Title: TA Session: Verlinde algebra and 2d TQFT

Speakers: Du Pei

Collection: QFT for Mathematicians

Date: June 21, 2019 - 4:00 PM

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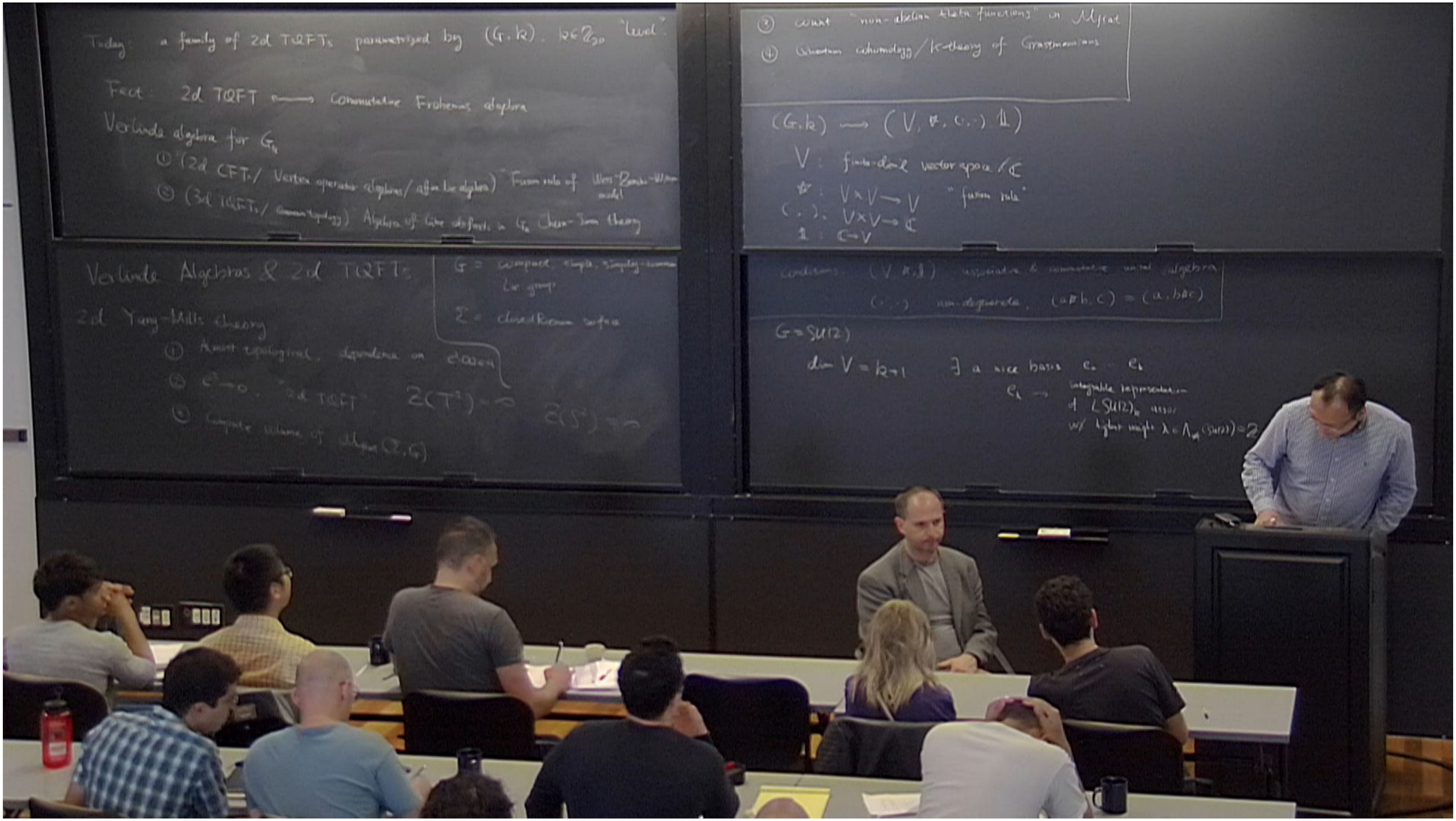
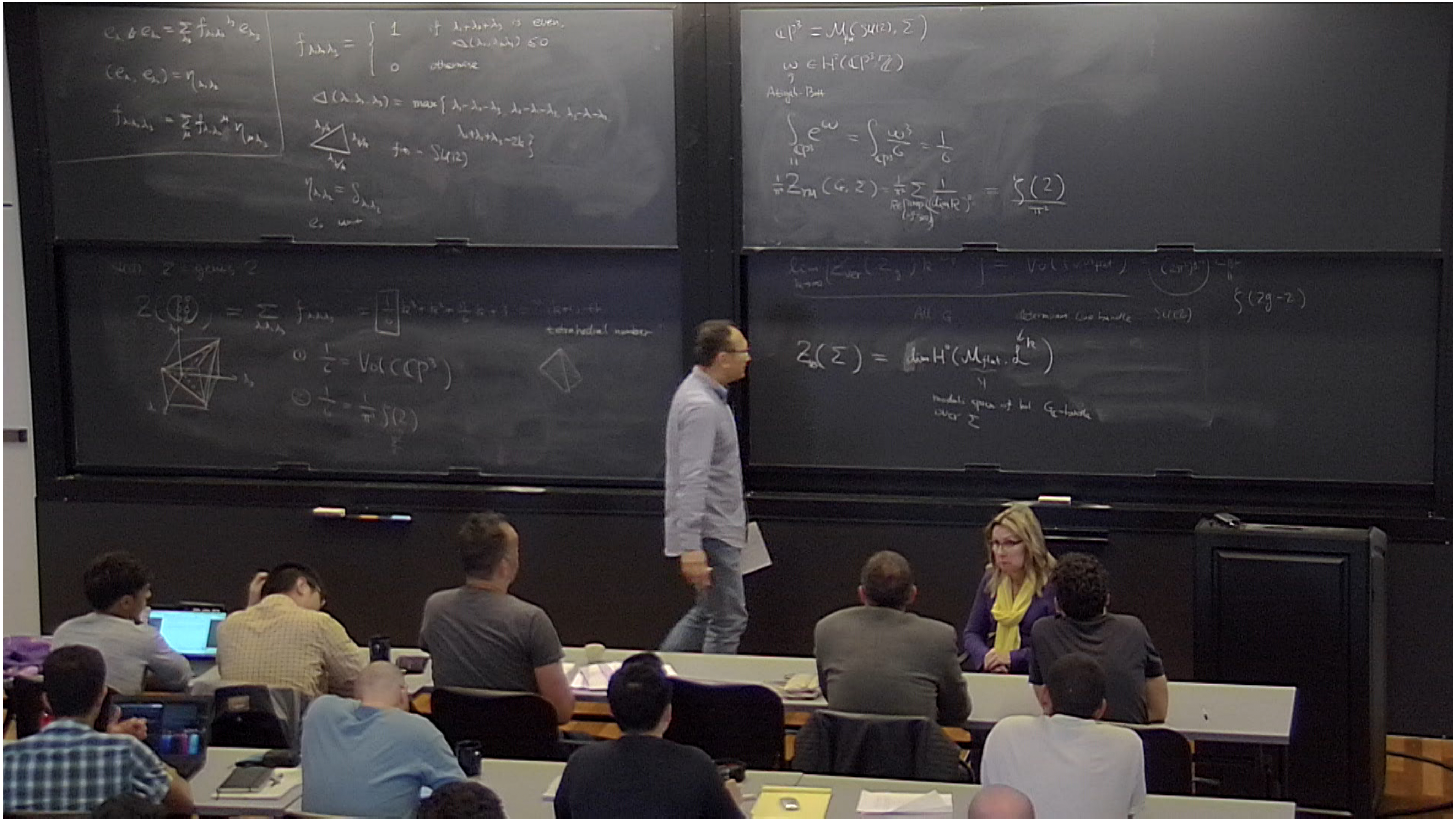
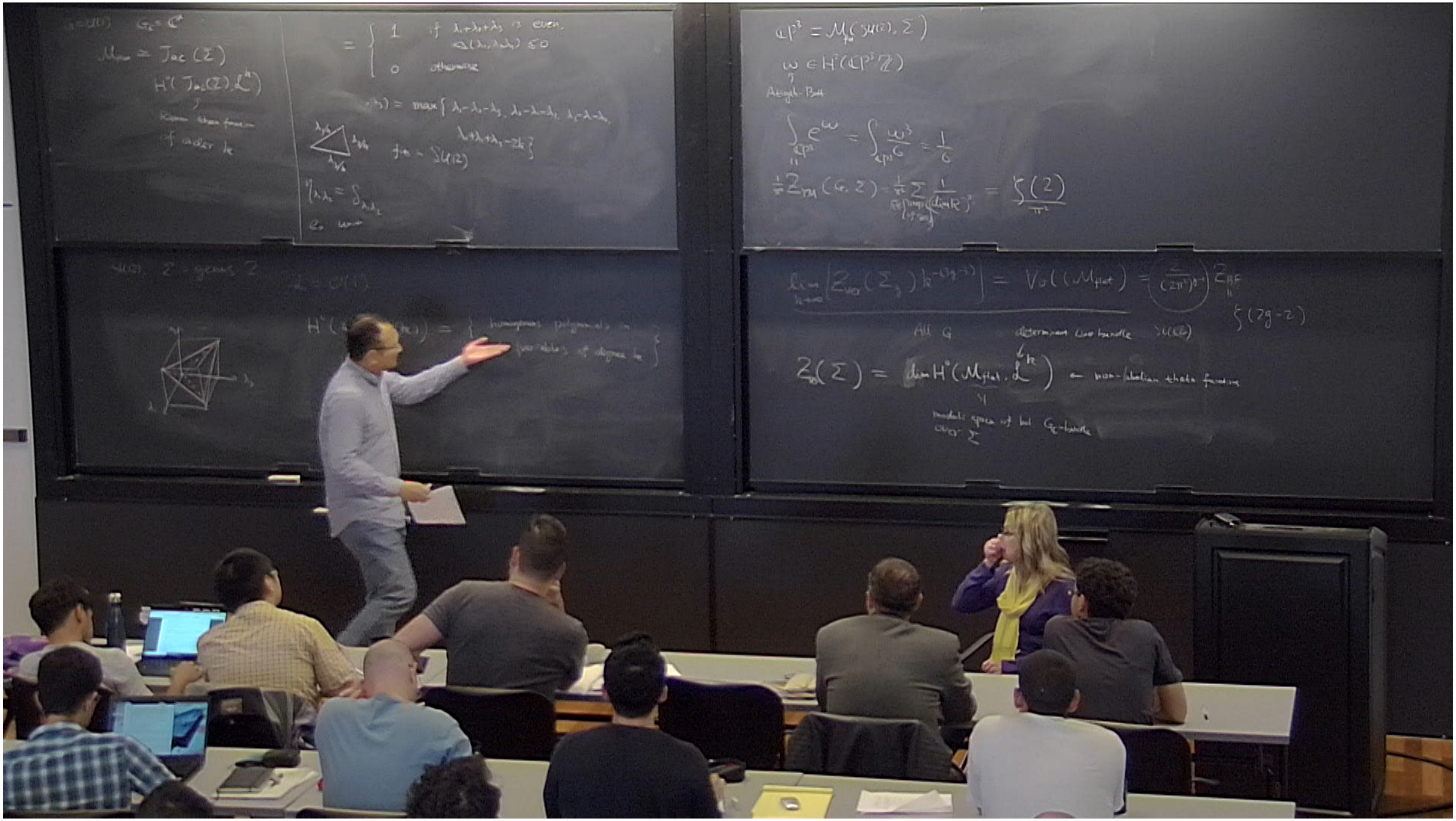
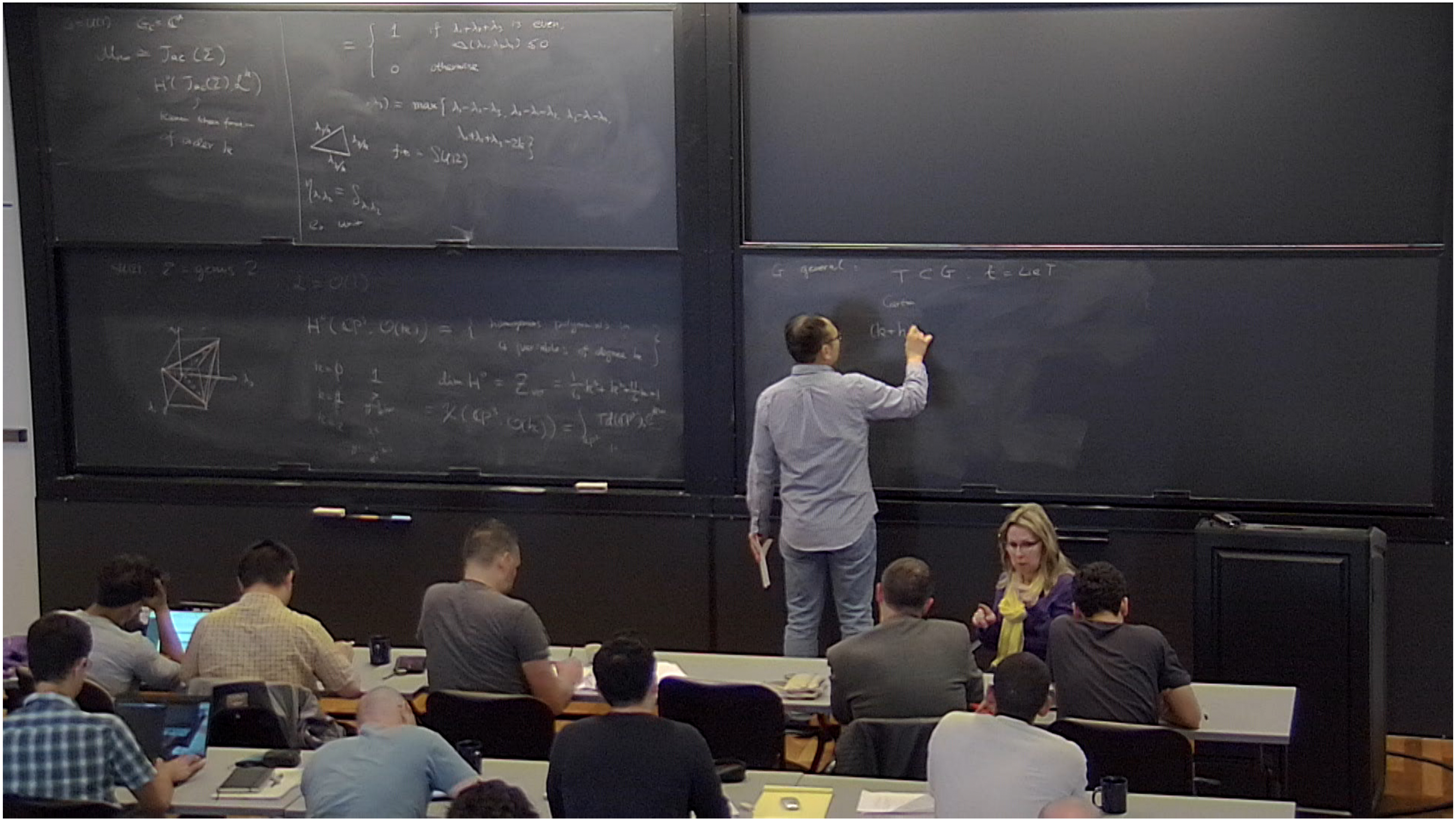
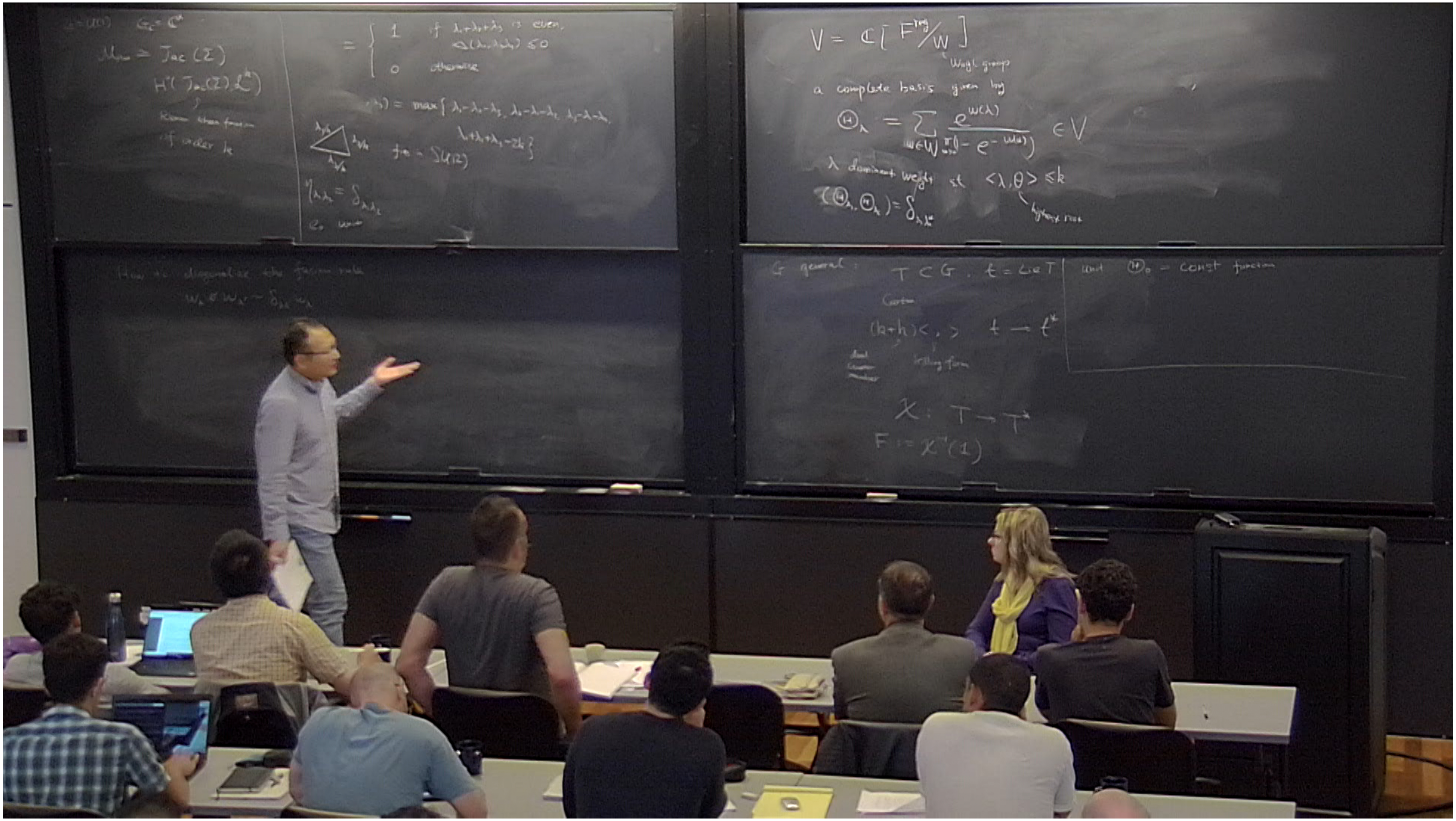

Today: a family of 2d TQFTs parametrized by (G, k). k ∈ Z≥0 "level"
Fact: 2d TQFT ⟷ Commutative Frobenius algebra
Verlinde algebra for G
Verlinde Algebras & 2d TQFTs
2d Yang-Mills theory
G = compact simple simply-connected Lie group
Σ = closed Riemann surface
③ count "non-abelian theta functions" on M
④ Quantum cohomology / K-theory of Grassmannians
(G, k) ⟶ (V, ∗, (·,·), 1)
V: finite-dim'l vector space / C
∗: V × V ⟶ V "fusion rule"
(·,·): V × V ⟶ C
1: C ⟶ V
G = SU(2)
dim V = k+1
∃ a nice basis

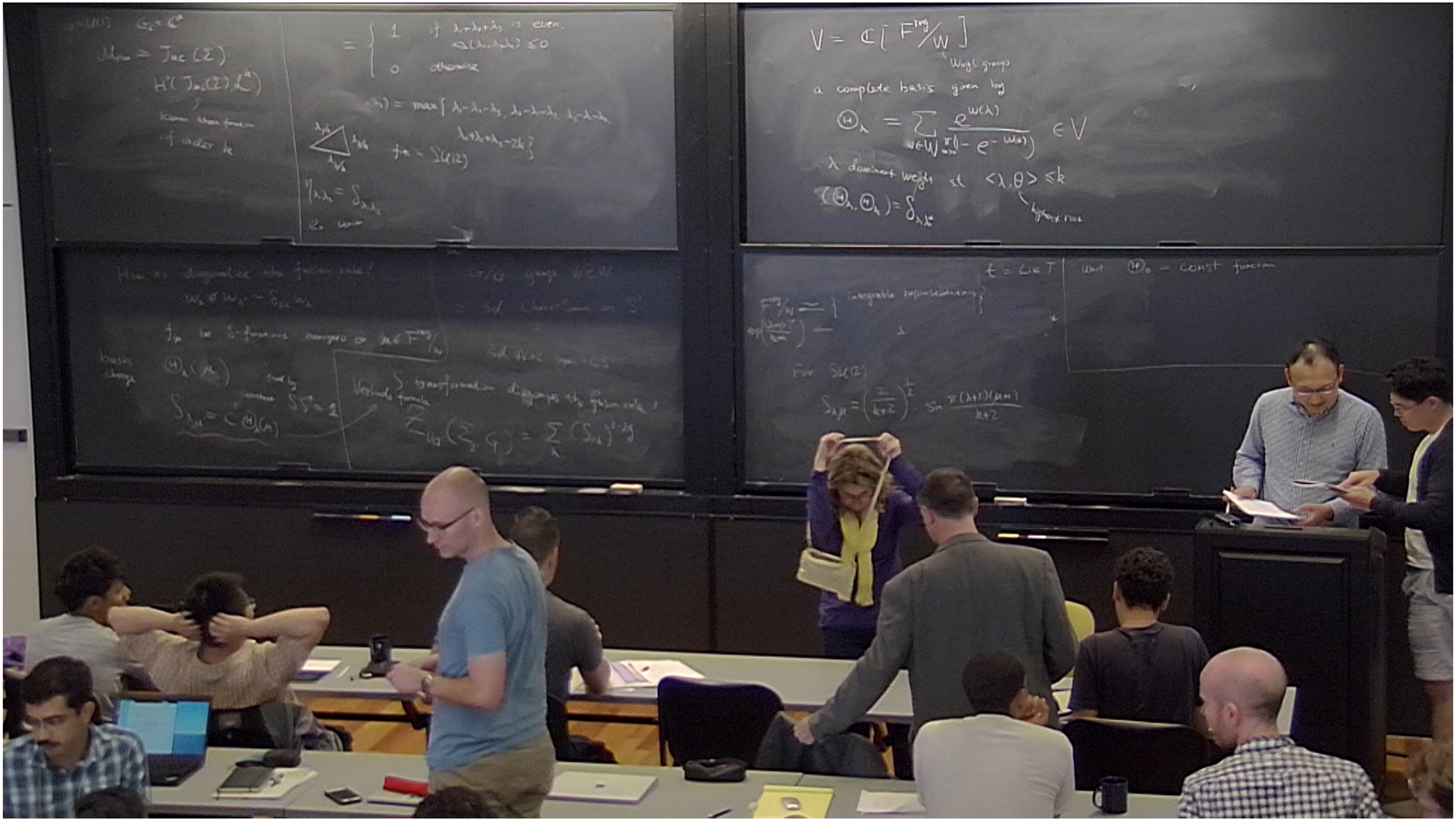



Atiyah-Bott
All G
determinant line bundle
non-abelian theta function
moduli space of flat G-bundle
over Σ





a complete basis given by
Weyl group
λ dominant weight st <λ,θ> ≤ k
highest root
G general : T ⊂ G , t = Lie T
Cartan
killing form
const function
otherwise


V = ℂ[F^reg/W]
Weyl group
a complete basis given by
λ dominant weight st ⟨λ, θ⟩ ≤ k
const function
For SU(2)
otherwise