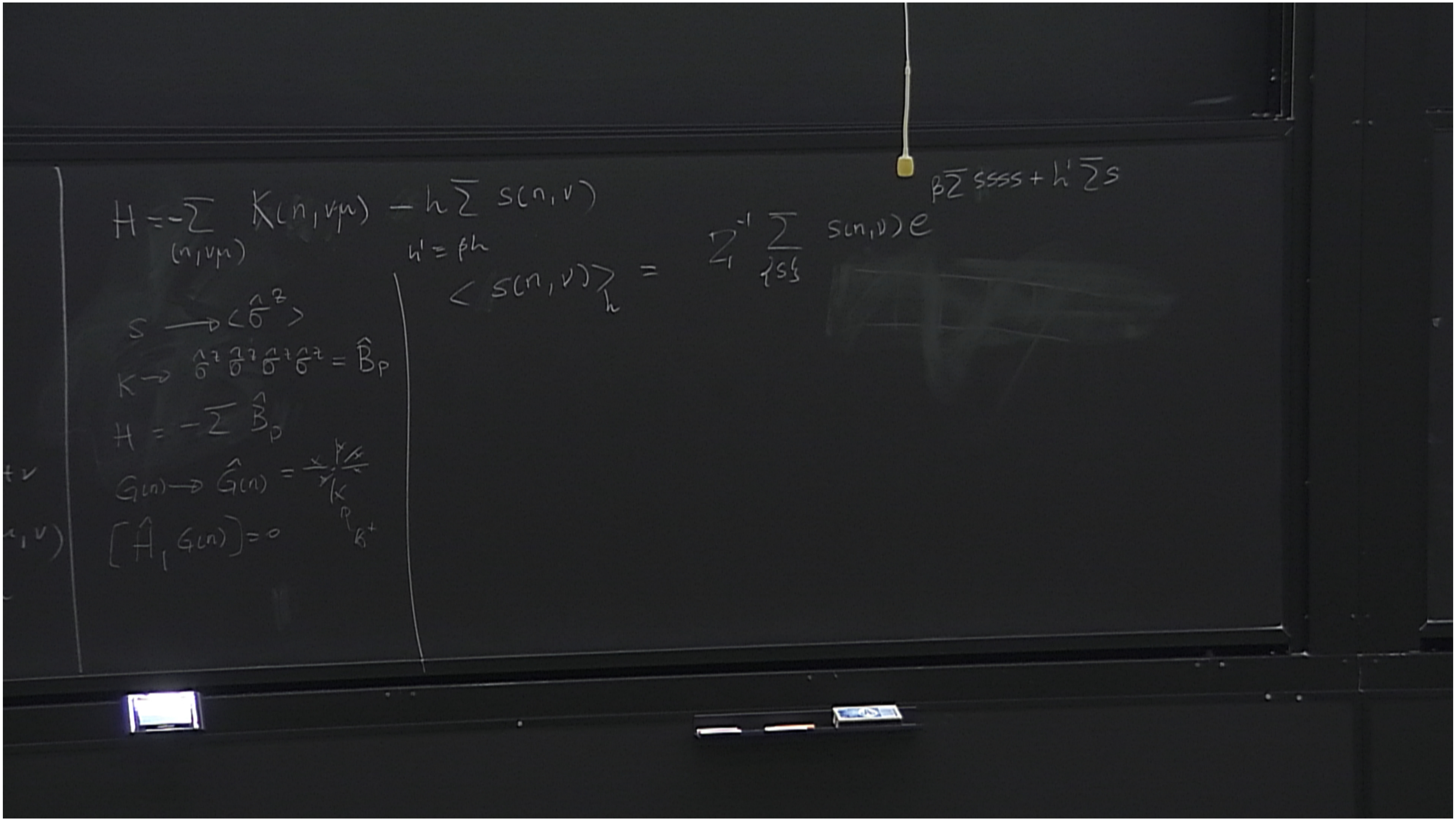
Abstract:

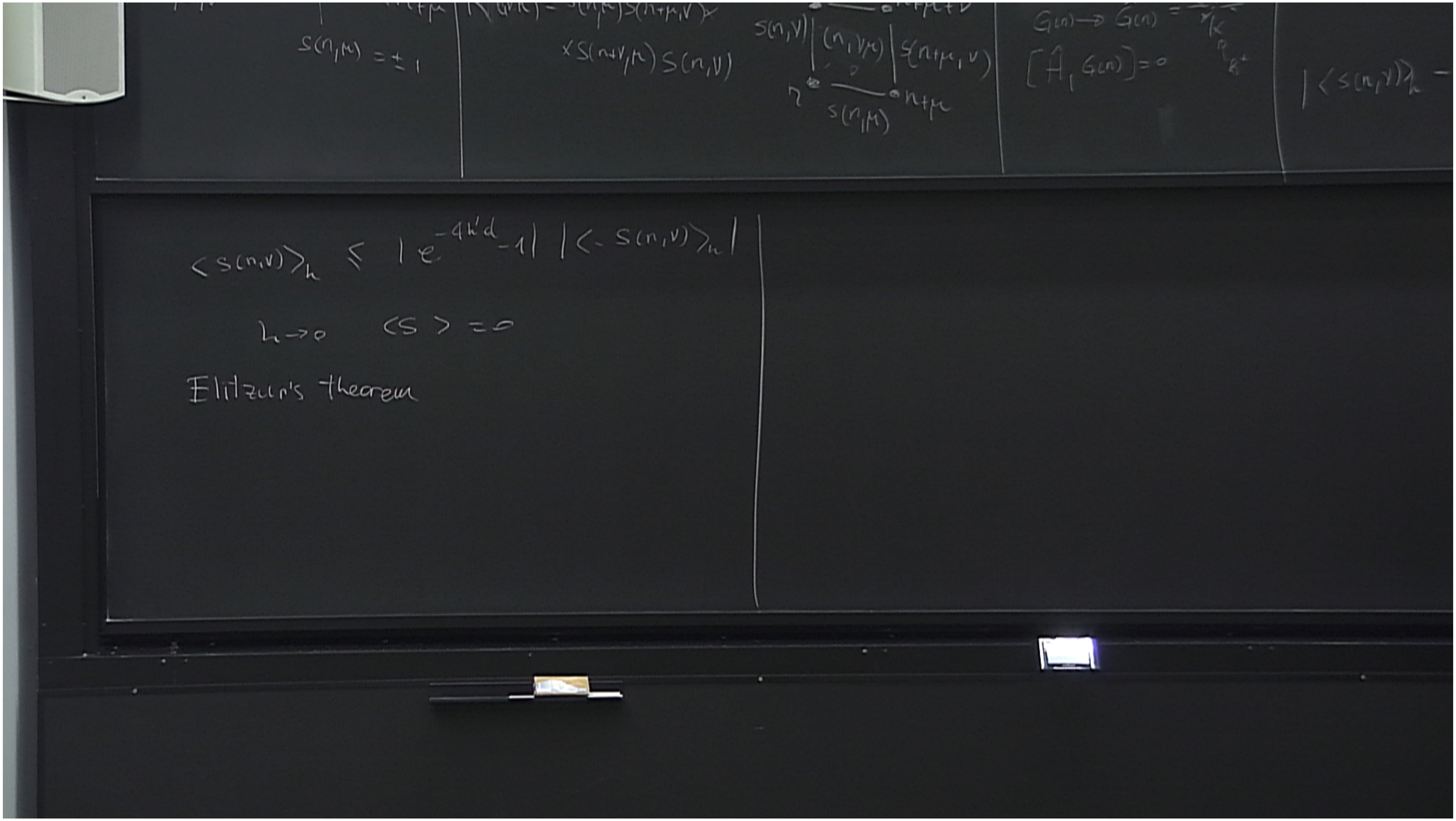

Lattice Ising Gauge Theory → Kogut RMP'79
(Wegner '73)
d-dim. cubic lattice
(n, μ) ≡ (n+μ, −μ)
n+μ
S(n,μ) = ±1
G(n)
|S1−S2|

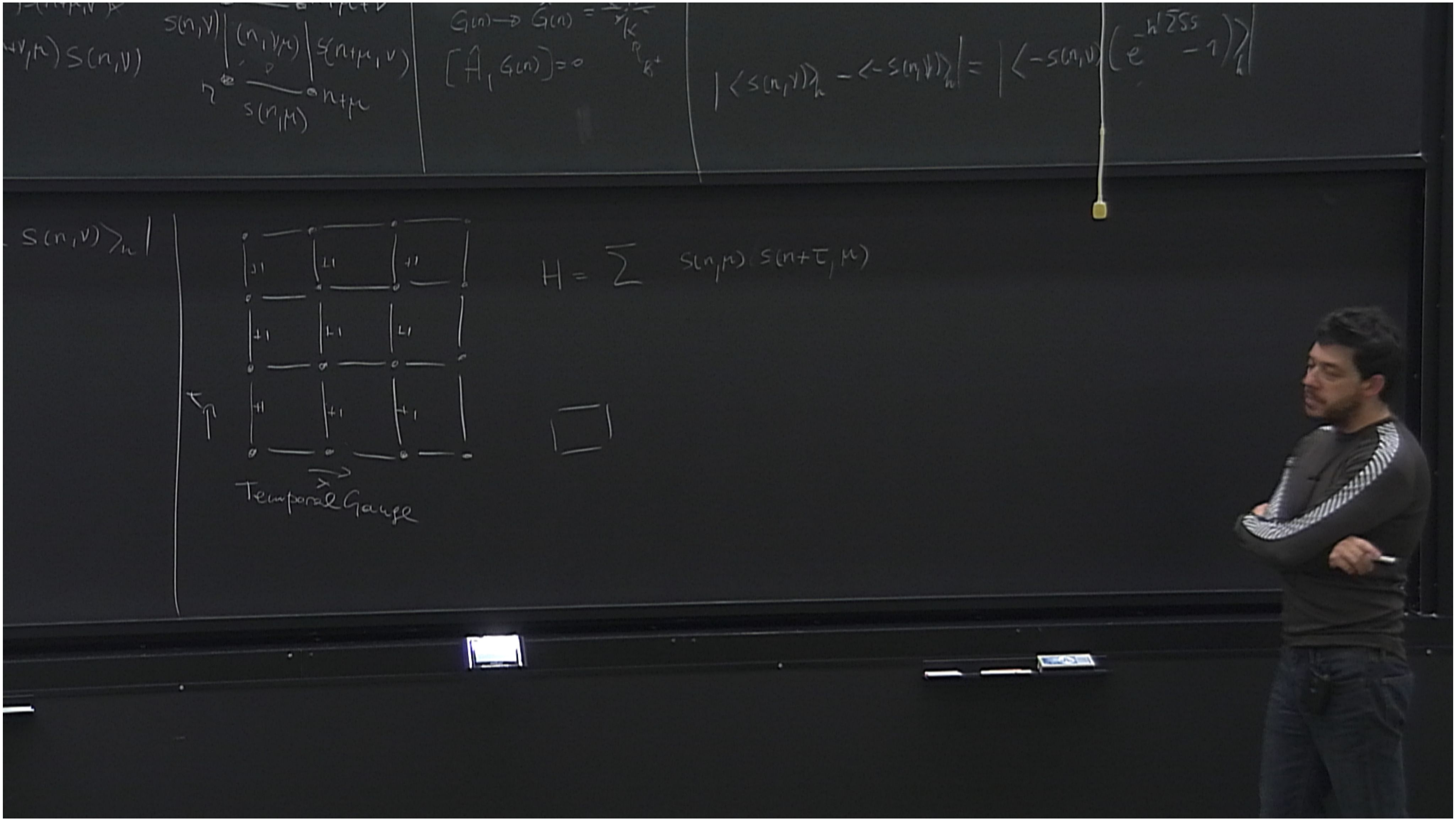

$H = \sum_{(n,\nu\mu)} K(n,\nu\mu) - h \sum s(n,\nu)$
$<$



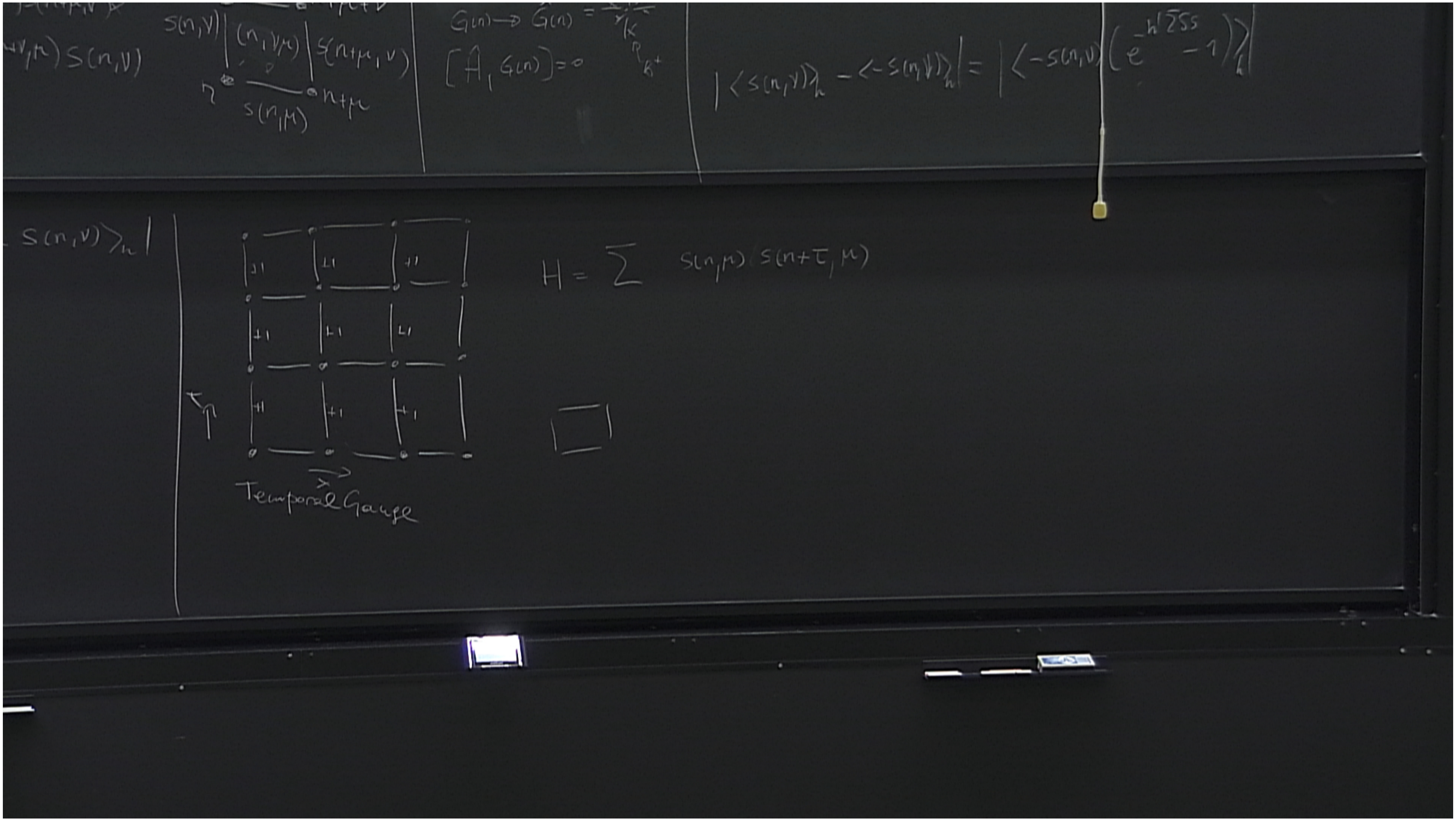
$H = -\sum_{(n,\nu\mu)} K(n,\nu\mu) - h \sum S(n,\nu)$
$S \longrightarrow \langle \hat{\sigma}^z \rangle$
$K \rightarrow \hat{\sigma}^z \hat{\sigma}^z \hat{\sigma}^z \hat{\sigma}^z = \hat{B}_p$
$H = -\sum \hat{B}_p$
$G(n) \rightarrow \hat{G}(n) =$
$[\hat{H}, G(n)] = 0$

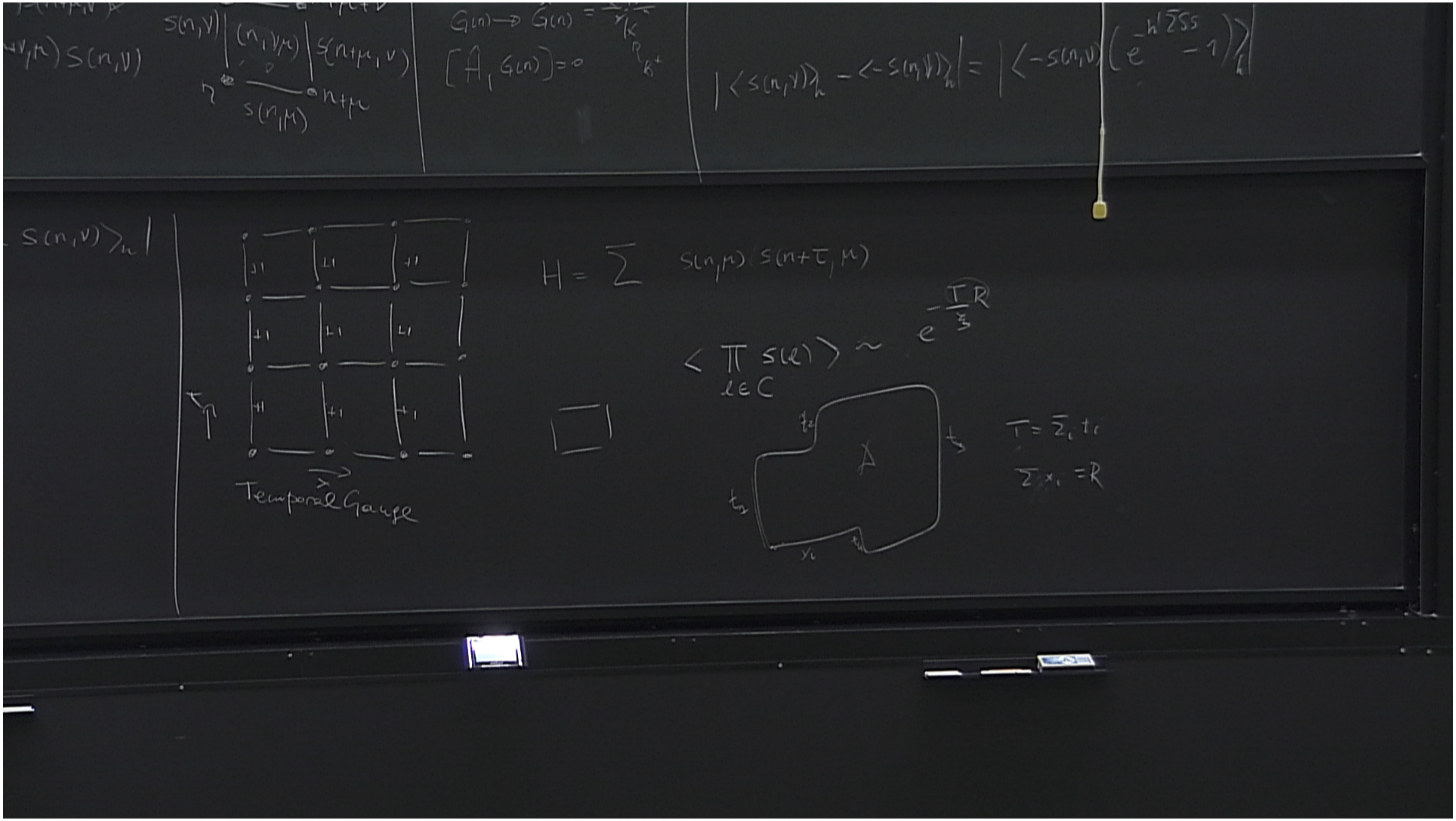

$H = -\sum_{(n,\nu\mu)} K(n,\nu\mu) - h\sum s(n,\nu)$
$h' = \beta h$
$\langle s(n,\nu)\rangle_h = Z^{-1}\sum_{\{s\}} s(n,\nu)\, e^{\beta\sum ssss + h'\sum s}$
$S \to \langle \hat{\sigma}^z \rangle$
$K \to \hat{\sigma}^z\hat{\sigma}^z\hat{\sigma}^z\hat{\sigma}^z = \hat{B}_p$
$H = -\sum \hat{B}_p$
$G(n) \to \hat{G}(n) =$
$[\hat{A}_1, G(n)] = 0$


$S(n,\mu) = \pm 1$
$\times S(n+\nu,\mu)\, S(n,\nu)$
$S(n,\nu)$
(n,ν,μ)
$S(n+\mu,\nu)$
n
$n+\mu$
$S(n,\mu)$
$G(n) \to G(n)$
$[\hat{A}, G(n)] = 0$
$|\langle S(n,\nu)\rangle_h$
$\langle S(n,\nu)\rangle_h \leq |e^{-4h'd} - 1|\, |\langle -S(n,\nu)\rangle_h|$
$h \to 0 \quad \langle S \rangle = 0$
Elitzur's theorem



G(n) → G(n) =
[H, G(n)] = 0
H = Σ s(n,μ) s(n+τ, μ)
Temporal Gauge


G(n) → G(n)
[A, G(n)] = 0
H = Σ s(n,μ) s(n+τ,μ)
Temporal Gauge

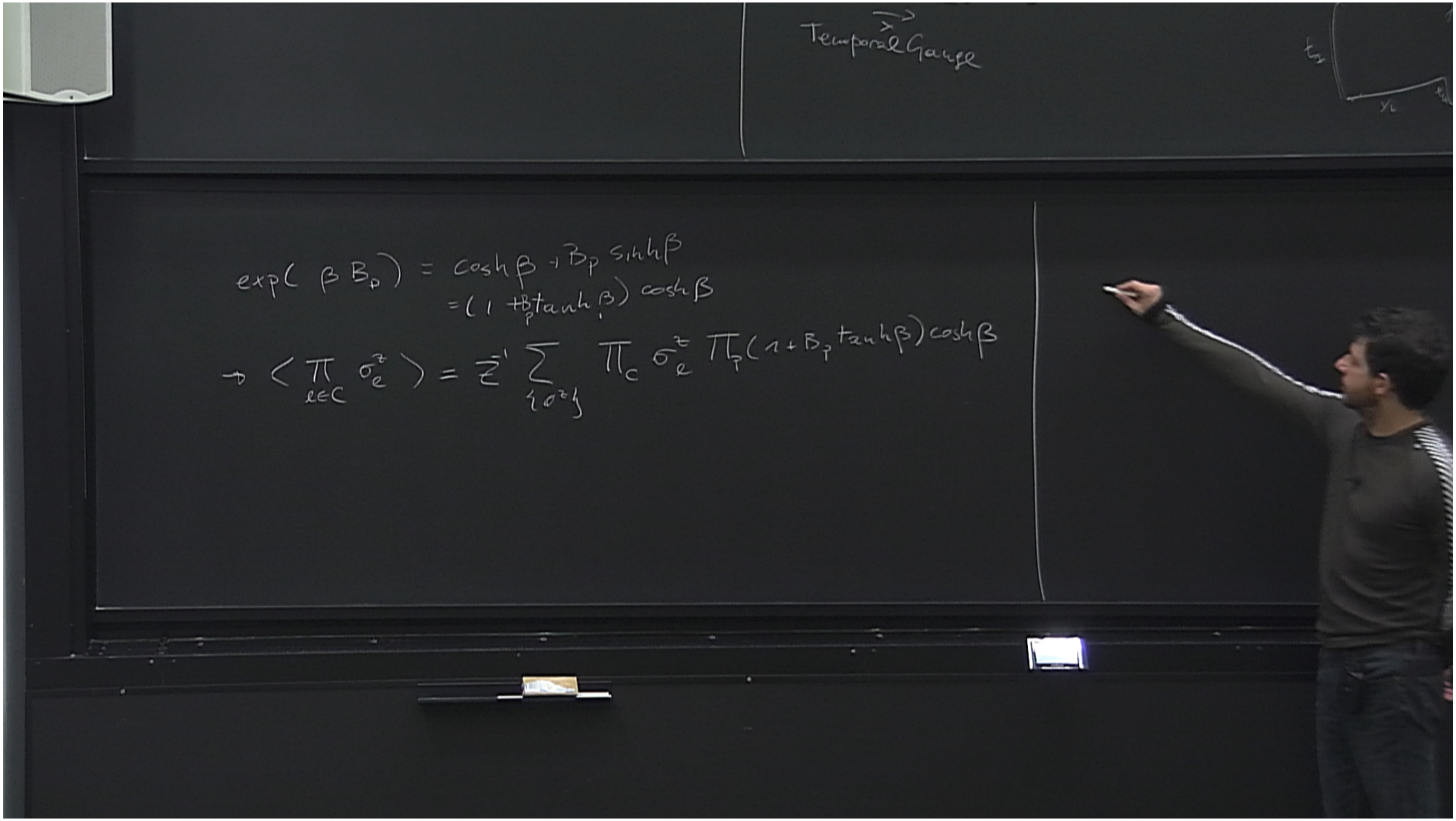

G(n) → G(n)
[A, G(n)] = 0
|⟨s(n,ν)⟩_h − ⟨−s(n,ν)⟩_h| = |⟨−s(n,ν)(e^{−h'Σss} − 1)⟩_h|
H = Σ s(n,μ) s(n+τ,μ)
⟨ Π_{l∈C} s(l) ⟩ ~ e^{−TR/ξ}
T = Σ_i t_i
Σ x_i = R
Temporal Gauge

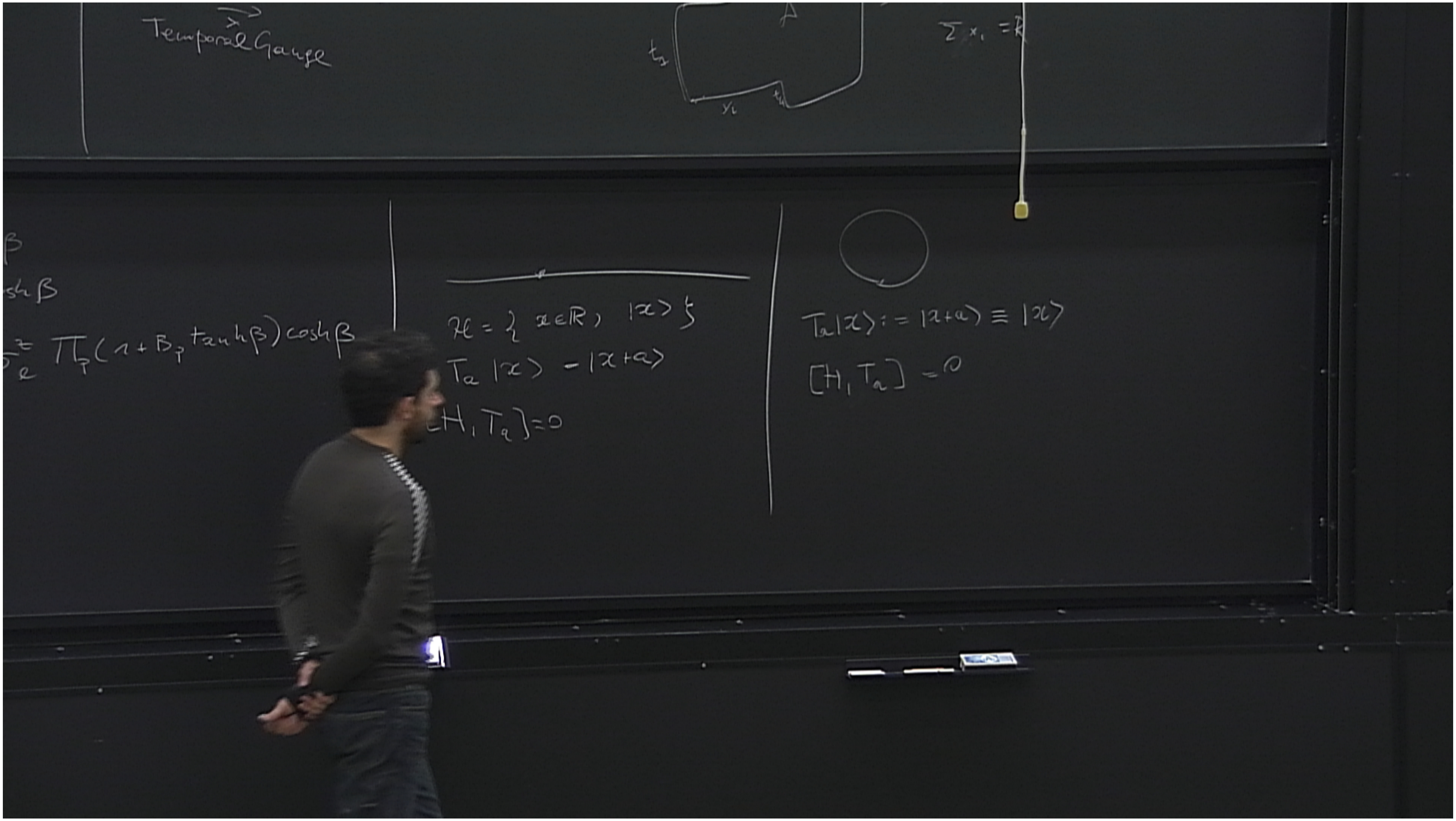
Temporal Gauge

$$\exp(\beta B_p) = \cosh\beta + B_p \sinh\beta$$

$$= (1 + B_p \tanh\beta)\cosh\beta$$

$$\rightarrow \left\langle \prod_{l\in C} \sigma^z_l \right\rangle = Z^{-1} \sum_{\{\sigma^z\}} \prod_C \sigma^z_l \prod_p (1 + B_p \tanh\beta)\cosh\beta$$


Temporal Gauge
$\exp(\beta B_p) = \cosh\beta + B_p \sinh\beta$
$= (1 + B_p \tanh\beta)\cosh\beta$
$\rightarrow \langle \prod_{\ell \in C} \sigma^z_\ell \rangle = Z^{-1} \sum_{\{\sigma^z\}} \prod_C \sigma^z_\ell \prod_p (1 + B_p \tanh\beta)\cosh\beta$


Temporal Gauge
$\Sigma x_i = R$
$\mathcal{H} = \{ x \in \mathbb{R}, |x\rangle \}$
$T_a |x\rangle = |x+a\rangle$
$[H, T_a] = 0$
$T_a|x\rangle := |x+a\rangle \equiv |x\rangle$
$[H, T_a] = 0$