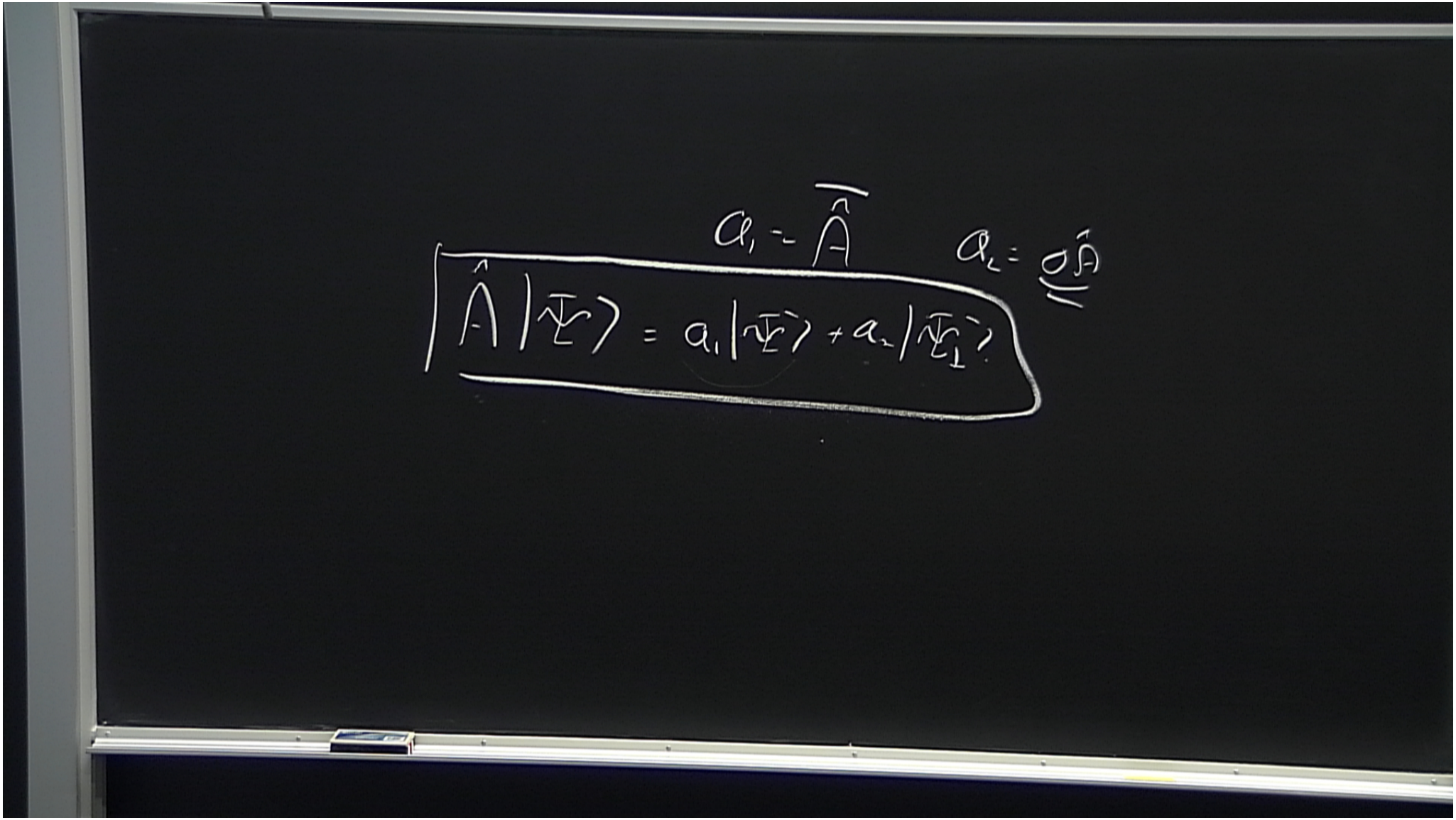
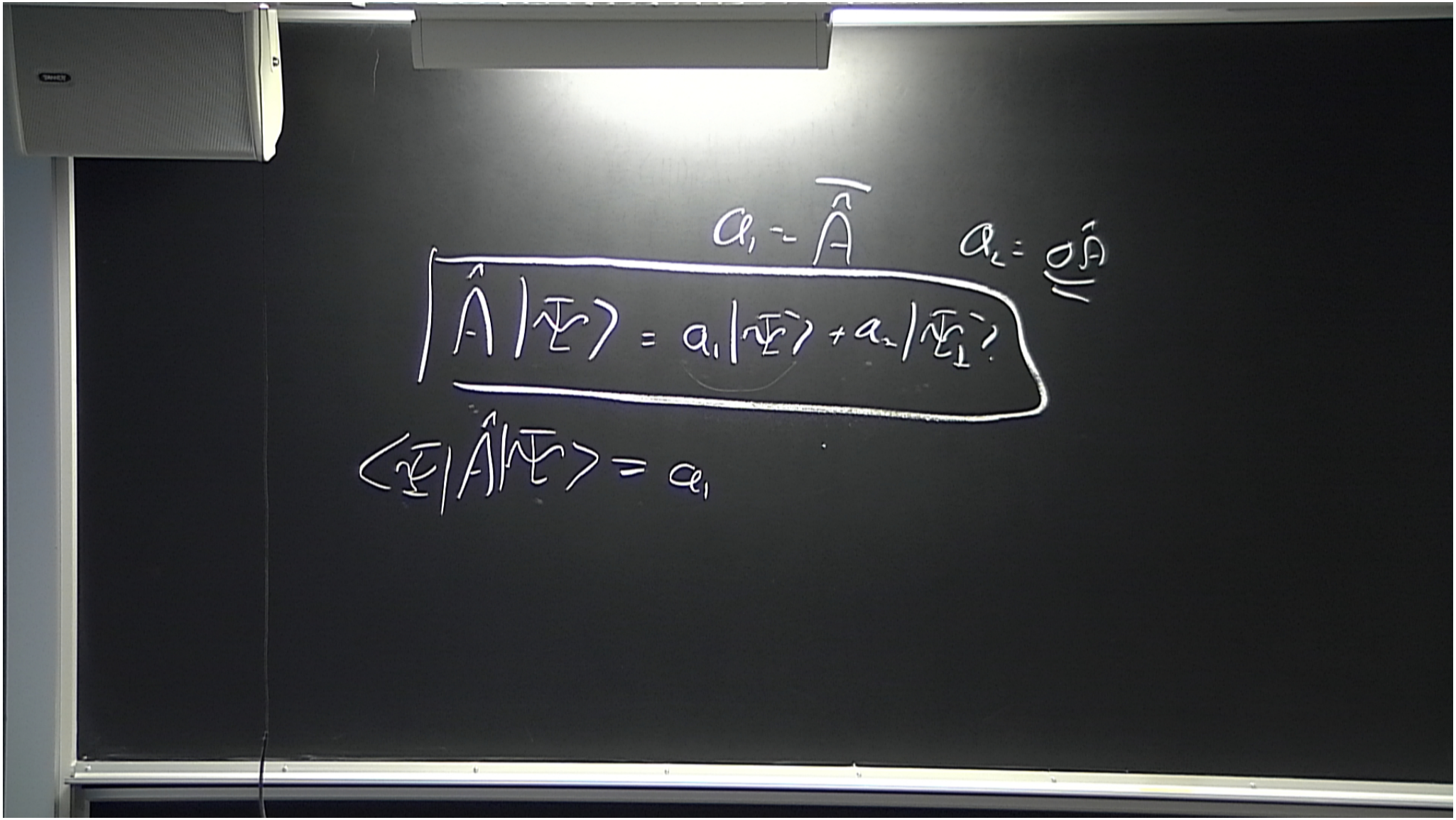
Title: Finally making sense of Quantum Mechanics, part 3

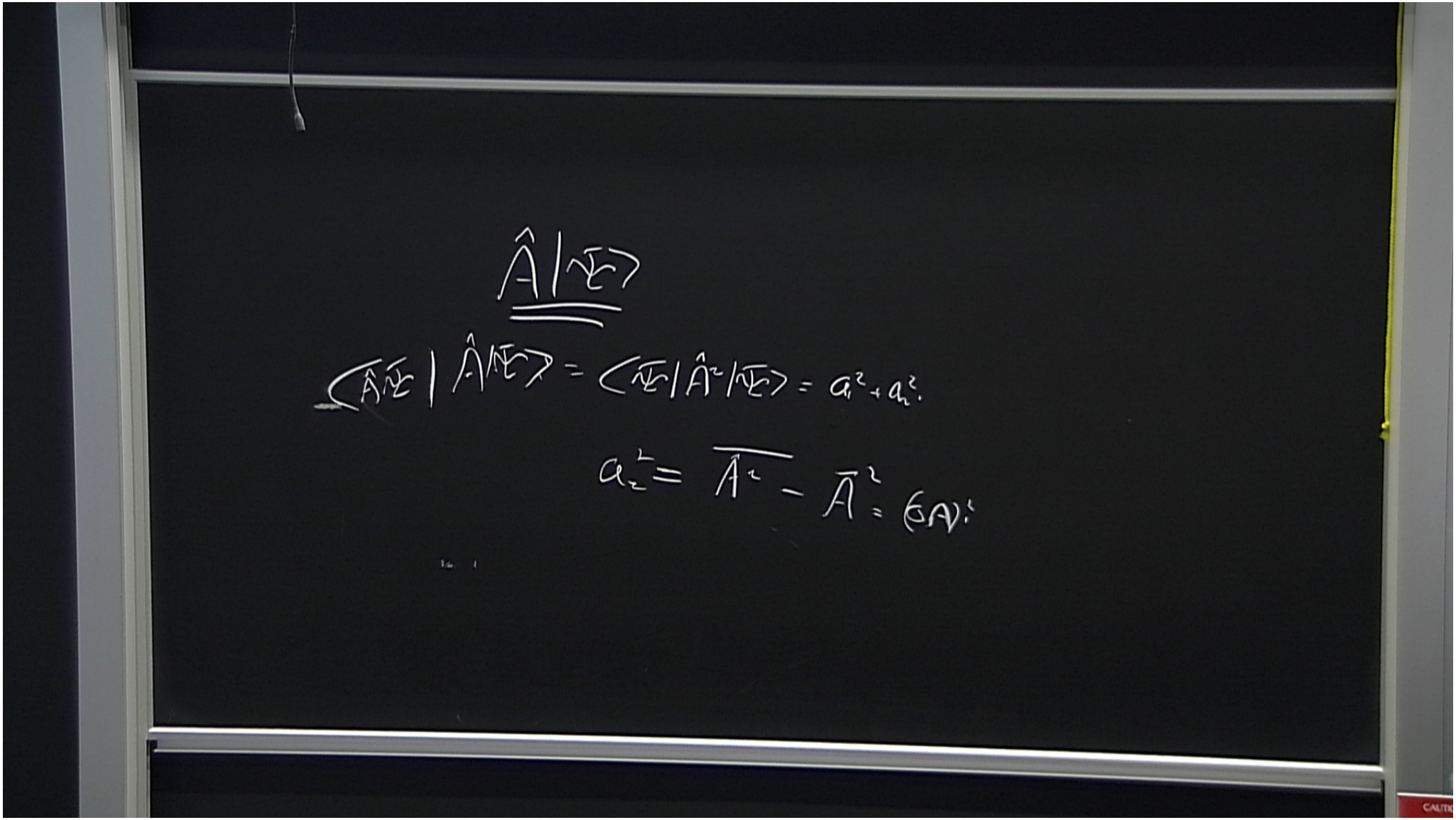
Date: Jun 22, 2016 09:00 AM

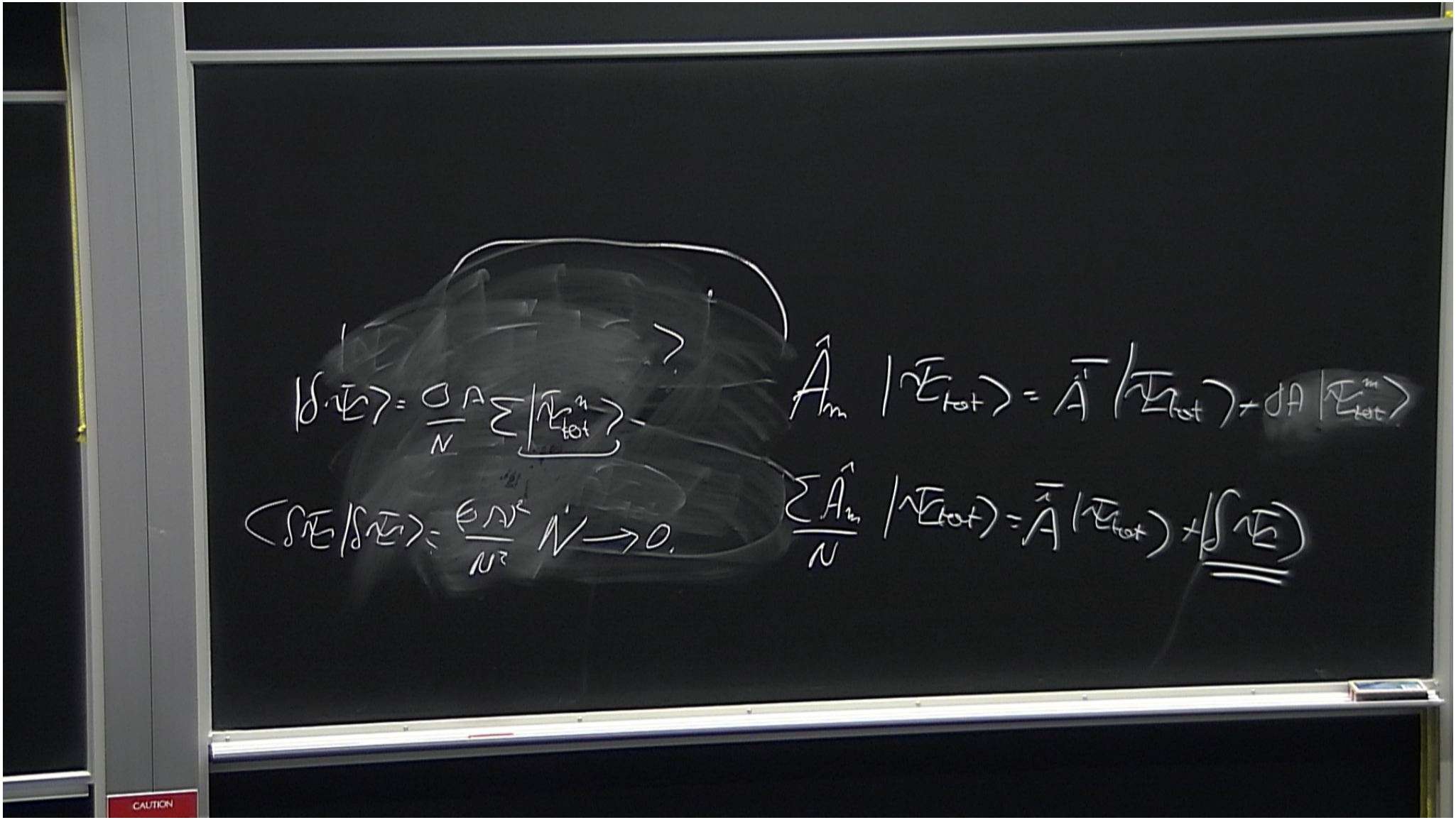
URL: http://pirsa.org/16060052

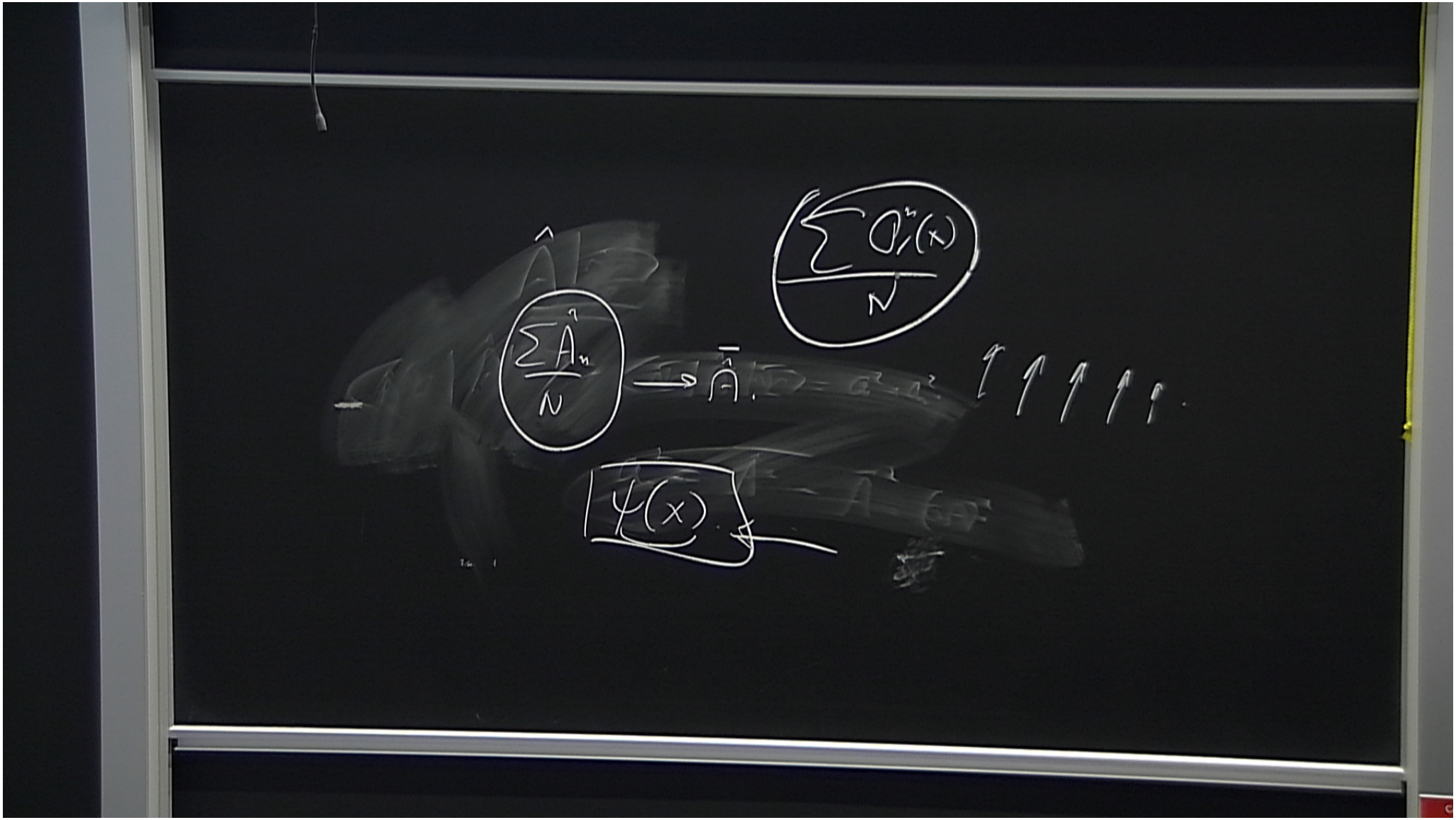
Abstract:

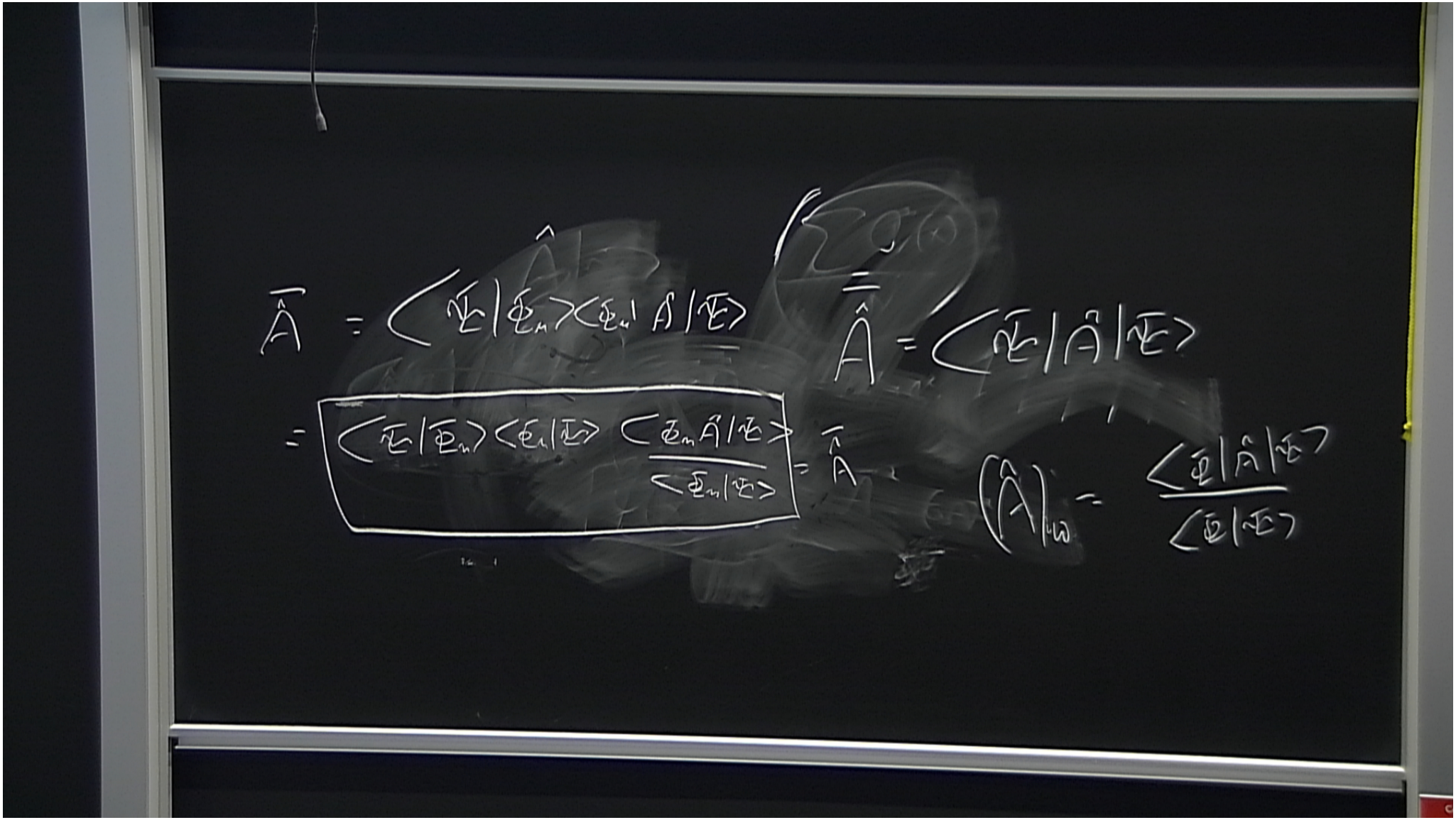

$a_1 = \bar{\hat{A}}$
$a_2 = \sigma_{\hat{A}}$
$\hat{A}|\psi\rangle = a_1|\psi\rangle + a_2|\psi_\perp\rangle$

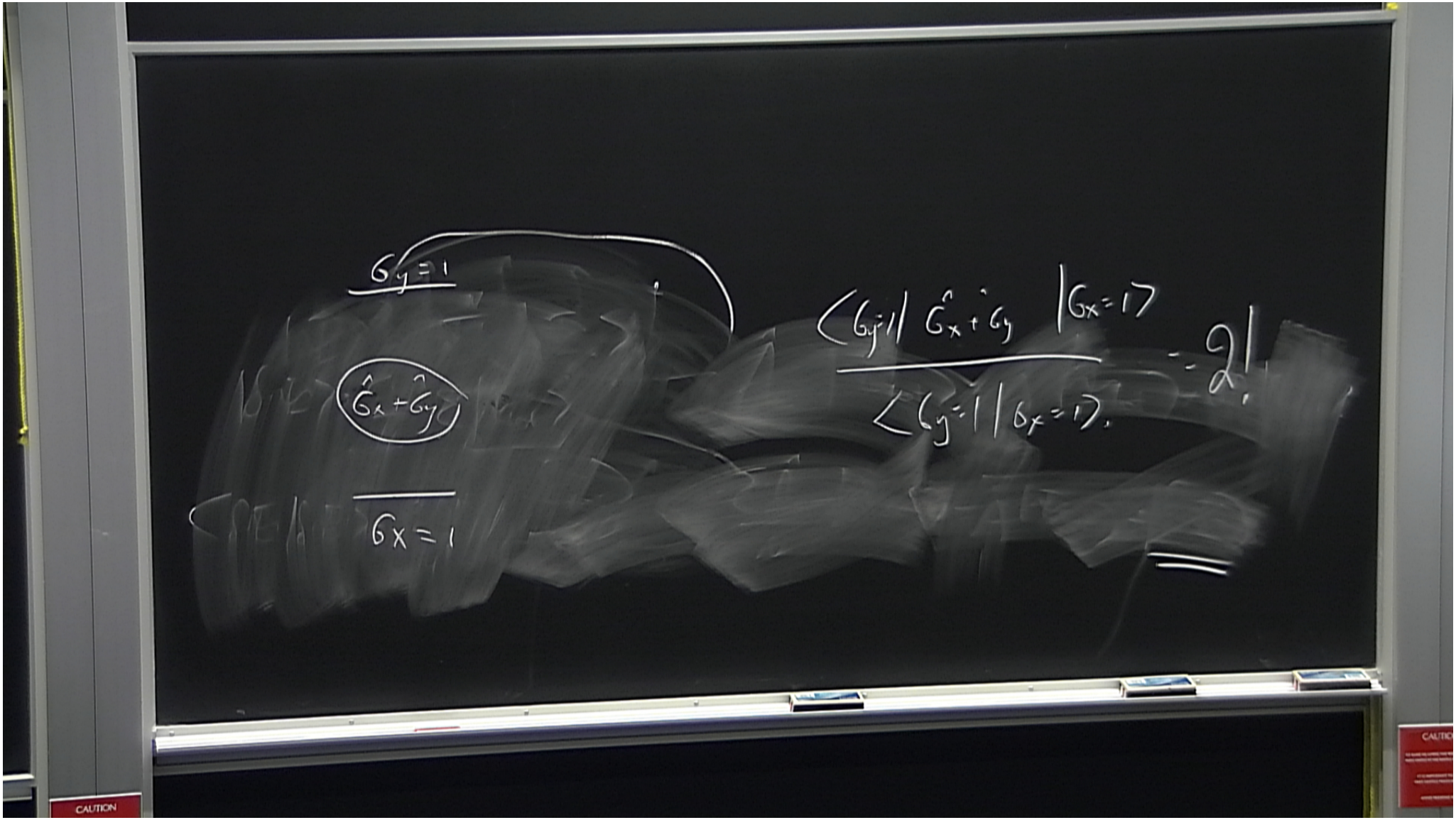

$a_1 = \bar{\hat{A}}$
$a_2 = \sigma_{\hat{A}}$
$\hat{A}|\psi\rangle = a_1|\psi\rangle + a_2|\psi_\perp\rangle$
$\langle\psi|\hat{A}|\psi\rangle = a_1$

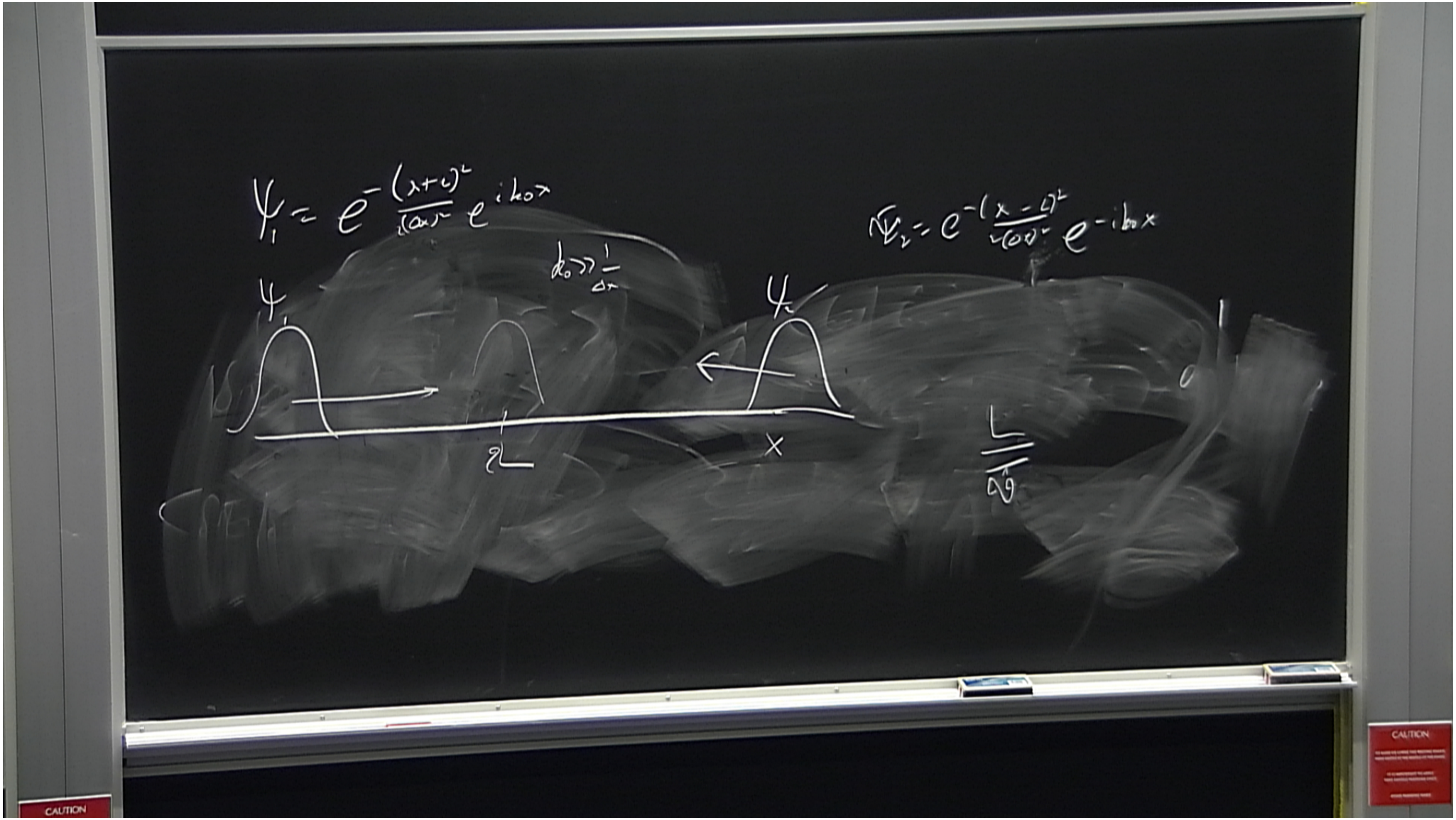

$\hat{A}|\psi\rangle$
$\langle\hat{A}\psi|\hat{A}|\psi\rangle = \langle\psi|\hat{A}^2|\psi\rangle = a_1^2 + a_2^2$
$a_2^2 = \overline{A^2} - \bar{A}^2 = (\Delta A)^2$

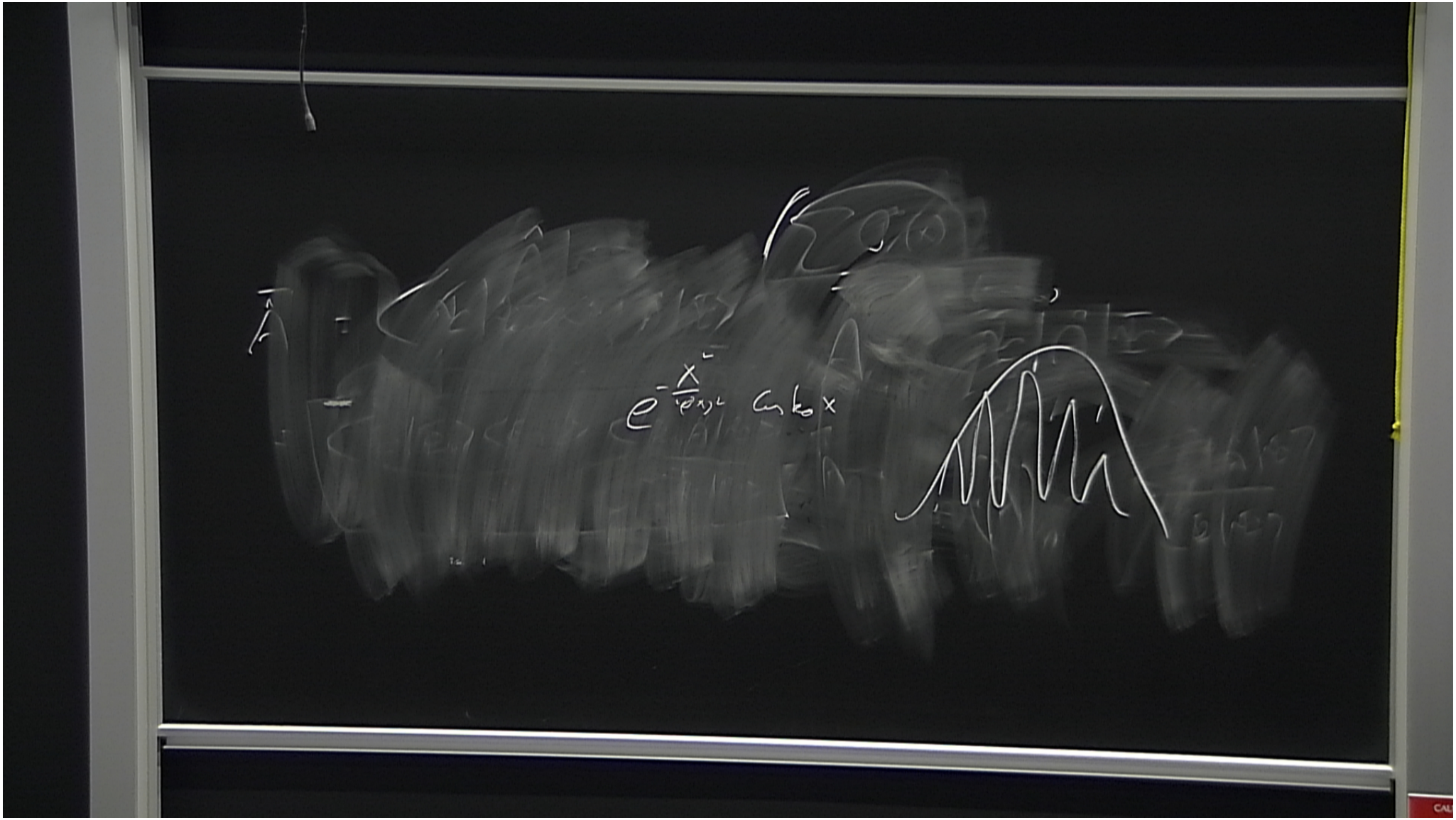

$|\delta\cdot\vec{E}\rangle = \frac{\Delta}{N}\sum |\vec{E}^{n}_{tot}\rangle$
$\hat{A}_m\,|\vec{E}_{tot}\rangle = \bar{A}\,|\vec{E}_{tot}\rangle + \delta A\,|\vec{E}^{m}_{tot}\rangle$
$\langle\delta\vec{E}|\delta\vec{E}\rangle = \frac{\epsilon\Delta^2}{N^2}N \to 0.$
$\frac{\sum \hat{A}_m}{N}\,|\vec{E}_{tot}\rangle = \bar{A}\,|\vec{E}_{tot}\rangle + |\delta\vec{E}\rangle$
CAUTION

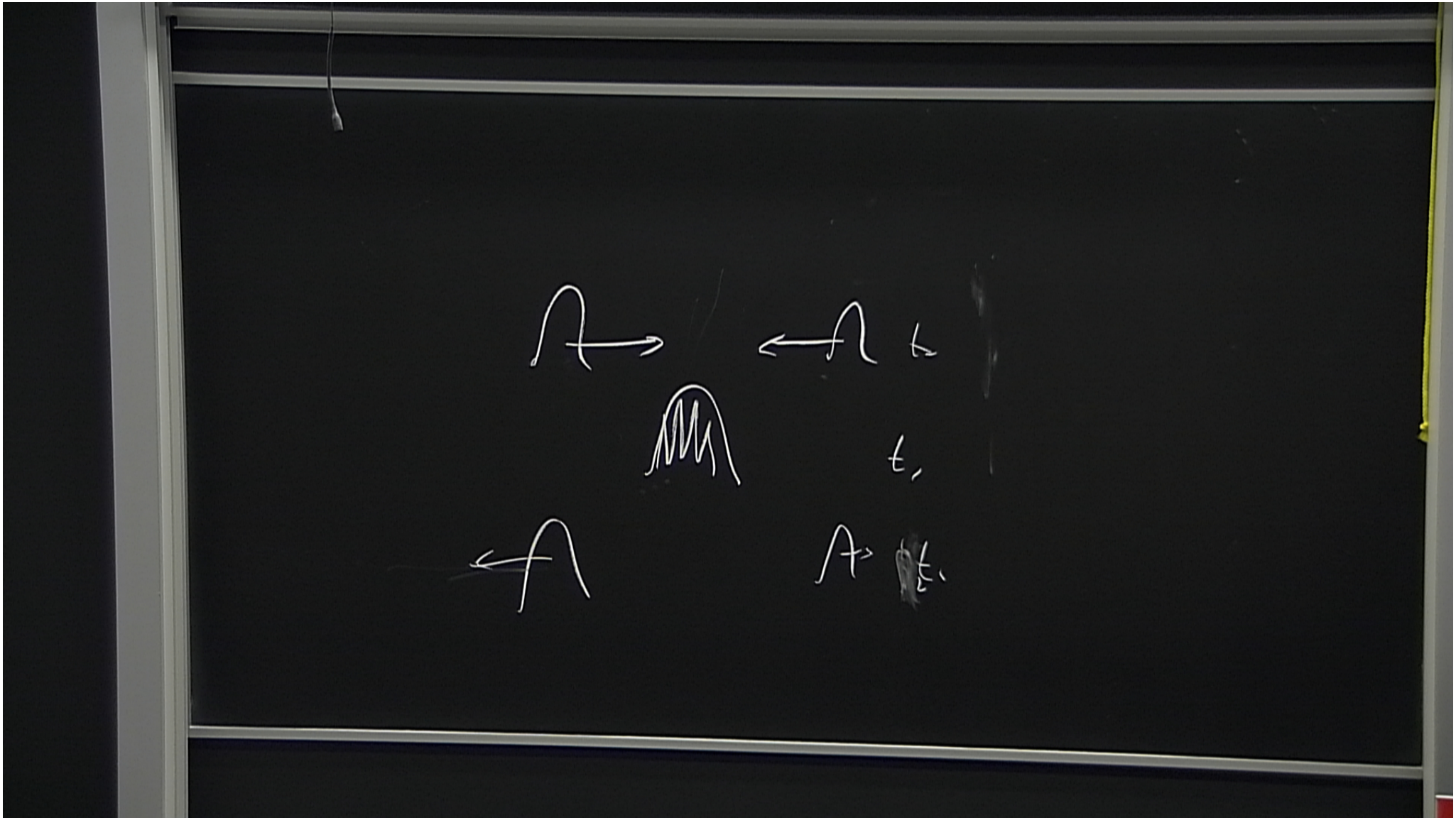

$\frac{\sum \hat{A}_n}{N}$
$\bar{\hat{A}}$.
$\frac{\sum \hat{O}_i^n(x)}{N}$
$|\psi(x)\rangle$

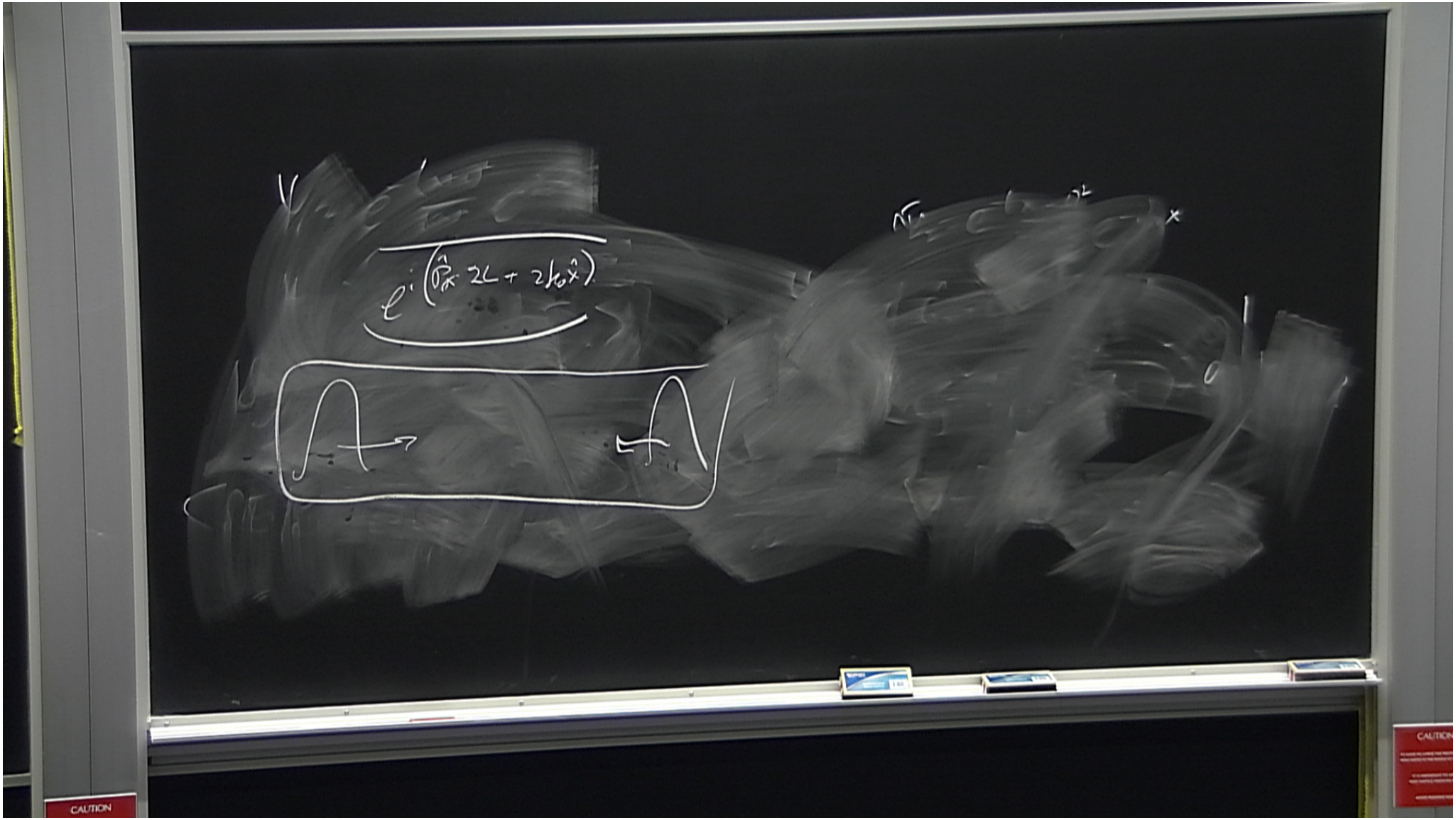

$\bar{\hat{A}} = \langle \Psi | \Phi_m \rangle \langle \Phi_n | \hat{A} | \Psi \rangle$
$= \langle \Psi | \Phi_m \rangle \langle \Phi_n | \Psi \rangle \frac{\langle \Phi_m | \hat{A} | \Psi \rangle}{\langle \Phi_m | \Psi \rangle} = \bar{\hat{A}}$
$\bar{\hat{A}} = \langle \Psi | \hat{A} | \Psi \rangle$
$\langle \hat{A} \rangle_\Psi = \frac{\langle \Psi | \hat{A} | \Psi \rangle}{\langle \Psi | \Psi \rangle}$

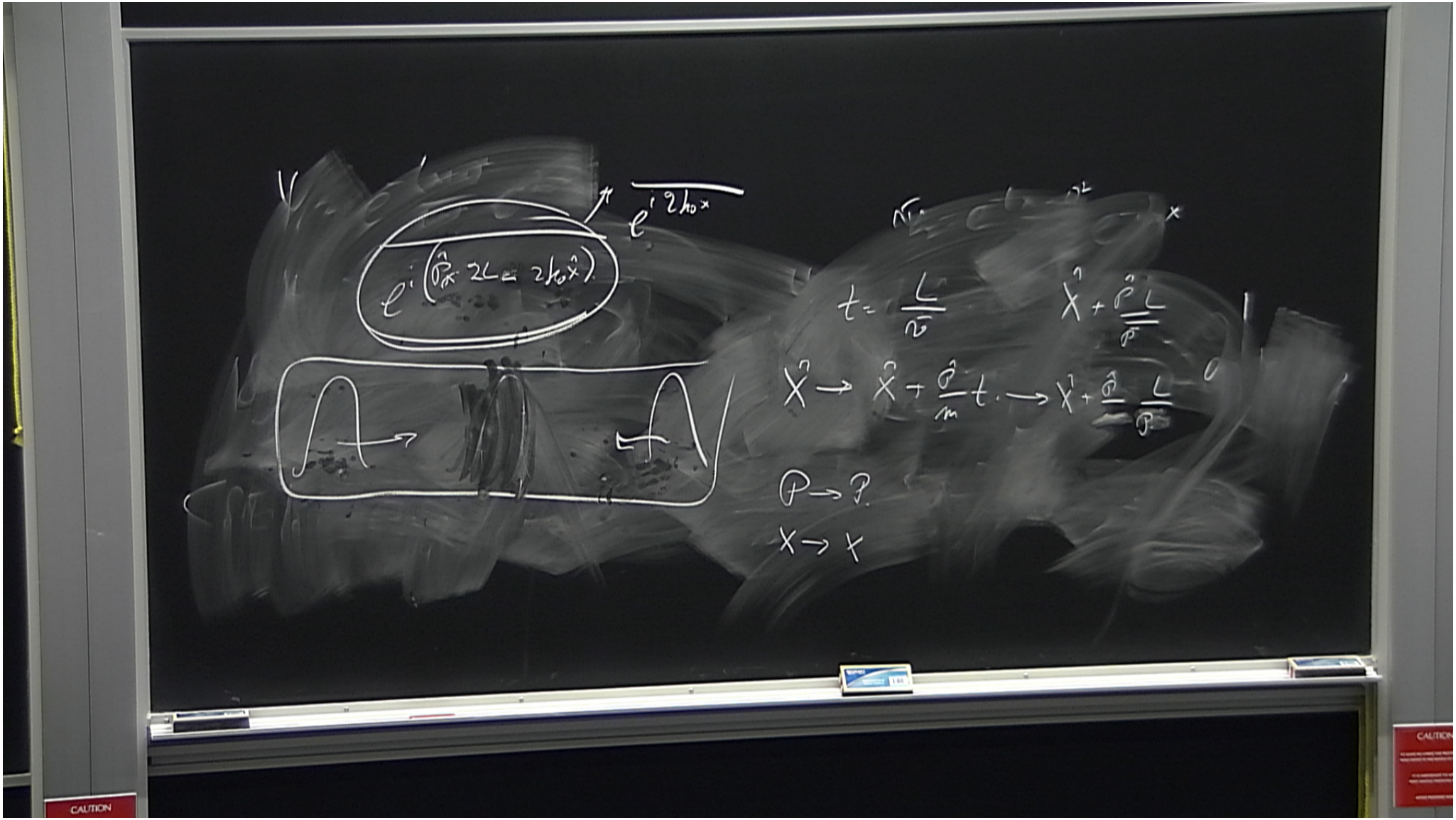

$\sigma_y = 1$
$\hat{\sigma}_x + \hat{\sigma}_y$
$\sigma_x = 1$
$\langle \sigma_y = 1 | \hat{\sigma}_x + \hat{\sigma}_y | \sigma_x = 1 \rangle$
$\langle \sigma_y = 1 | \sigma_x = 1 \rangle$
$= 2!$


$\psi_1 = e^{-\frac{(x+a)^2}{2\sigma^2}} e^{ik_0 x}$
$k_0 \gg \frac{1}{\sigma}$
ψ_1
$2L$
$\psi_2 = e^{-\frac{(x-a)^2}{2\sigma^2}} e^{-ik_0 x}$
ψ_2
x
$\frac{L}{v_0}$
CAUTION
CAUTION








$e^{i(\hat{p}_x 2L = 2k_0 \hat{x})}$
$e^{i 2k_0 x}$
$t = \frac{L}{v}$
$\hat{x} + \frac{\hat{p}}{m} t \to \hat{x} + \frac{\hat{p}}{m} \frac{L}{v}$
$\hat{p} \to ?$
$x \to x$