Title: PSI 2015/2016 Explorations in Quantum Information - David Cory - 5

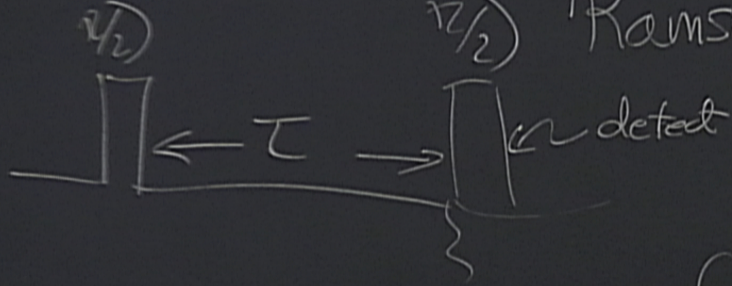
Date: Mar 28, 2016 09:00 AM

URL: http://pirsa.org/16030004

Abstract:

local fields

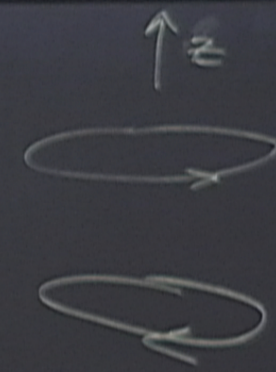
Ramsey



$$M_{x,y}(\tau) = \int P(B_{local})\, e^{i\gamma B_{local}\tau}\, e^{-\tau/T_2}\, dB_{local}$$

$\partial B_z / \partial z$; $B(z) = B_0 + z\, \partial B_z / \partial z$

introduces a correlation between the spin ϕ and its location.

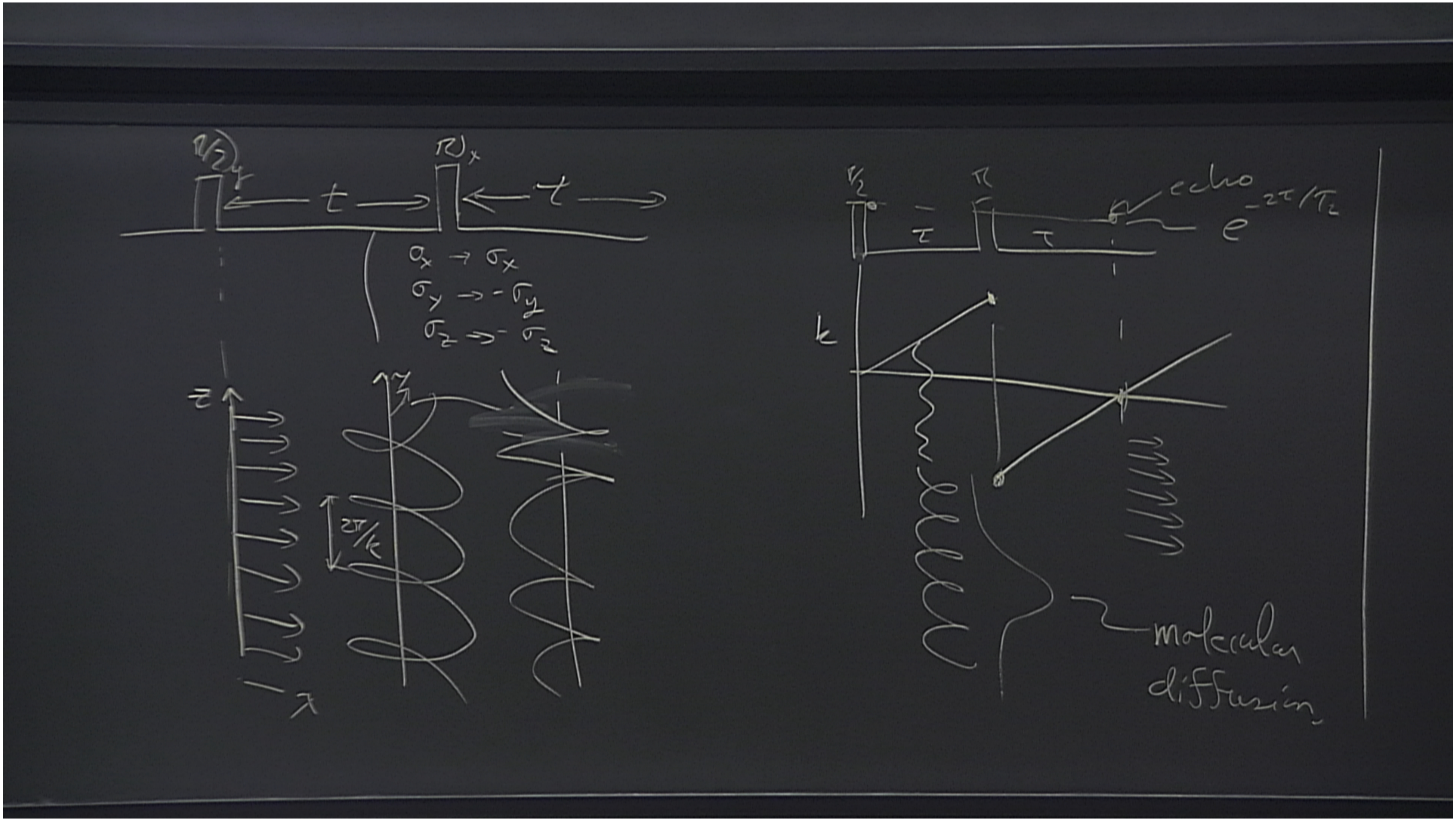


B_{local}

$$e^{i\gamma \frac{\partial B_z}{\partial z} z t} \quad ; \quad k = \gamma \frac{\partial B_z}{\partial z} t$$

$\frac{2\pi \cdot Hz}{G}$ $\quad \frac{G}{cm}$ $\quad cm$ $\quad s$

$$e^{ik(t)z}$$



π/2)y
π)x
t
t
σx → σx
σy → -σy
σz → -σz
z
x
2π/k
π/2
π
echo
e^{-2τ/T2}
τ
τ
k
molecular diffusion

echo $\sim e^{-2\tau/T_2}$

molecular diffusion

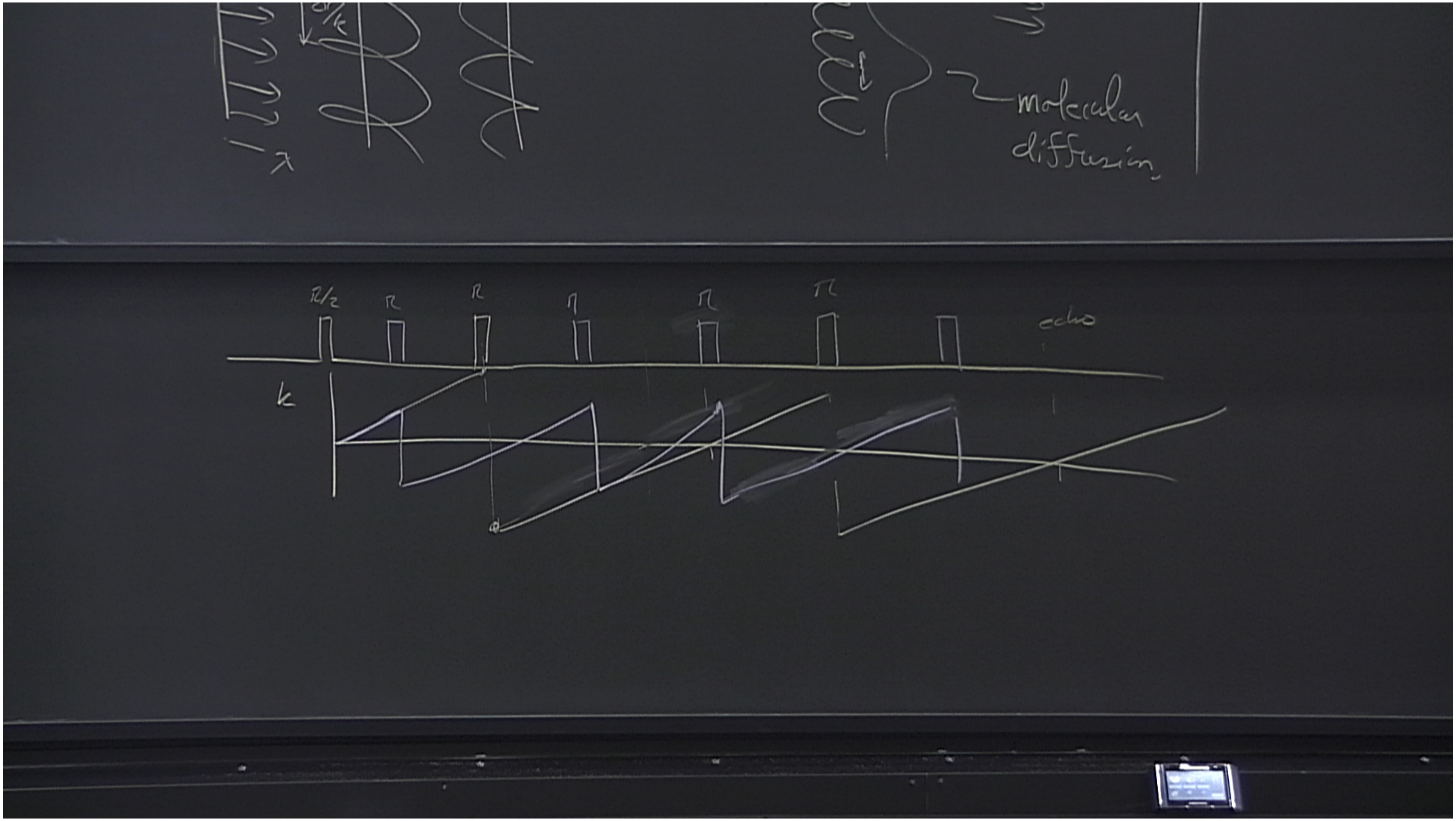
$$P(z,t) = \frac{1}{\sqrt{2\pi}\,\sigma} e^{-\frac{z^2}{2\sigma^2}} \; ; \quad \sigma = \sqrt{2Dt}$$

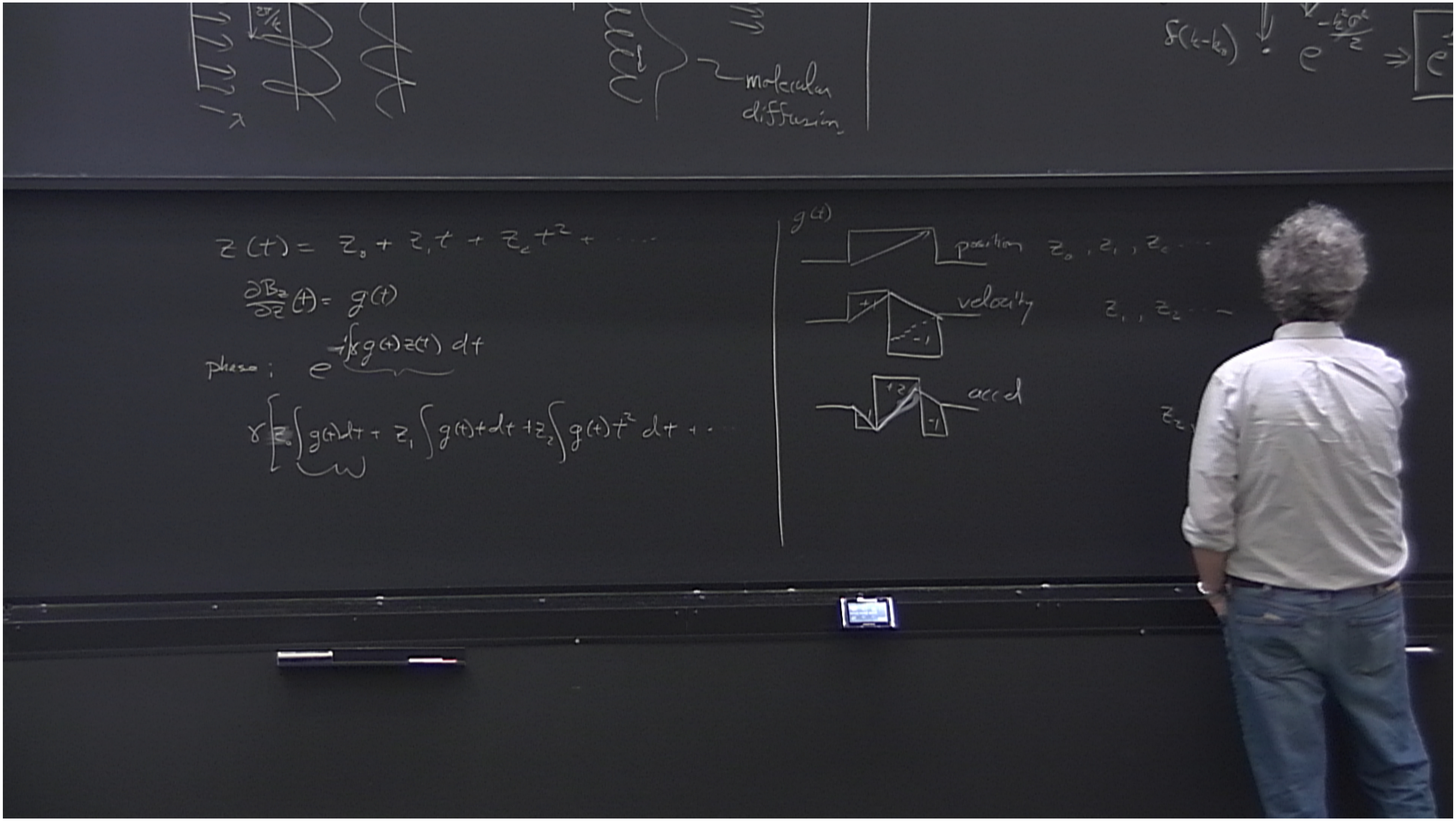
$$\boxed{A = e^{-k_0^2 D t}}$$

$$\sigma_x \xrightarrow{\frac{\partial B_z}{\partial z},\, t} e^{-ik_0 z} \xrightarrow{\otimes\, P(z,t)} e^{-\frac{k_0^2\sigma^2}{2}}\, e^{-ik_0 z}$$

$$e^{-ik_0 z} \Updownarrow \delta(k-k_0) \cdot e^{-\frac{k^2\sigma^2}{2}} \Rightarrow \boxed{e^{-\frac{k_0^2\sigma^2}{2}}}$$

attenuation of the grating


molecular
diffusion
π/2
π
π
π
π
π
echo
k

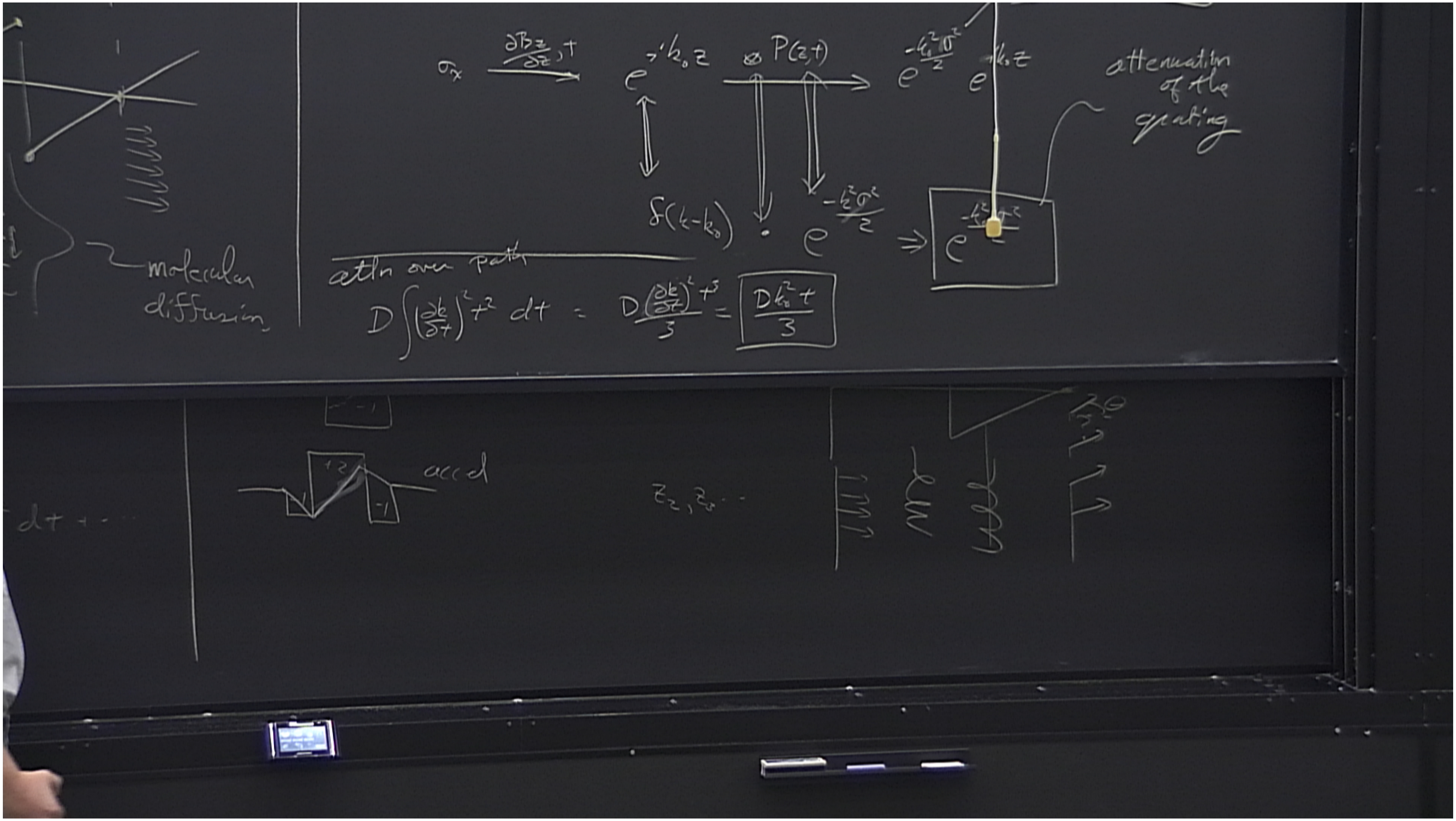

molecular diffusion
z(t) = z0 + z1 t + z2 t^2 + ...
g(t)
phase
position z0, z1, z2 ...
velocity z1, z2 ...
accel

$$z(t) = z_0 + z_1 t + z_2 t^2 + \cdots$$

$$\frac{\partial B_z}{\partial z}(t) = g(t)$$

phase ; $e^{-i \underbrace{\int \gamma\, g(t)\, z(t)\, dt}}$

$$\gamma \left[z_0 \underbrace{\int g(t)\, dt}_{\omega} + z_1 \int g(t)\, t\, dt + z_2 \int g(t)\, t^2\, dt + \cdots \right.$$


attenuation of the grating
molecular diffusion
attn over path
accel