Title: Lecture - QFT I, PHYS 601

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Collection/Series: Quantum Field Theory I (Core), PHYS 601, October 7 - November 6, 2024

Subject: Condensed Matter, Particle Physics, Quantum Fields and Strings

Date: October 11, 2024 - 9:00 AM

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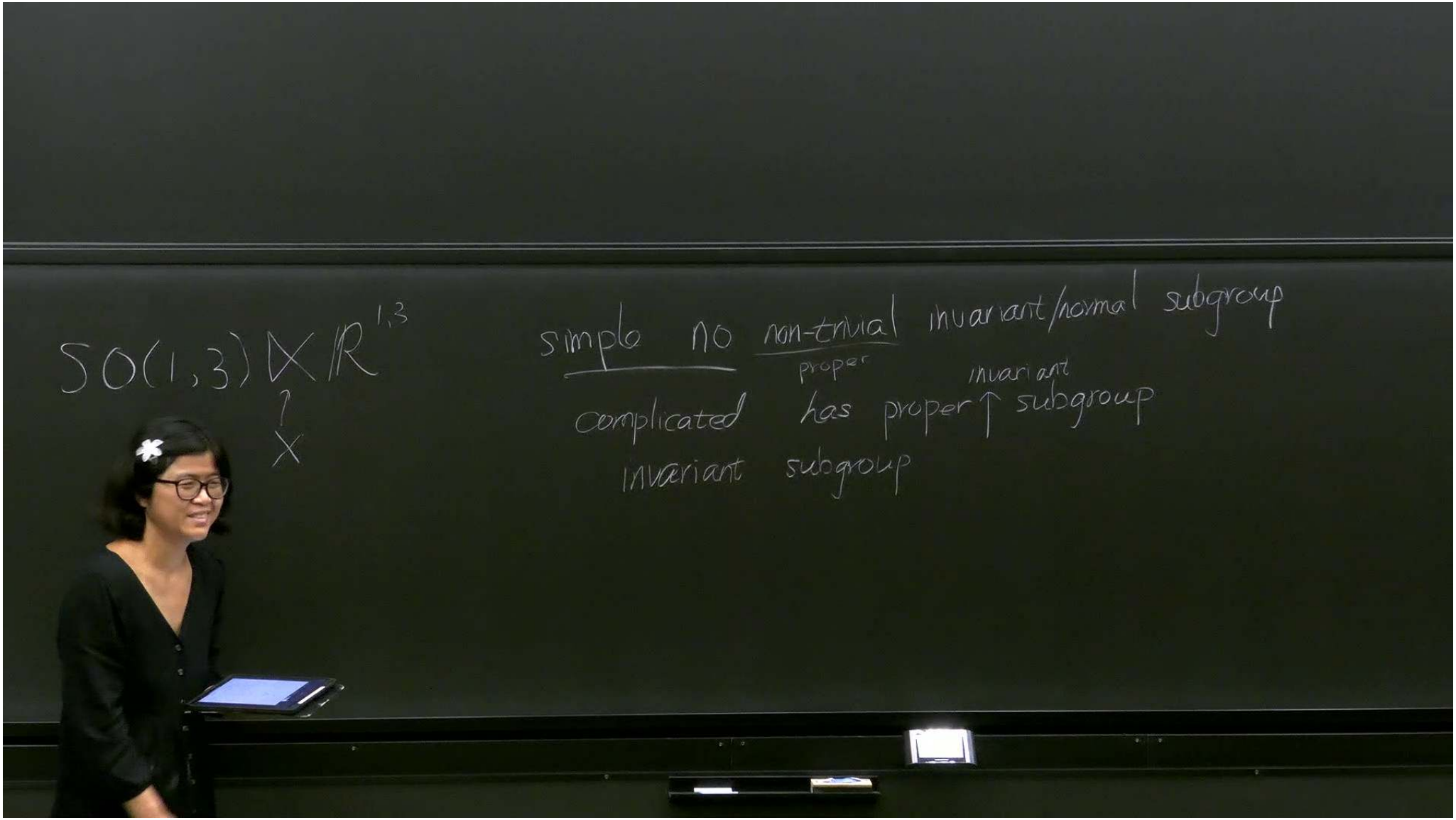
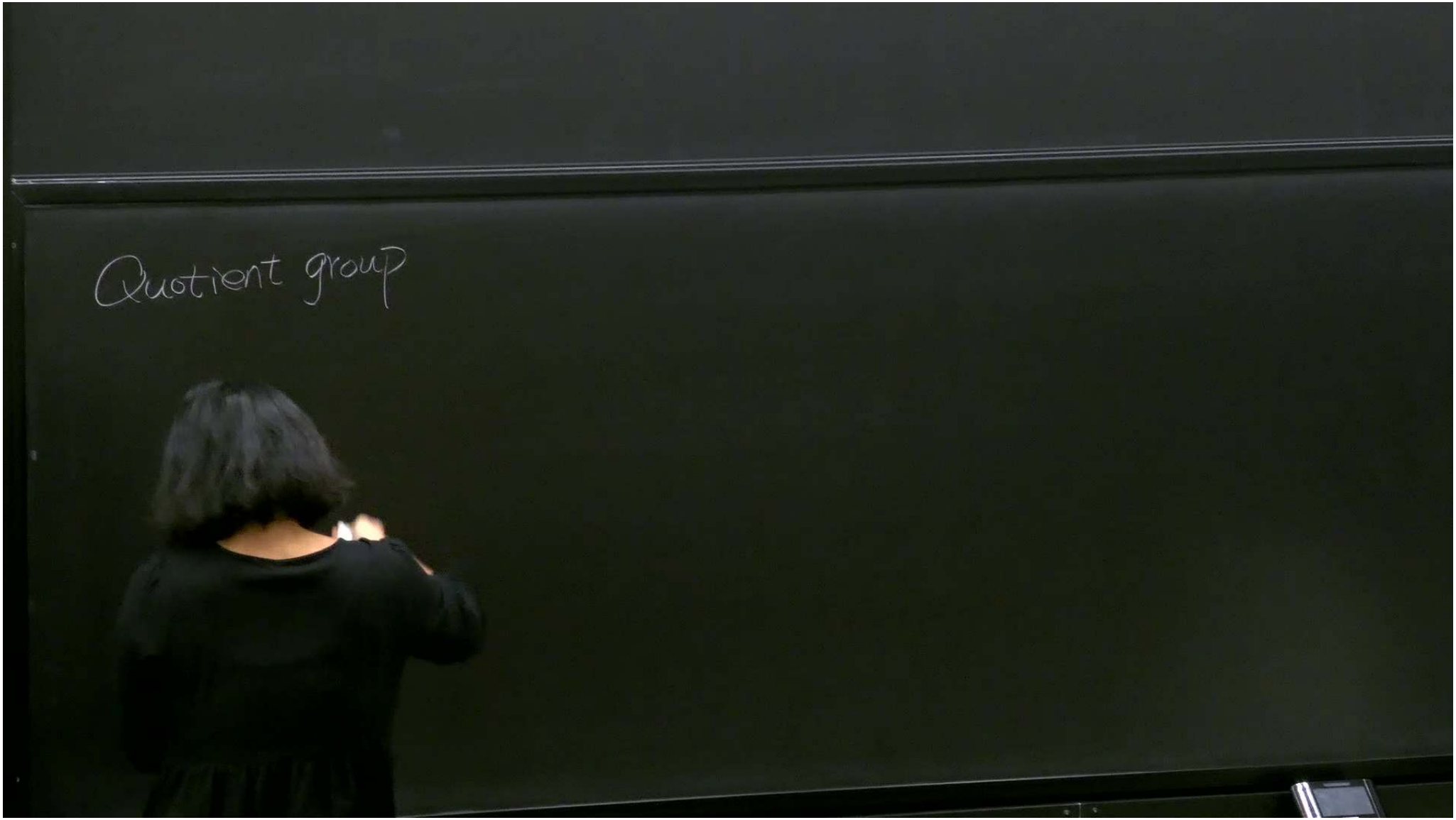
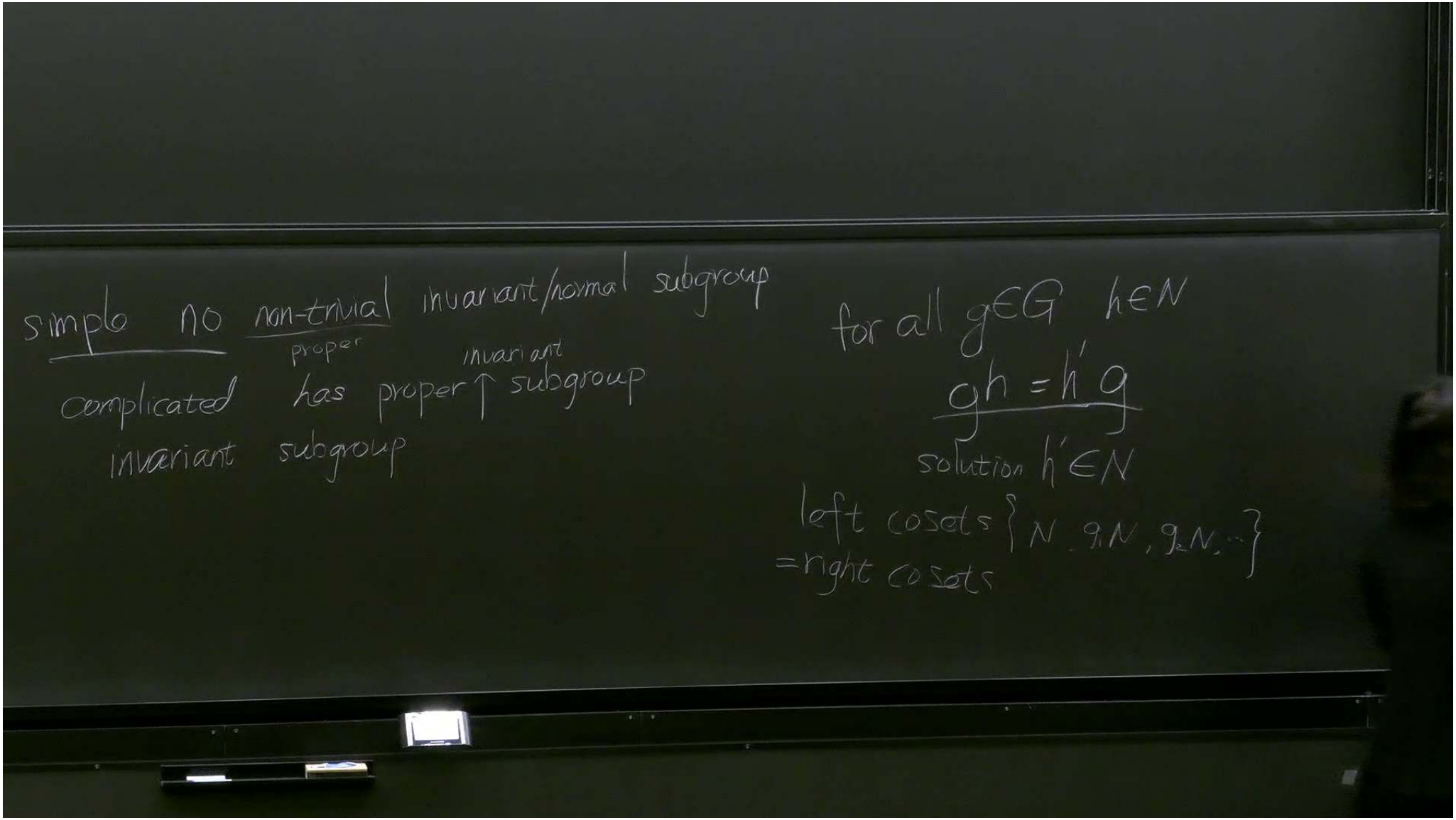
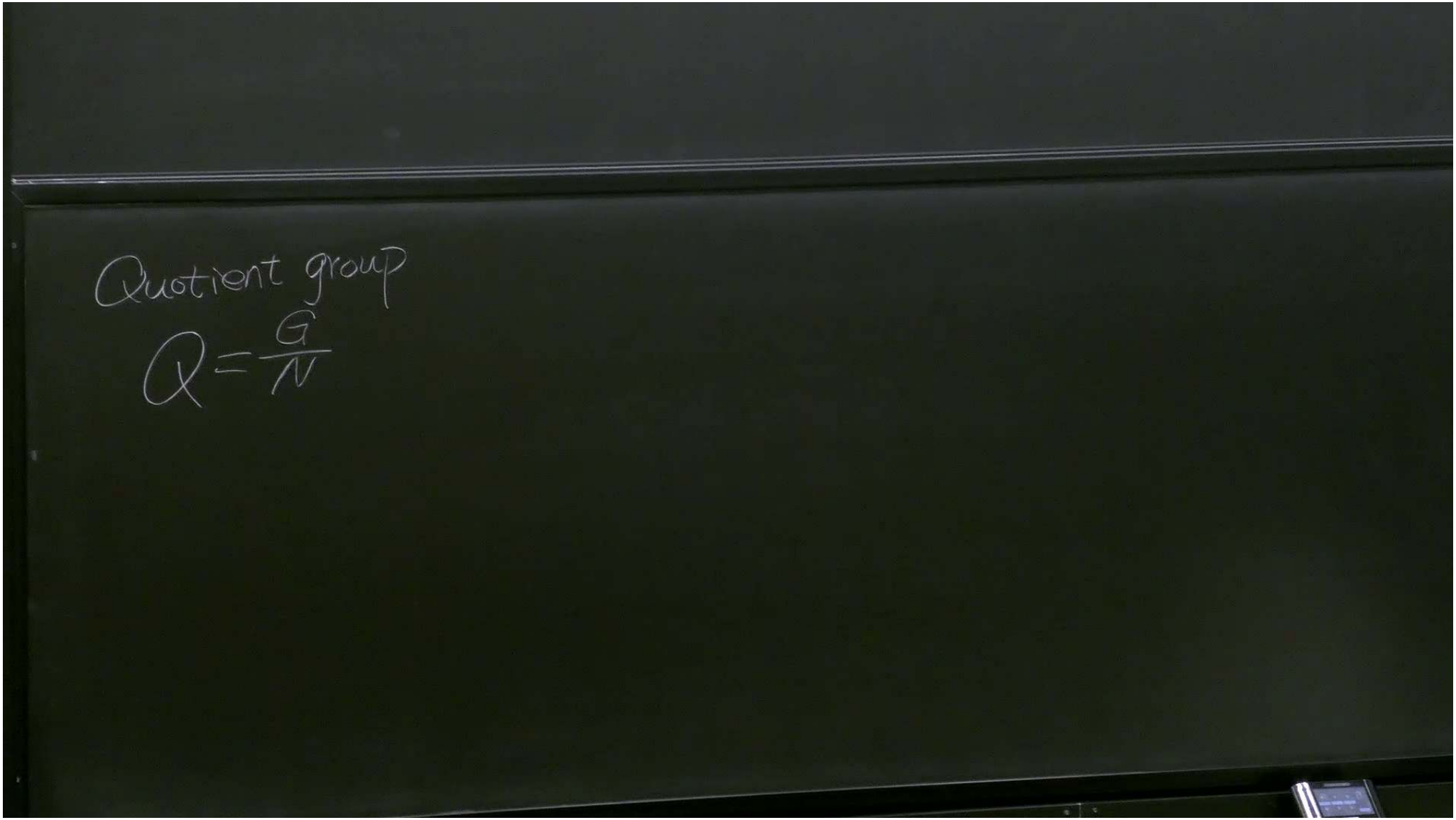
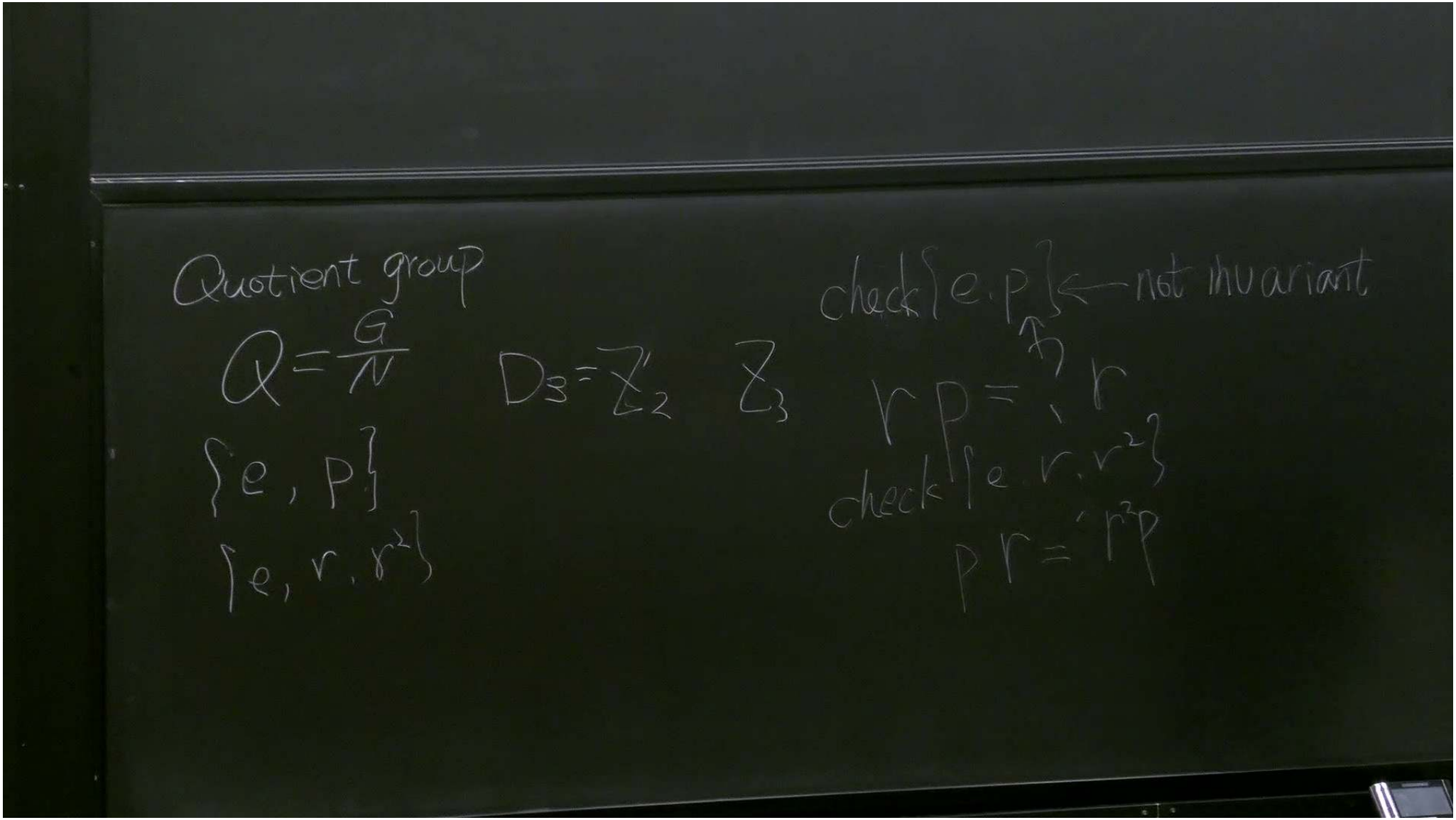
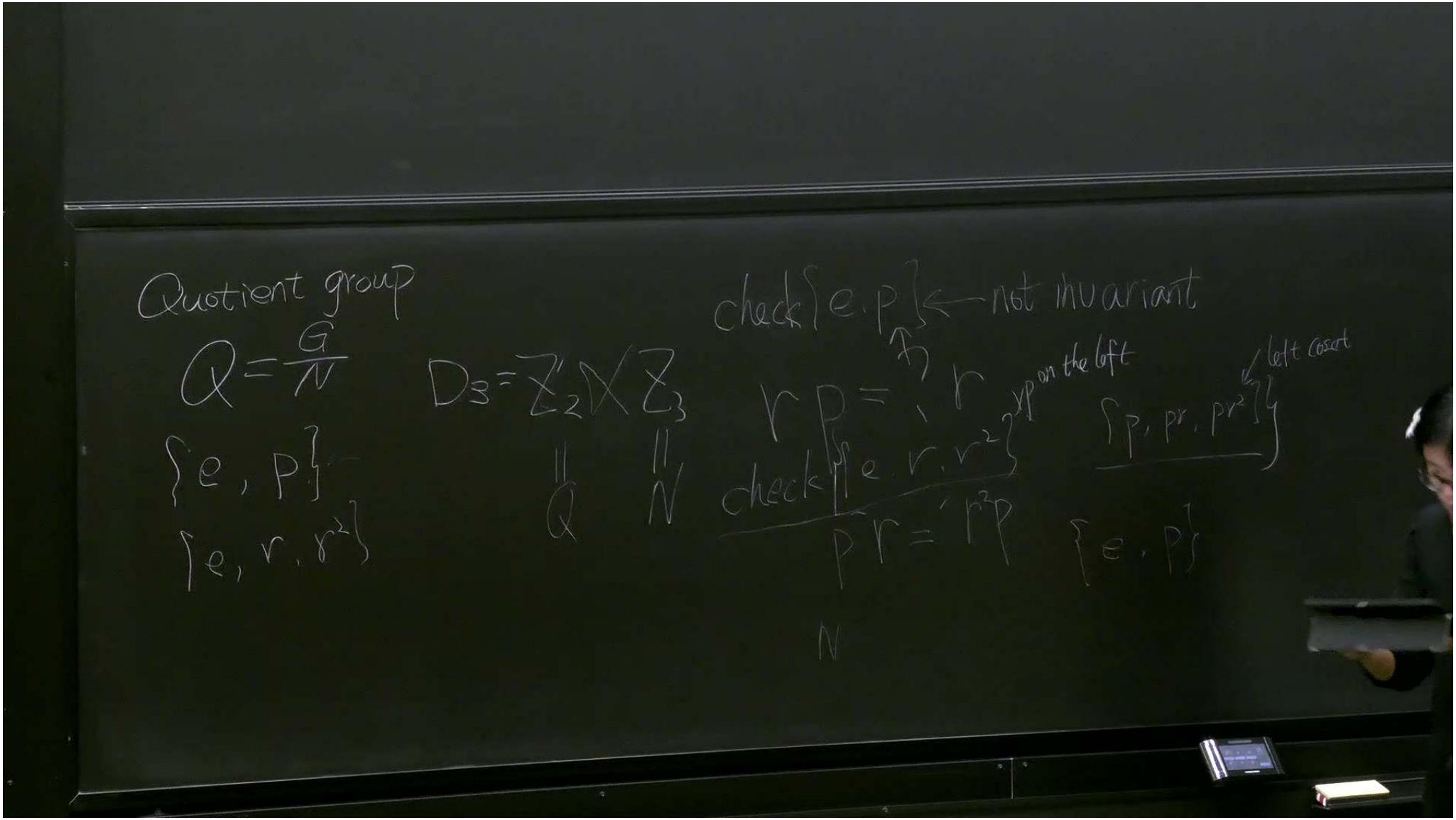

$SO(1,3) \ltimes \mathbb{R}^{1,3}$
?
X
simple no non-trivial proper invariant/normal subgroup
complicated has proper invariant subgroup
invariant subgroup

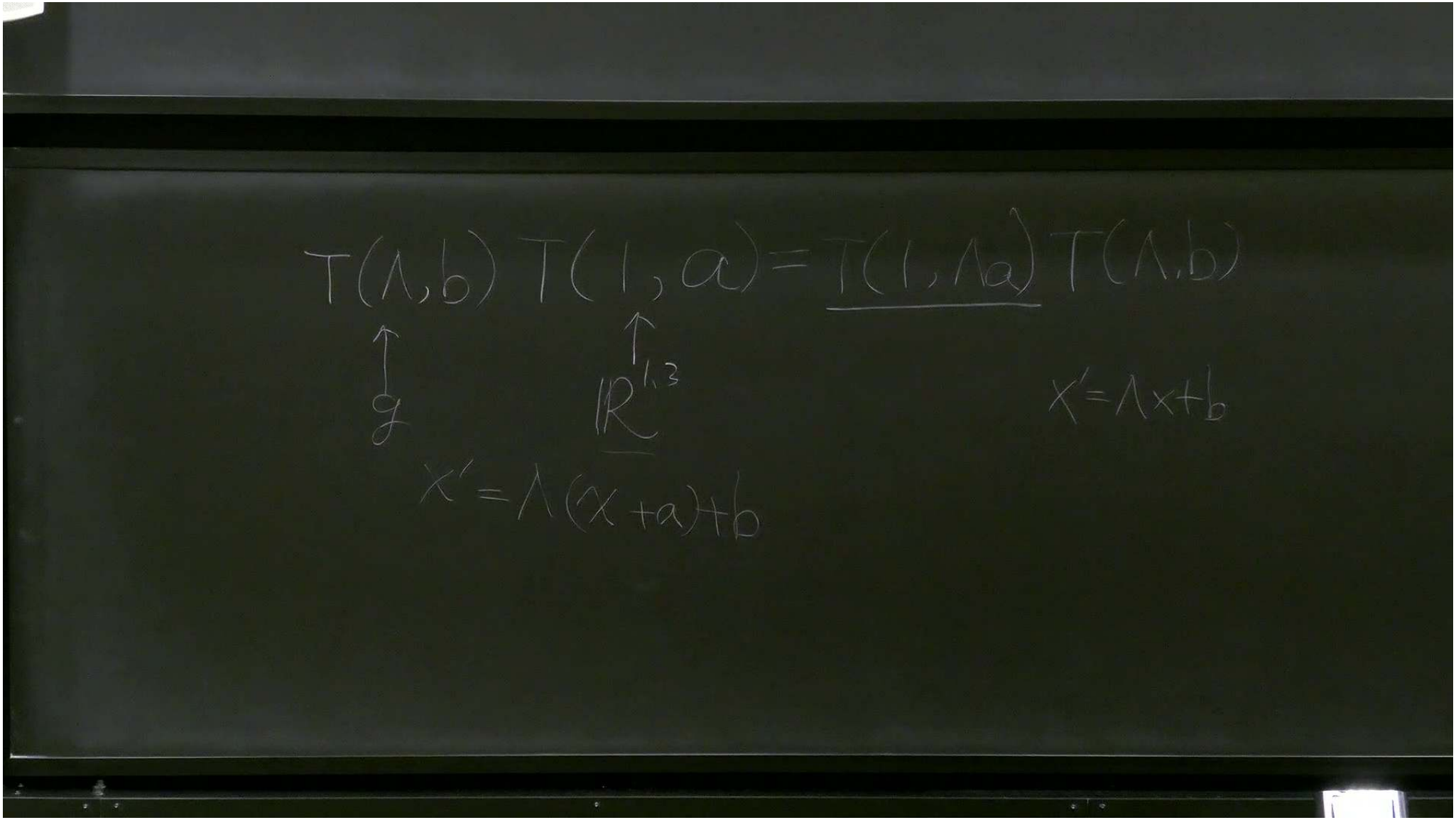

Quotient group


simple no non-trivial (proper) invariant/normal subgroup
complicated has proper (invariant) subgroup
invariant subgroup
for all g∈G h∈N
gh = h'g
solution h'∈N
left cosets {N, g1N, g2N, ...}
= right cosets


Quotient group
$Q = \frac{G}{N}$


Quotient group
$Q = \frac{G}{N}$
$D_3 = Z_2 \; Z_3$
$\{e, P\}$
$\{e, r, r^2\}$
check $\{e, P\}$ ← not invariant
$rP = ?\, Pr$
check $\{e, r, r^2\}$
$Pr = r^2P$


Quotient group
$Q = \frac{G}{N}$
$\{e, p\}$
$\{e, r, r^2\}$
$D_3 = Z_2 \times Z_3$
$Q \quad N$
check $\{e, p\}$ ← not invariant
$rp = pr^2$
check $\{e, r, r^2\}$ xp on the left
$\{p, pr, pr^2\}$ left coset
$pr = r^2p$
$\{e, p\}$
N


T(Λ,b) T(1,a) = T(1,Λa) T(Λ,b)
g
$\mathbb{R}^{1,3}$
x' = Λx + b
x' = Λ(x + a) + b

$[T_a, T_b] = i f_{abc} T_c$

$OB(1)$ is our only hope

$\mathbb{R}^2 \times D_2$ is ...

$SU(2)$ is our hope

$[T_a, T_b] = i f_{abc} T_c$

$OB(1)$ is our only hope

$\mathbb{R}^2 \times D_2$ is "

$SU(2)$ is our hope

best scenario

real

completly antisymmetric

Levi civita

$[T_a, T_b] = i \epsilon_{abc} T_c$