Title: Holographic Duals for a Class of 3-dimensional N=4 SCFT

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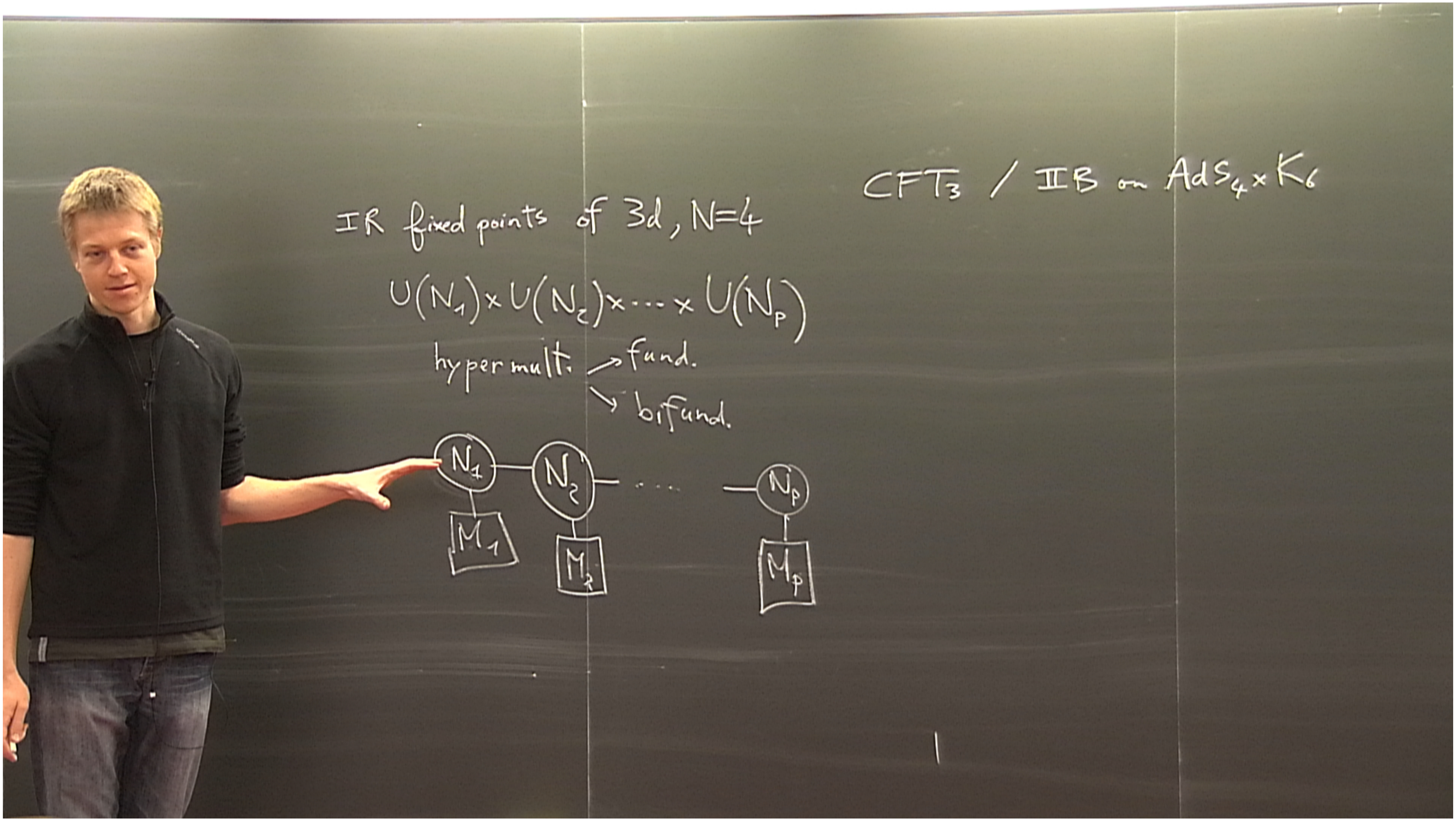
Abstract: I will present a newly found duality between an infinite class of 3-dimensional N=4 gauge theories at their conformal IR fixed point and type IIB string theory solutions. This correspondence gives a new tool to explore the strongly coupled phase of the supersymmetric gauge theories in question.


IR fixed points of 3d, N=4
$U(N_1) \times U(N_2) \times \cdots \times U(N_p)$
hypermult. → fund.
→ bifund.
N_1
N_2
N_p
M_1
M_2
M_p
CFT_3 / IIB on $AdS_4 \times K_6$

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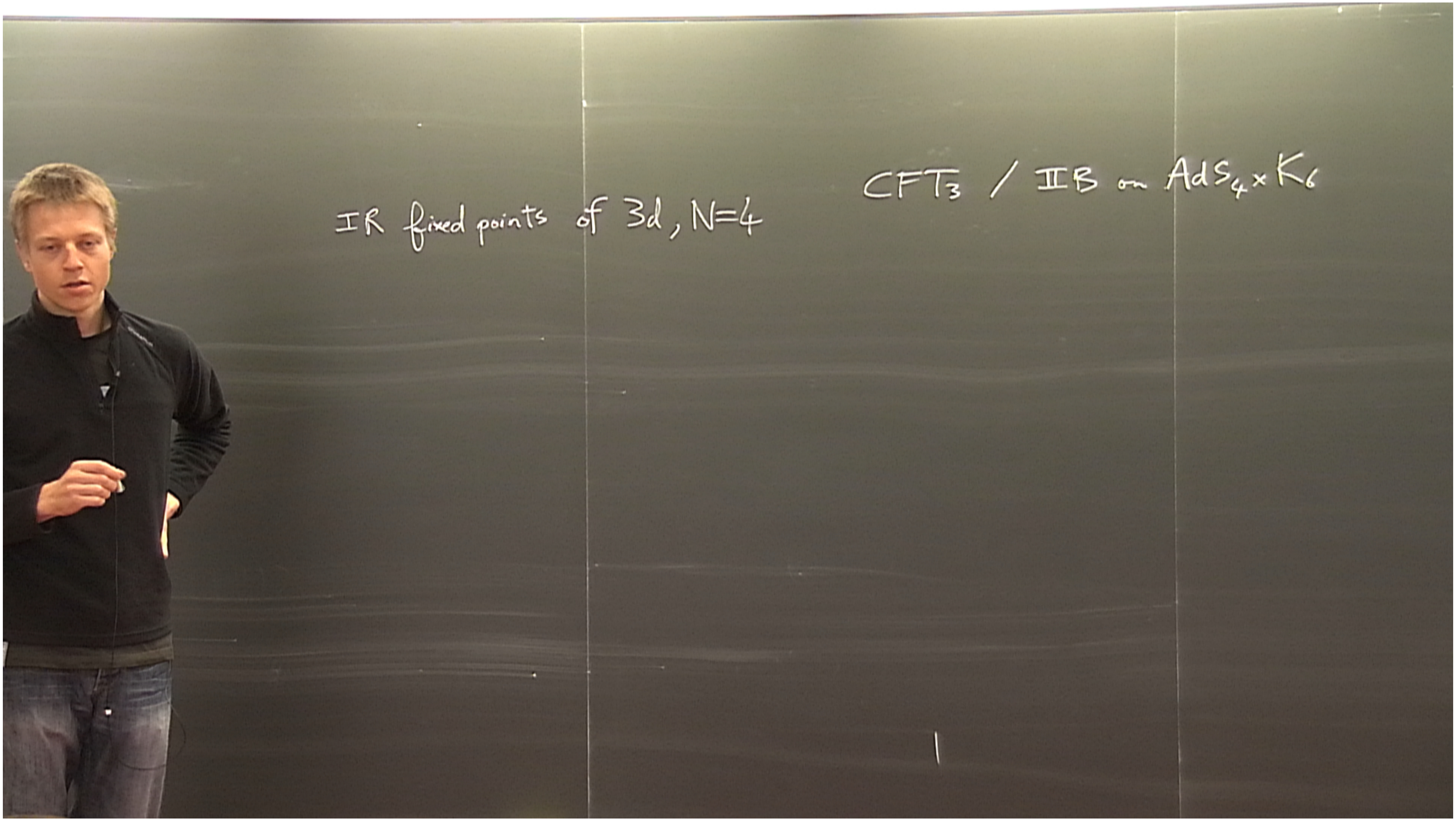
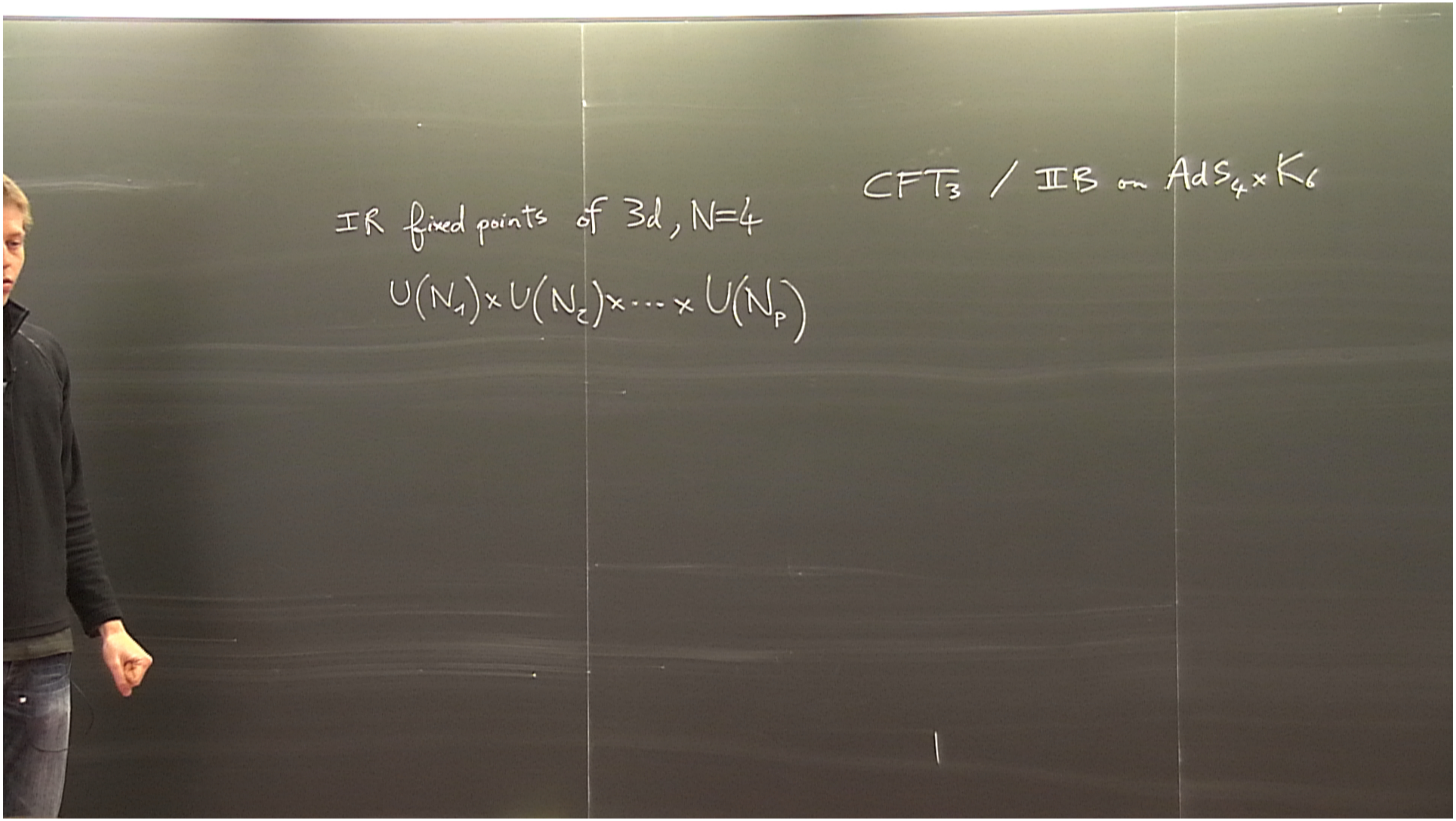
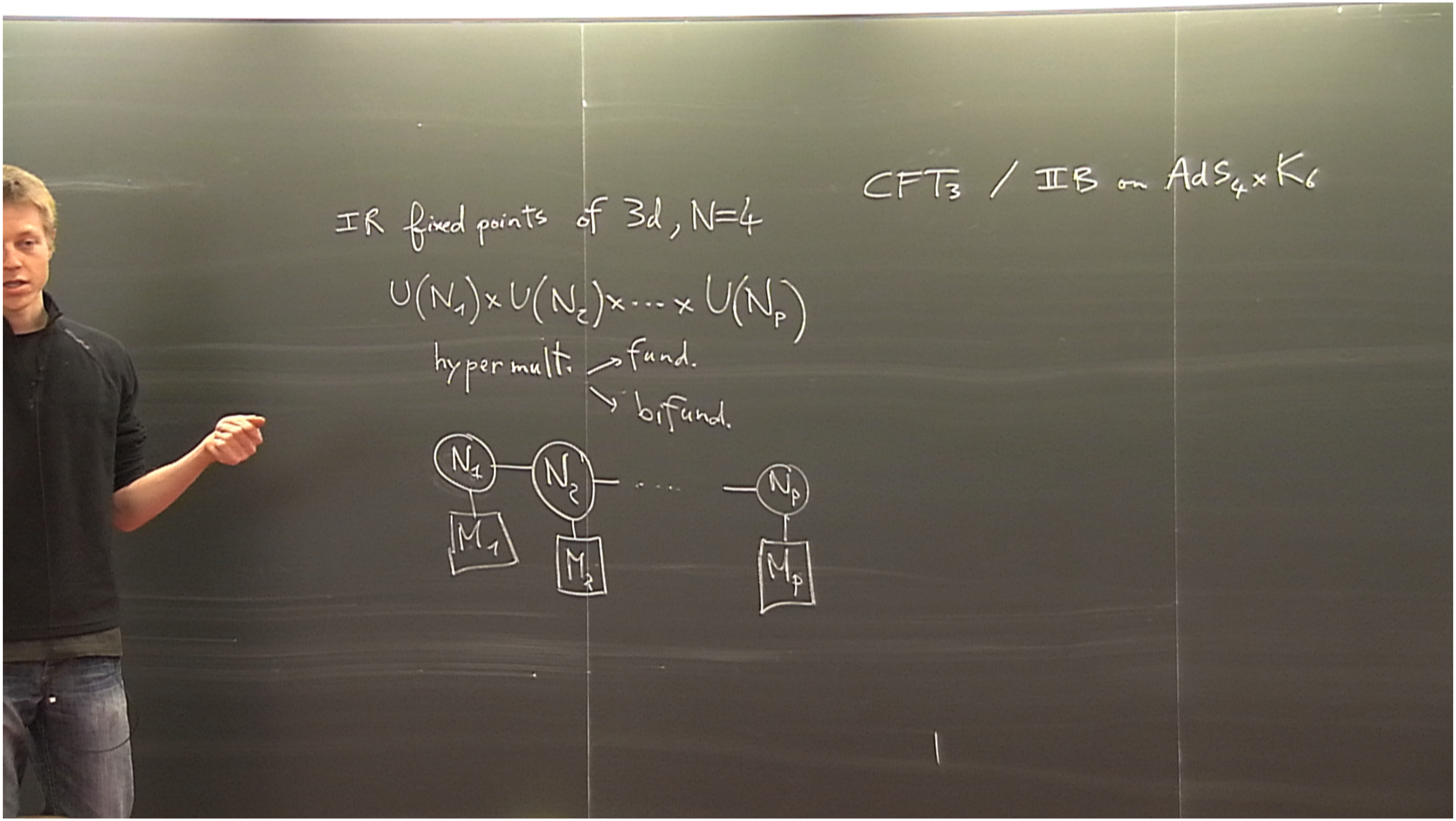

IR fixed points of 3d, N=4
CFT3 / IIB on AdS4 × K6


IR fixed points of 3d, N=4
U(N1) × U(N2) × ··· × U(Np)
CFT3 / IIB on AdS4 × K6


CFT_3 / IIB on $AdS_4 \times K_6$
IR fixed points of 3d, N=4
$U(N_1) \times U(N_2) \times \cdots \times U(N_p)$
hyper mult. → fund.
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N_1
N_2
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M_1
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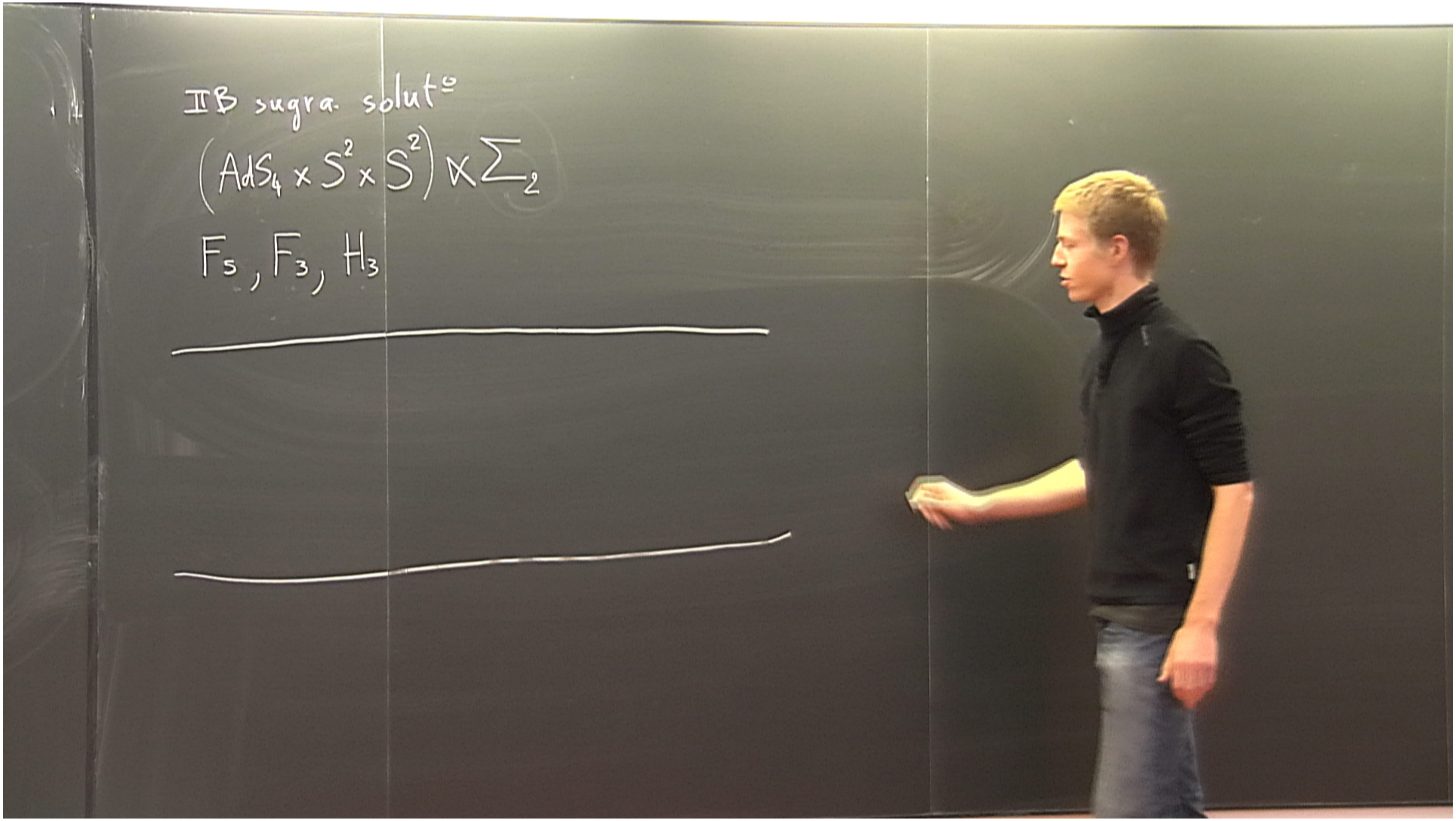
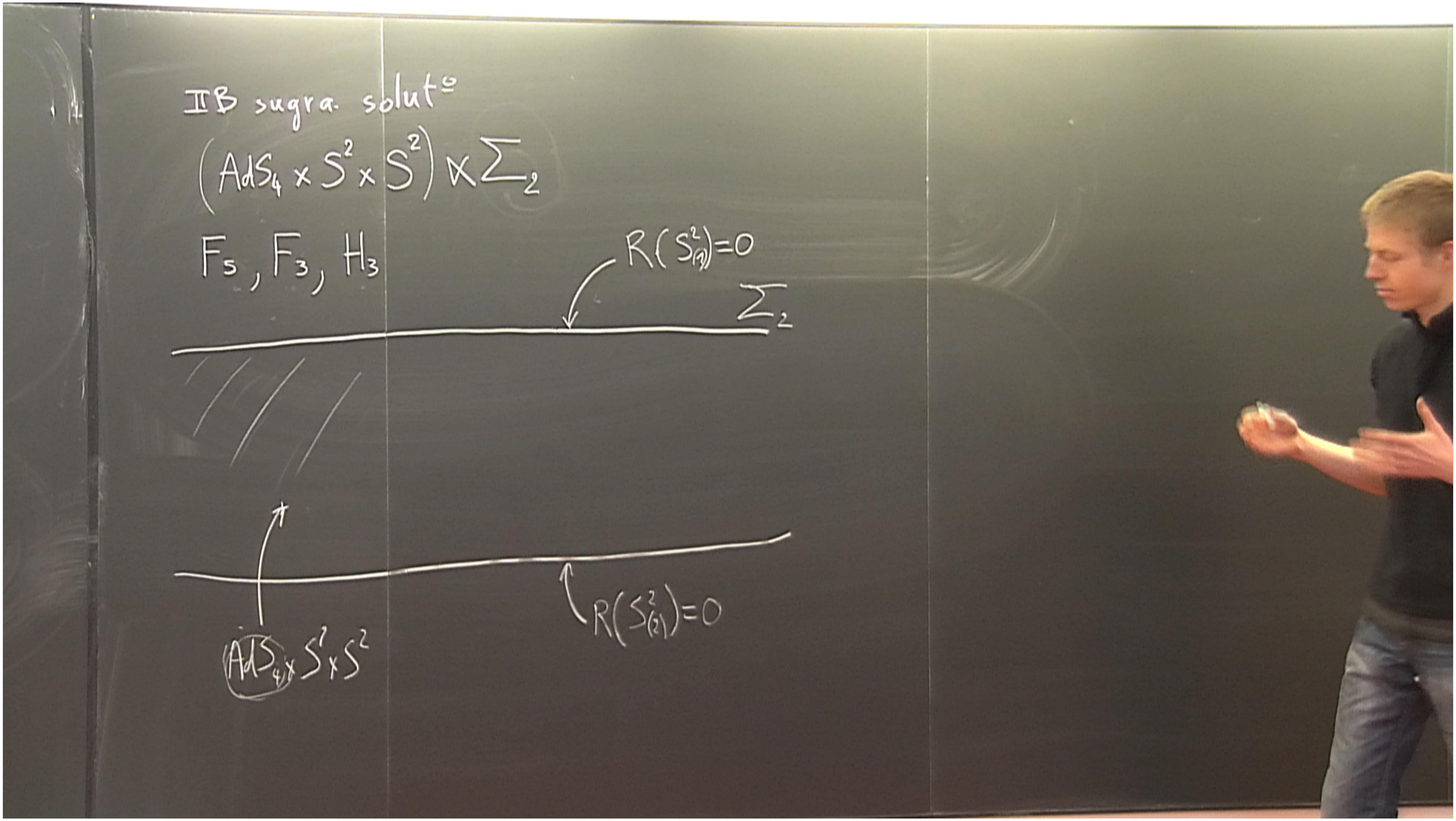
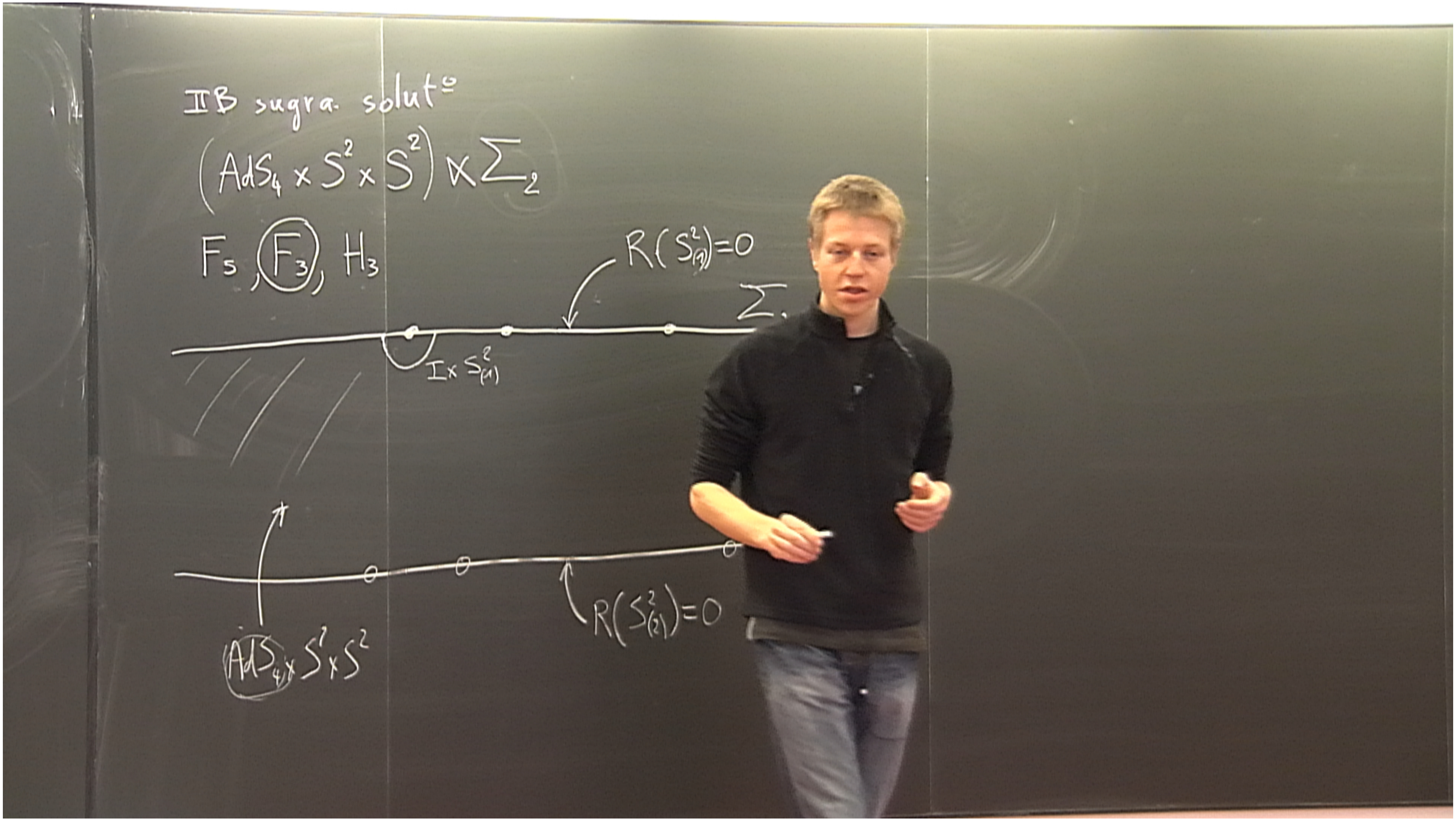
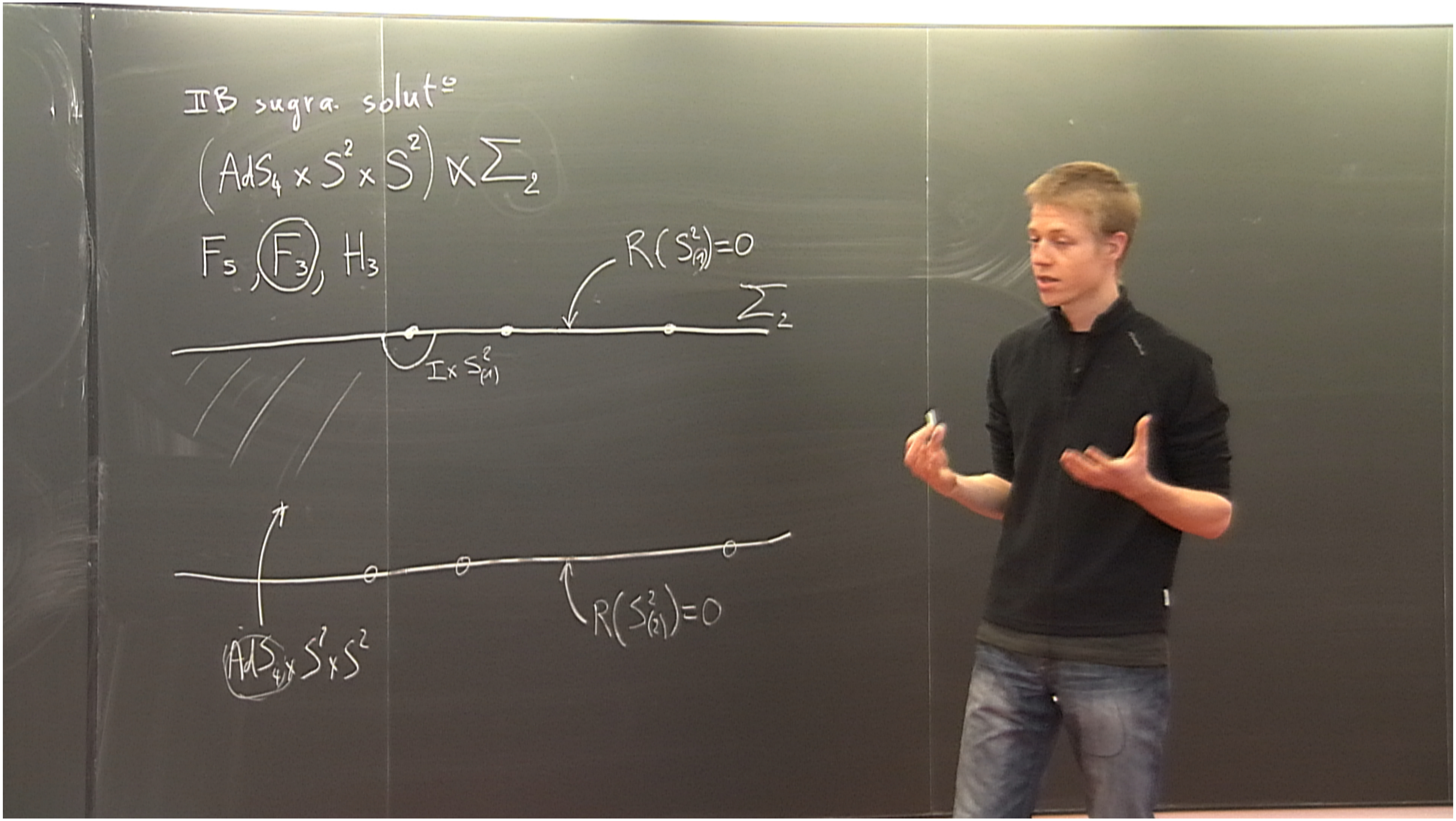
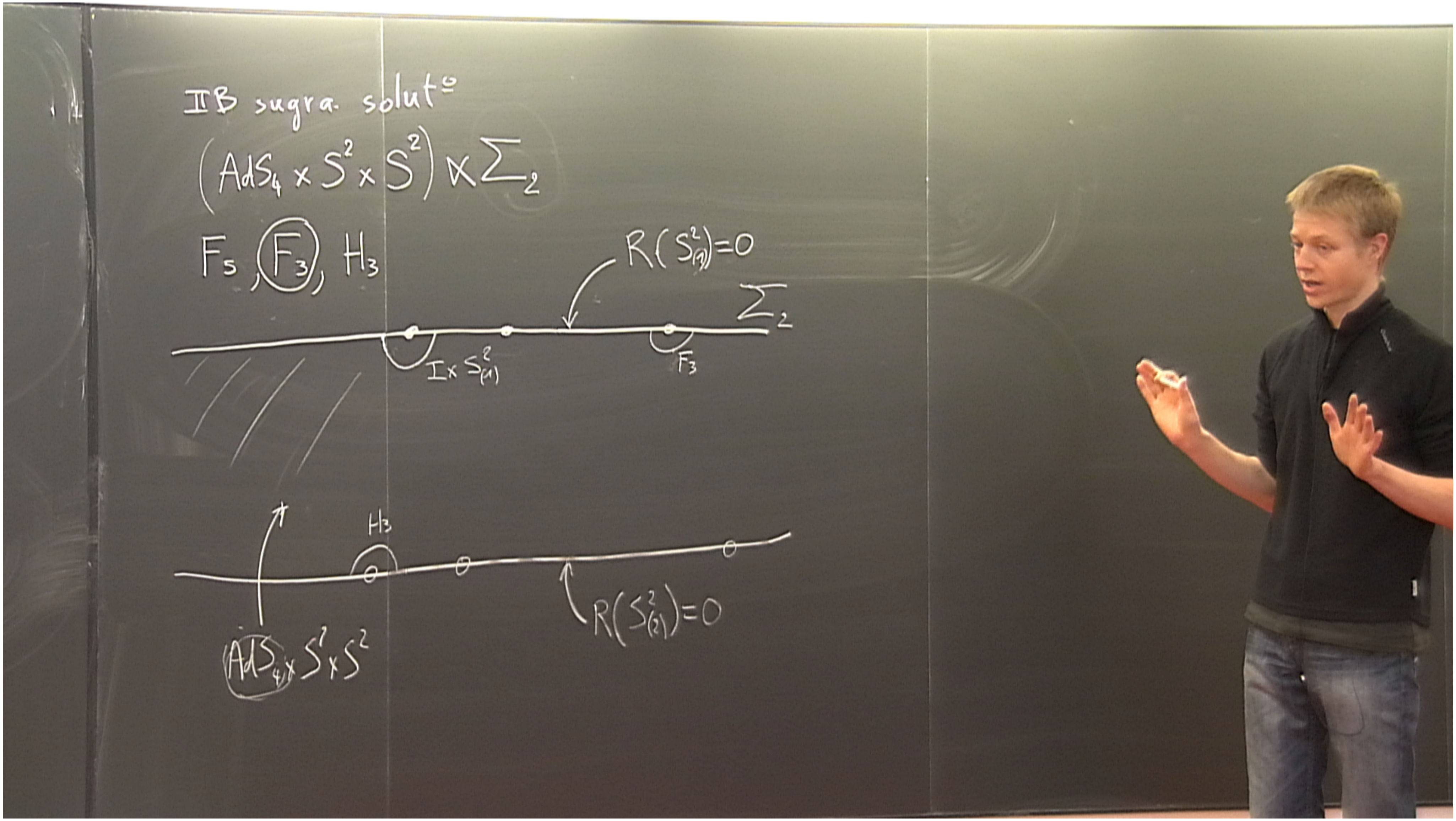

IIB sugra. solut°
(AdS4 × S2 × S2) ⋉ Σ2
F5 , F3 , H3

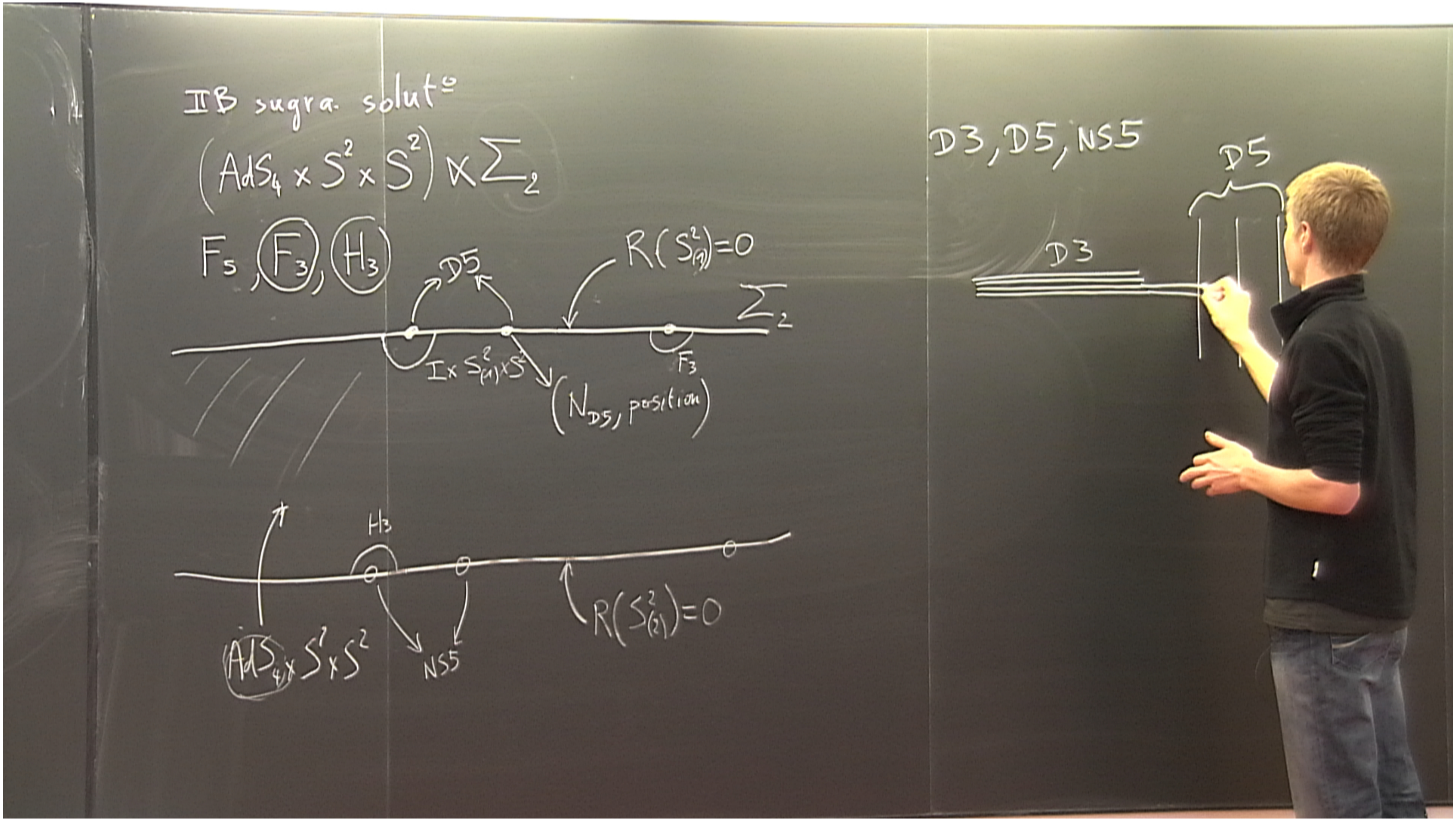

IIB sugra. solut°
$(AdS_4 \times S^2 \times S^2) \ltimes \Sigma_2$
F_5, F_3, H_3
$R(S^2_{(1)})=0$
Σ_2
$AdS_4 \times S^2 \times S^2$
$R(S^2_{(2)})=0$


IIB sugra soluto
(AdS4 × S2 × S2) ⋉ Σ2
F5, F3, H3
R(S2(1))=0
I × S2(1)
R(S2(2))=0
AdS4 × S2 × S2


IIB sugra. solut°
(AdS4 x S2 x S2) ⋉ Σ2
F5, F3, H3
R(S2(1))=0
Σ2
I x S2(1)
R(S2(2))=0
AdS4 x S2 x S2



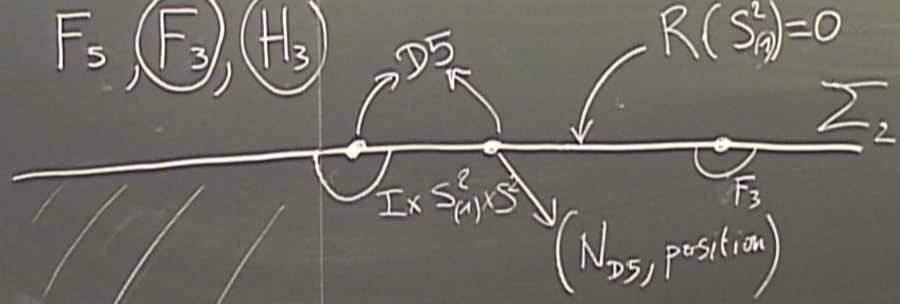
IIB sugra. solut°
$(AdS_4 \times S^2 \times S^2) \ltimes \Sigma_2$
F_5, F_3, H_3
$R(S^2_{(1)})=0$
Σ_2
$I \times S^2_{(1)}$
F_3
H_3
$R(S^2_{(2)})=0$
$AdS_4 \times S^2 \times S^2$

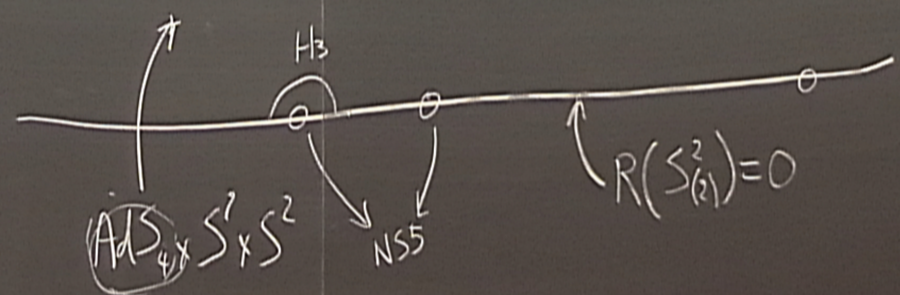

IIB sugra solut°
(AdS4 x S2 x S2) x Σ2
F5, F3, H3
D5
R(S2(1))=0
Σ2
I x S2(1) x S2
F3
(ND5, position)
H3
R(S2(2))=0
AdS4 x S2 x S2
NS5
D3, D5, NS5
D5
D3

IIB sugra solut°

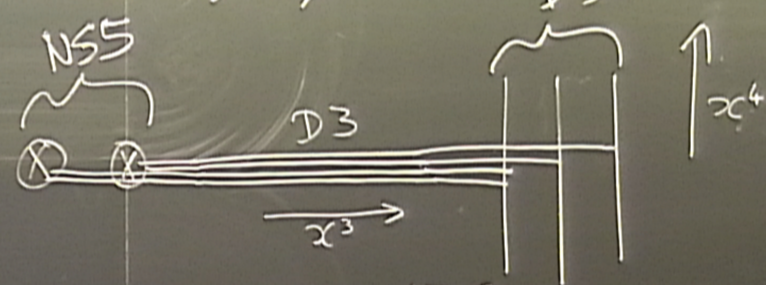
$$\left(AdS_4 \times S^2 \times S^2\right) \ltimes \Sigma_2$$

F_5, F_3, H_3

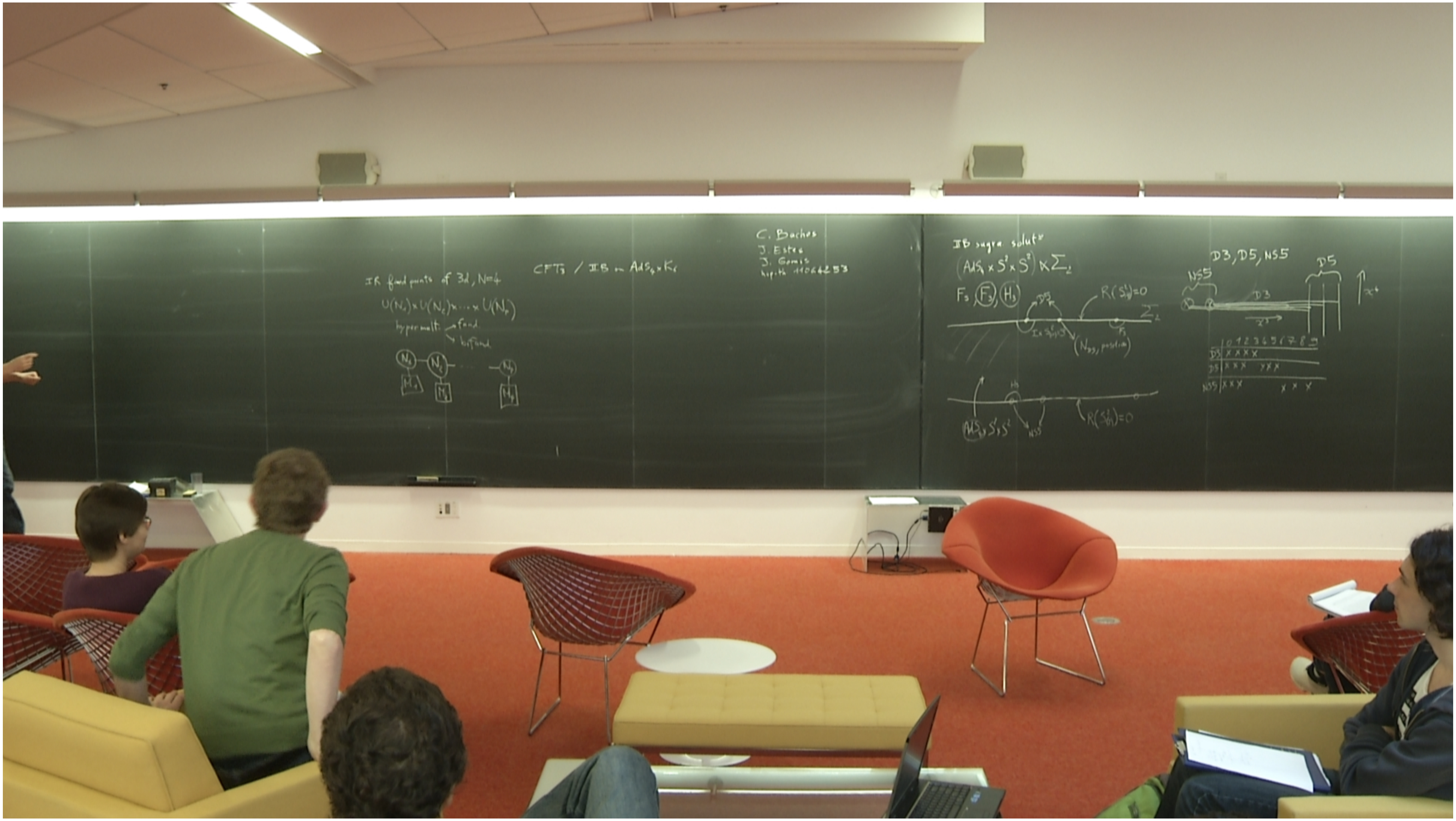


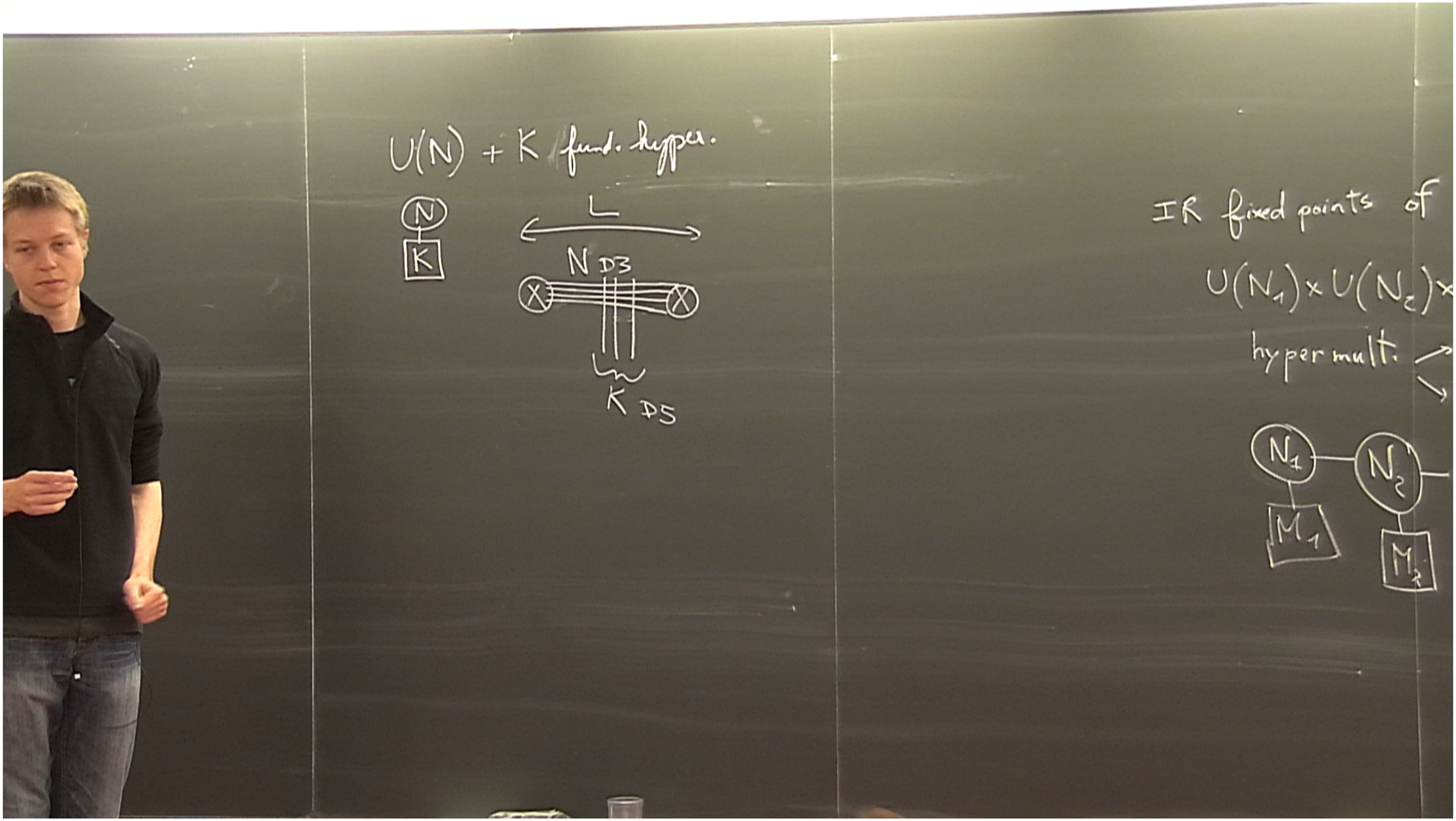


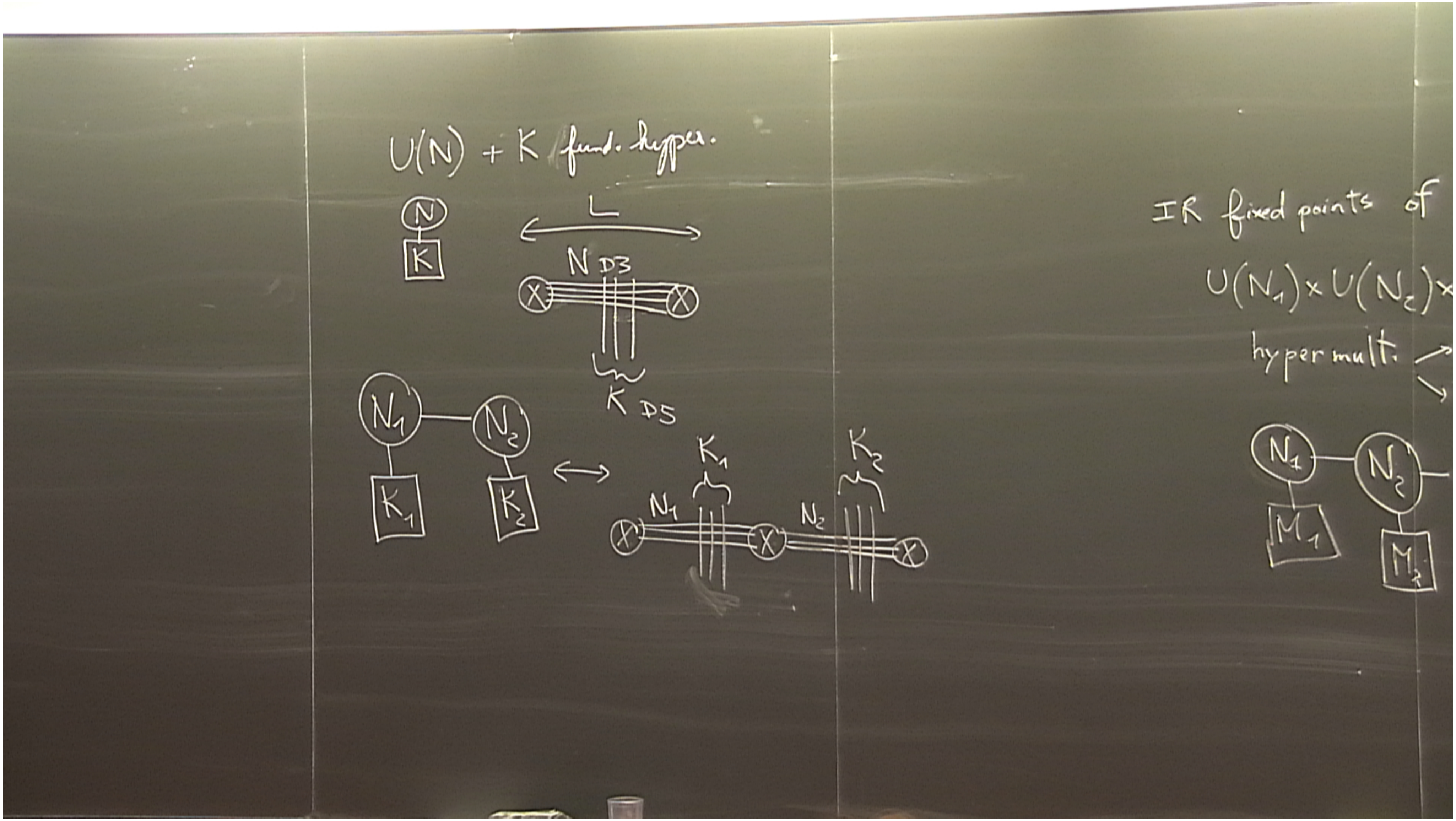
D3, D5, NS5

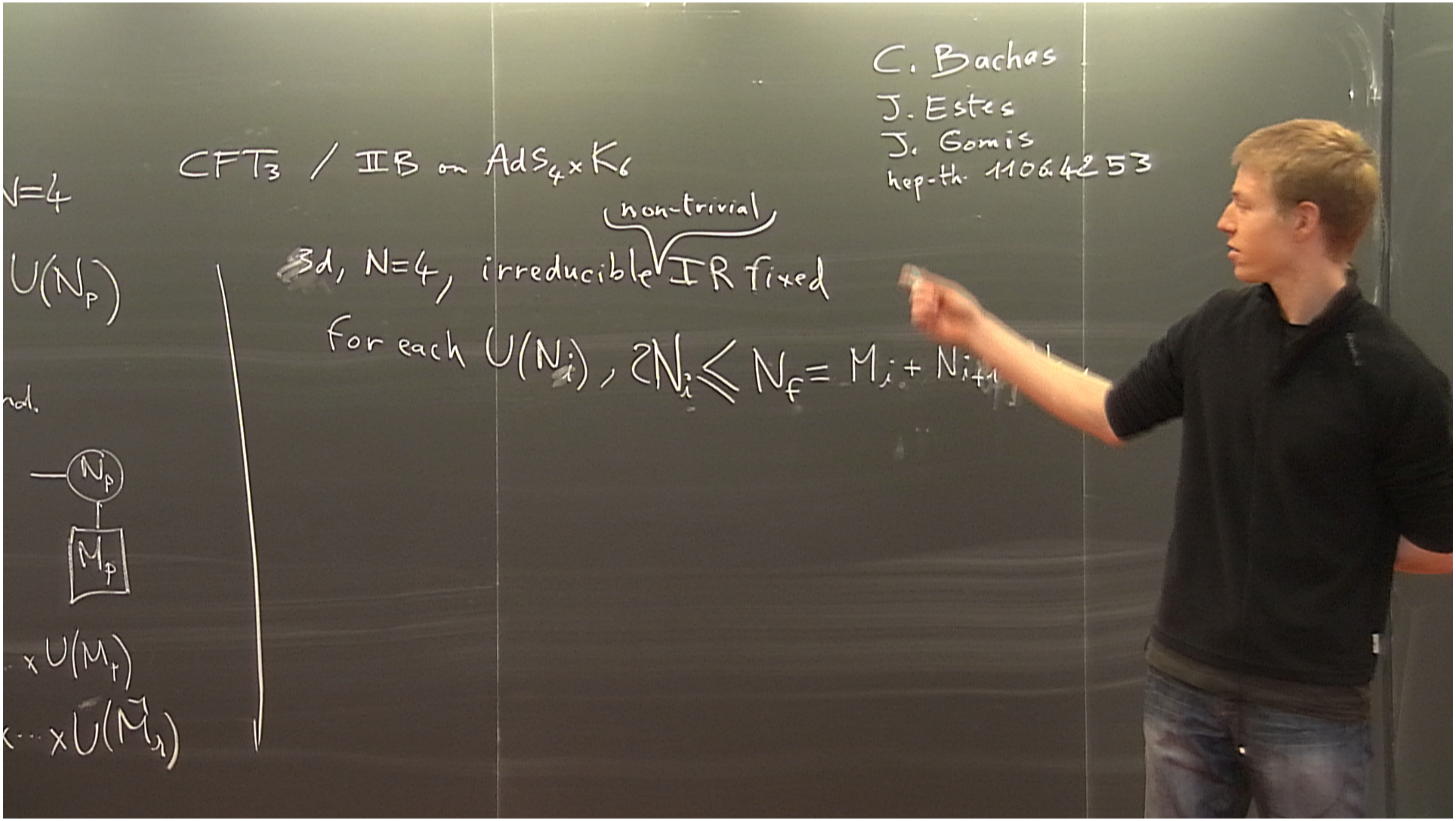


	0	1	2	3	4	5	6	7	8	9
D3	x	x	x	x						
D5	x	x	x		x	x	x			
NS5	x	x	x					x	x	x




U(N) + K fund. hyper.
N
K
L
N D3
K D5
IR fixed points of
U(N1) x U(N2) x
hyper mult.
N1
N2
M1
M2


U(N) + K fund. hyper.
N
K
L
N D3
K D5
N1
N2
K1
K2
IR fixed points of
U(N1) × U(N2) ×
hypermult.
M1
M2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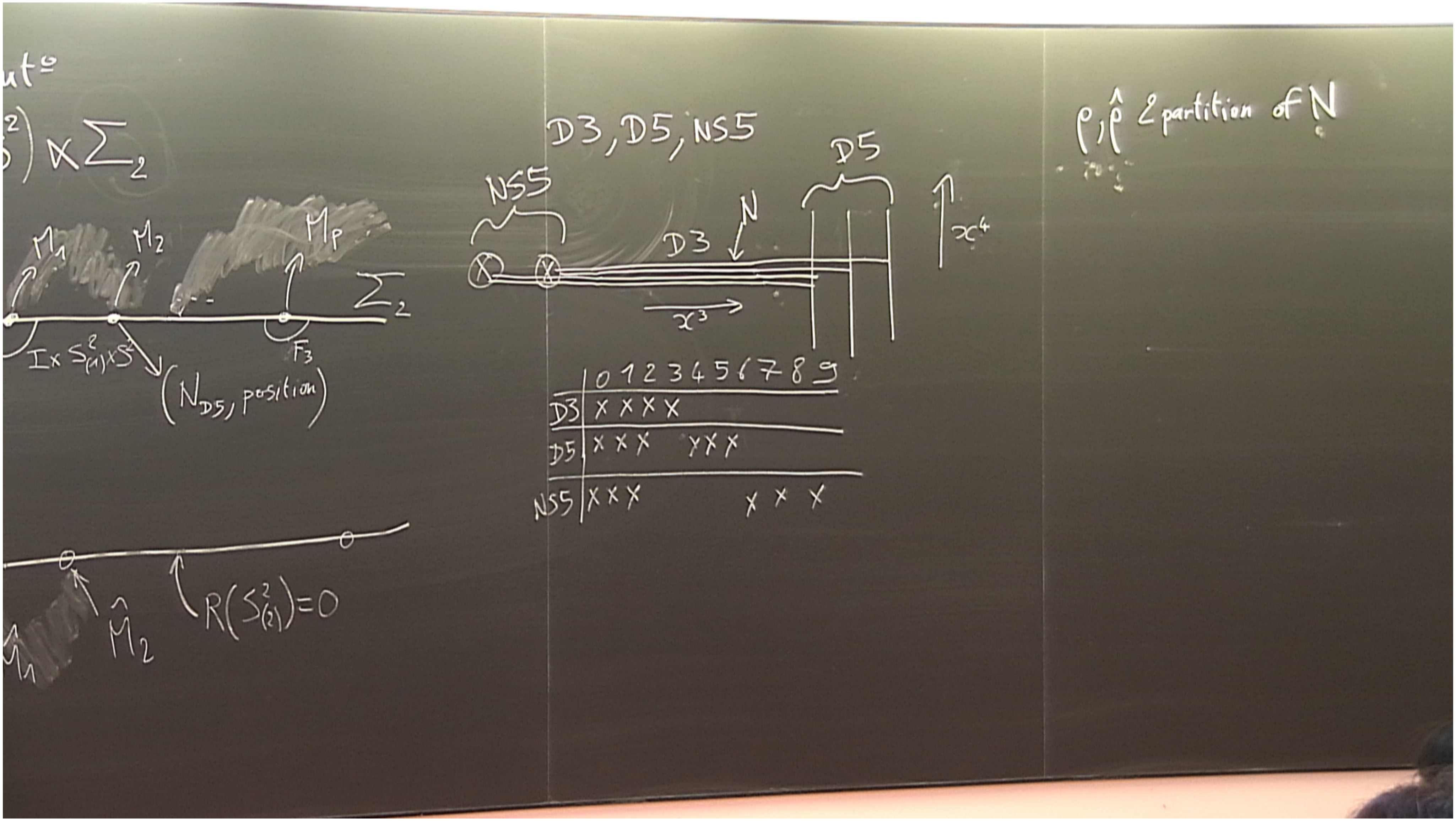
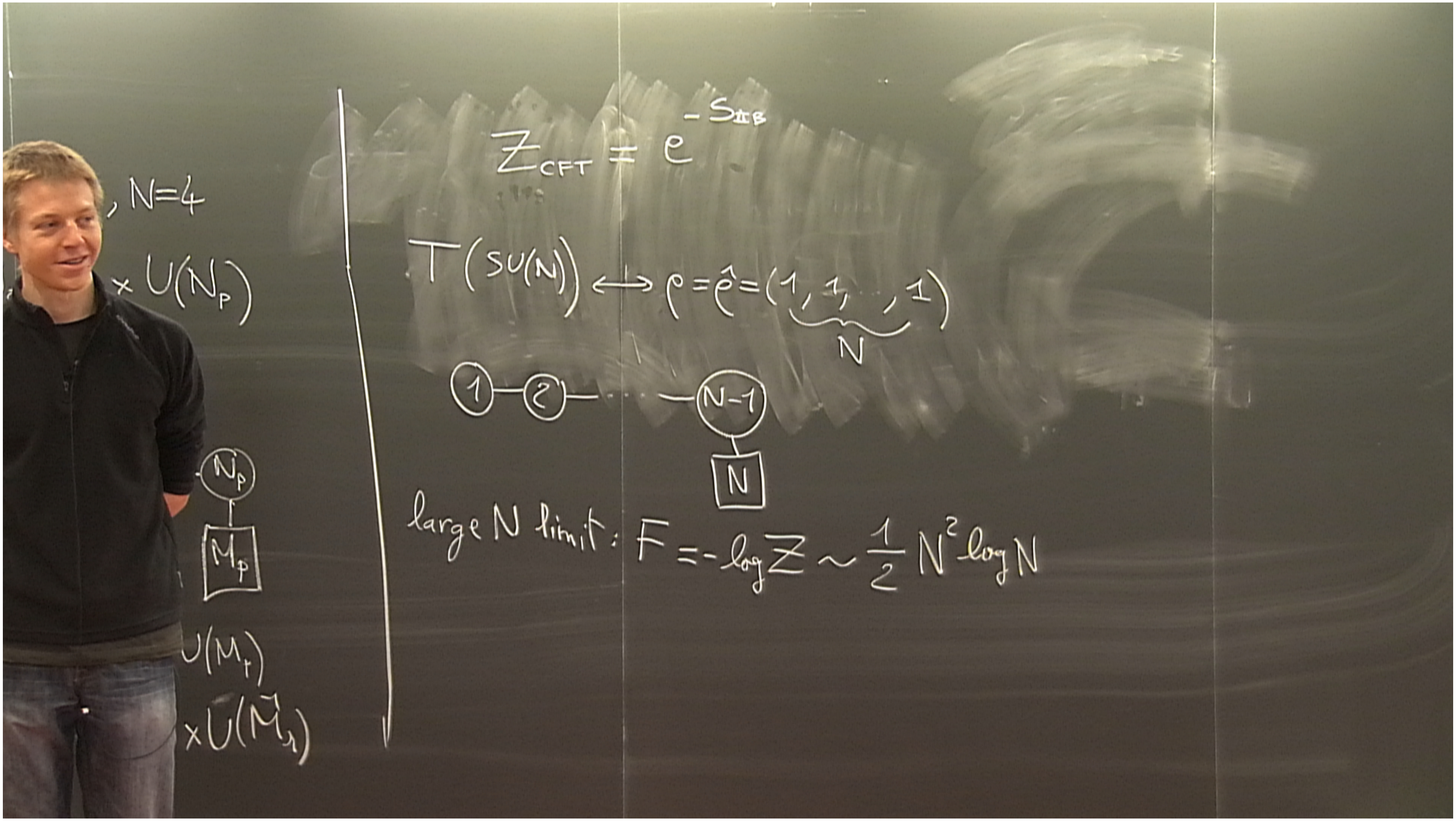
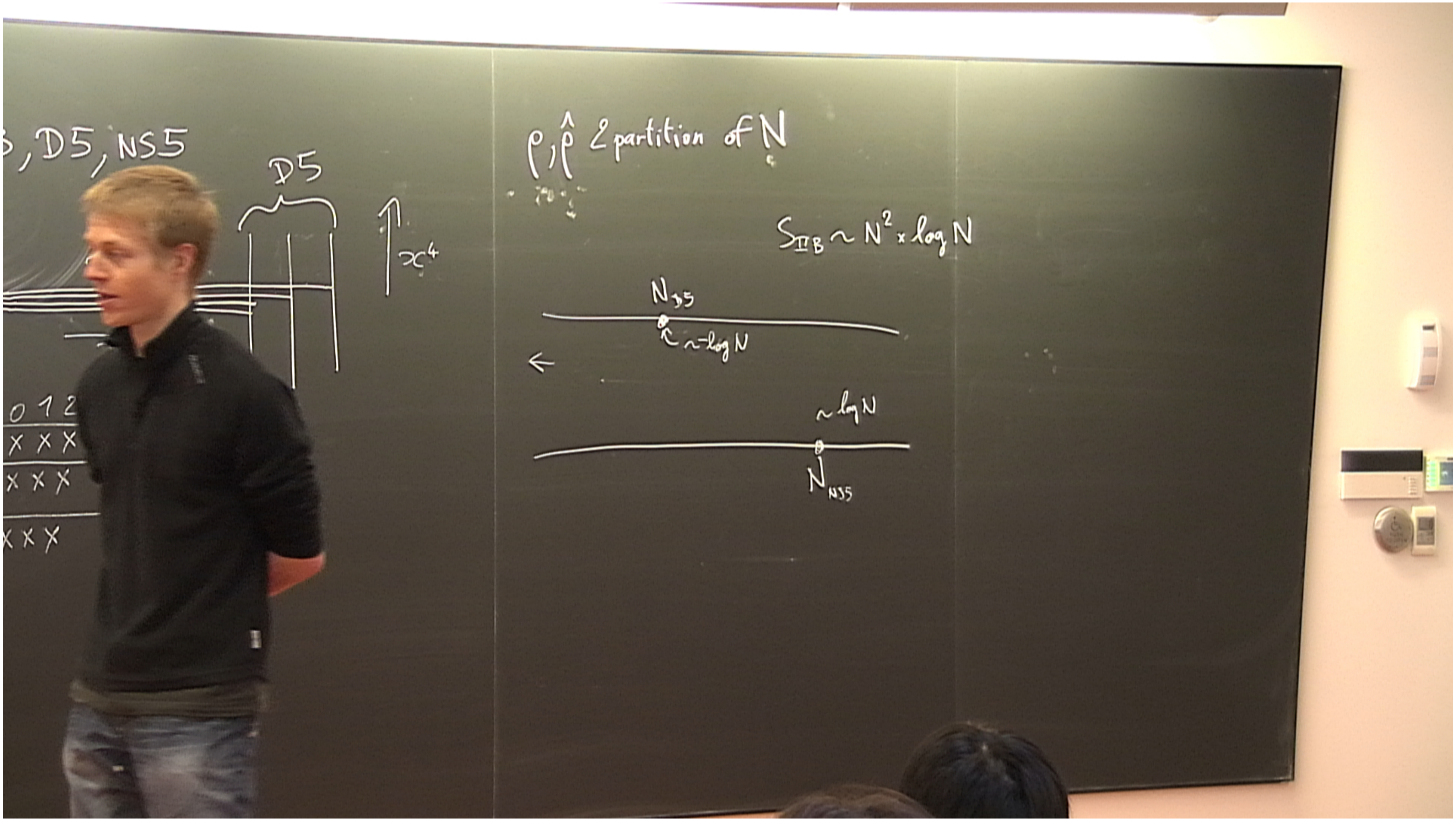
CFT3 / IIB on AdS4 x K6
N=4
U(Np)
non-trivial
3d, N=4, irreducible IR fixed
For each U(Ni), 2Ni ≤ Nf = Mi + Ni+1
Np
Mp
x U(Mr)
x … x U(M̃r)


D3, D5, NS5
NS5
D5
N
D3
x^4
x^3
0 1 2 3 4 5 6 7 8 9
D3 X X X X
D5 X X X X X X
NS5 X X X X X X
ρ, ρ̂ 2 partition of N
M_1 M_2 M_p
Σ_2
I × S^2_(1) × S^2
F_3
(N_D5, position)
R(S^2_(2)) = 0
M̂_2


, $N=4$
$\times U(N_p)$
N_p
M_p
$U(M_r)$
$\times U(\tilde{M}_1)$
$Z_{CFT} = e^{-S_{IIB}}$
$T(SU(N)) \longleftrightarrow \rho = \hat{\rho} = (\underbrace{1, 1, \dots, 1}_{N})$
$1 - 2 - \cdots - N-1$
N
large N limit: $F = -\log Z \sim \frac{1}{2} N^2 \log N$


, D5, NS5
D5
x⁴
ρ, ρ̂ 2 partition of N
S_IIB ~ N² x log N
N_D5
~ log N
~ log N
N_NS5
0 1 2