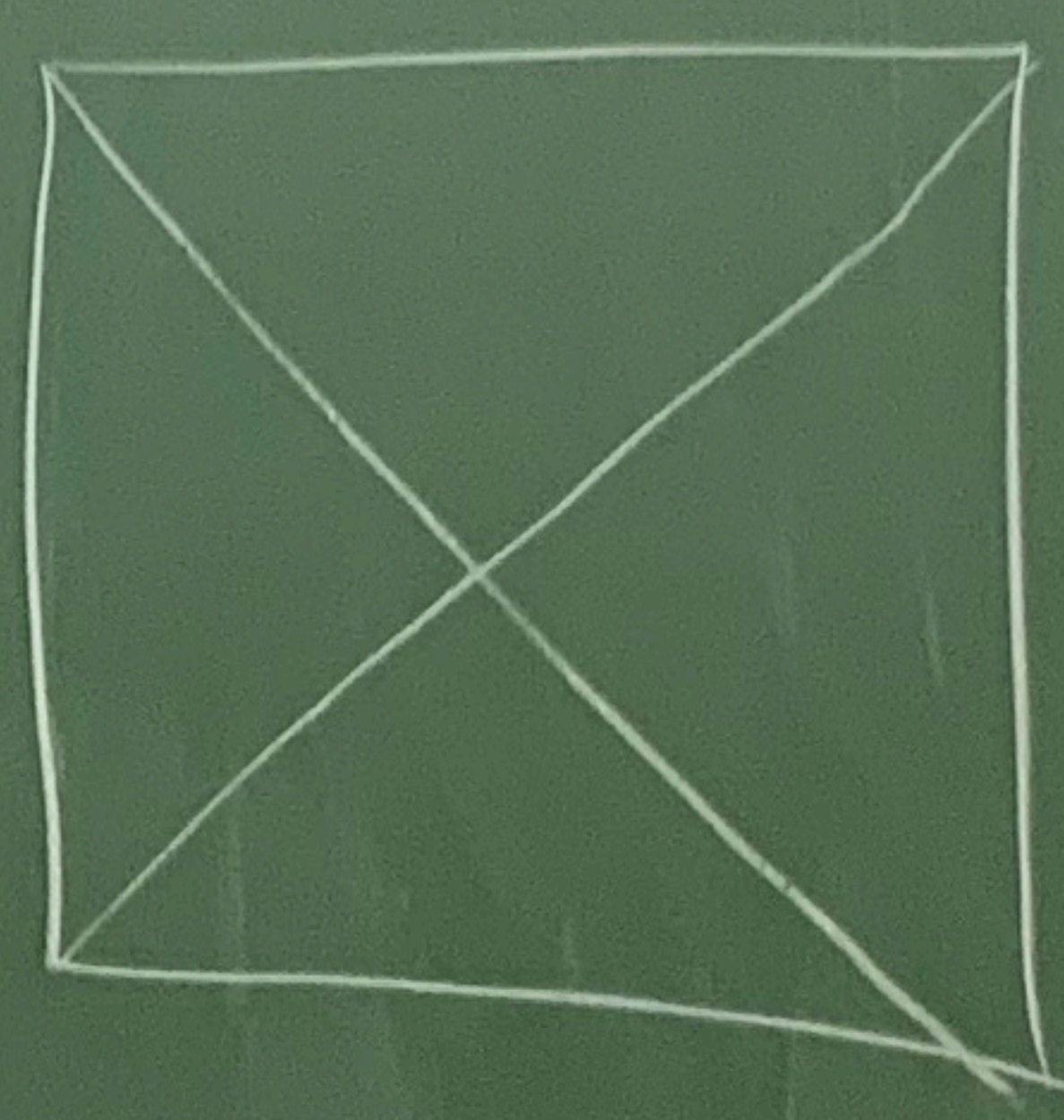


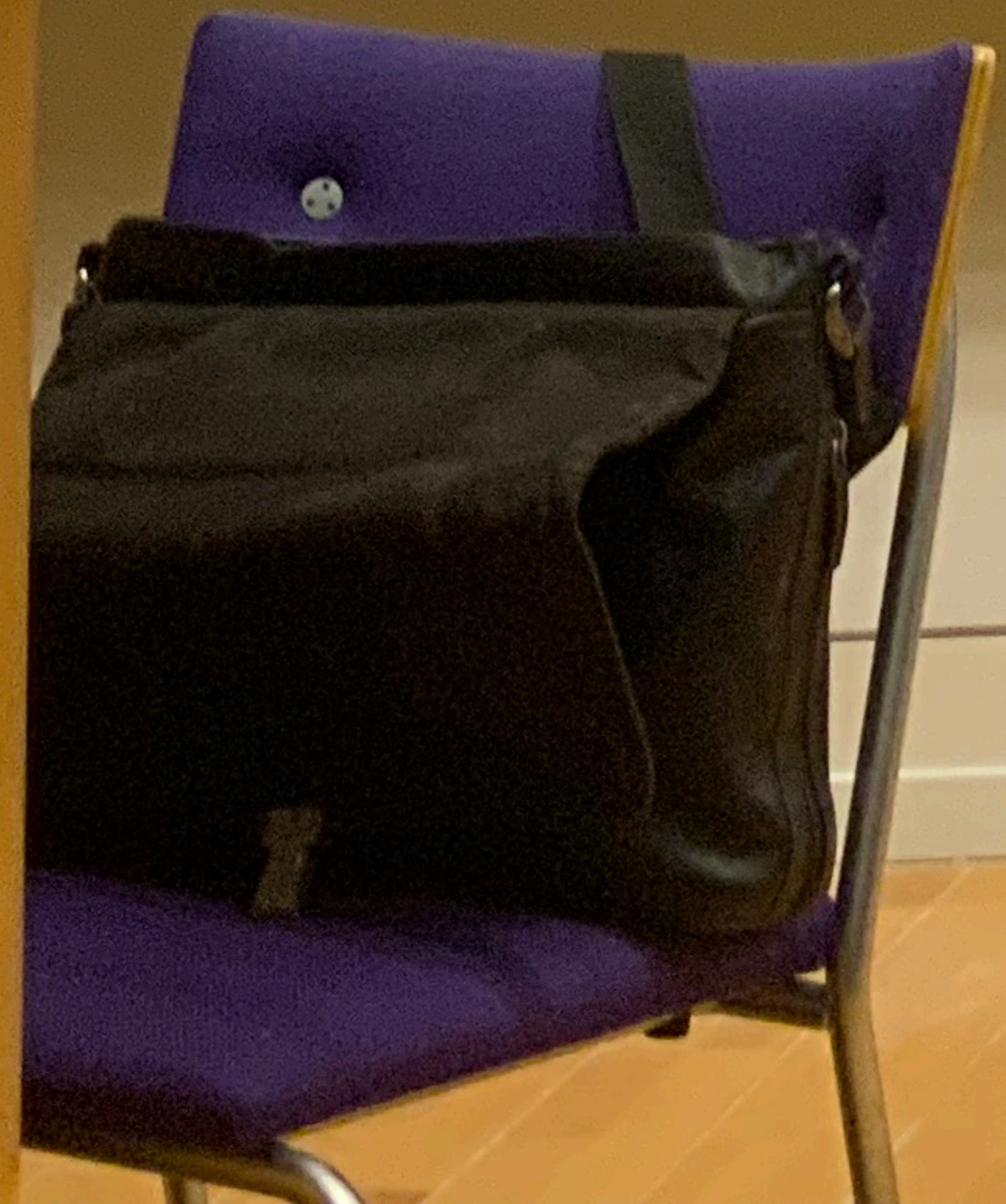
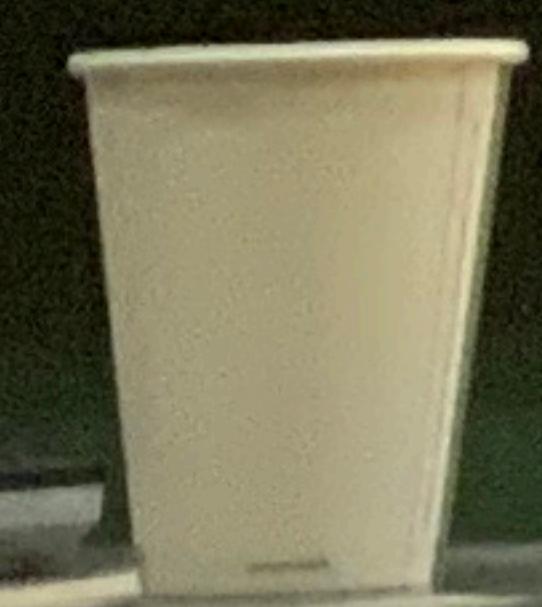
Operator Algebras & Information in dS.

by Jeremy van der Meijden.



Fulltouch

풀터치 분필



$$|\psi_{\text{MAX}}\rangle = \frac{1}{\sqrt{d}} \sum_{i=1}^d |i\rangle |i\rangle$$

$$a|\psi_{\text{MAX}}\rangle = \frac{1}{\sqrt{d}} \sum_{i,j} a_{ij} |i\rangle |j\rangle$$

Inflation of $dS \Leftrightarrow$ Quantum Chaos

$$e^{tH}$$

$$\beta = \frac{2\pi}{H}$$

$$e^{\lambda t}$$

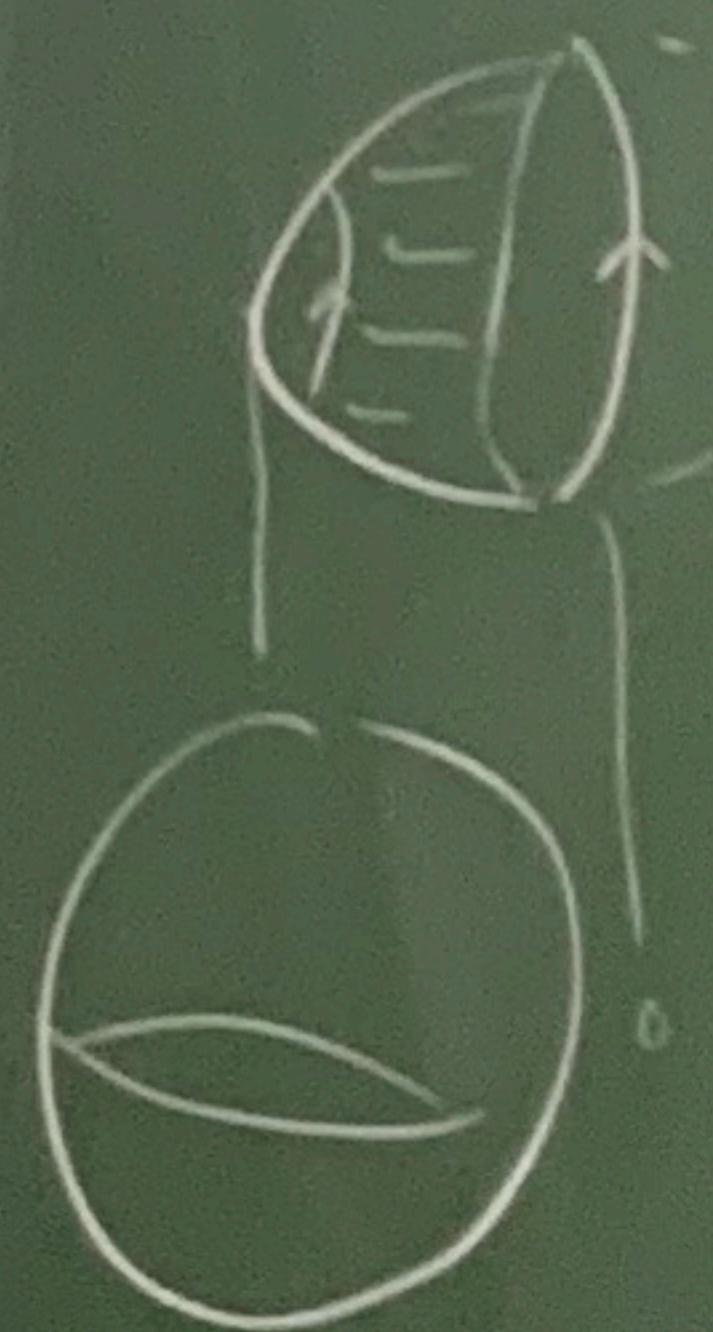
$$\lambda = \frac{2\pi}{\beta}$$

Scrambling time $t_s = \frac{1}{H} \log S_{dS}$

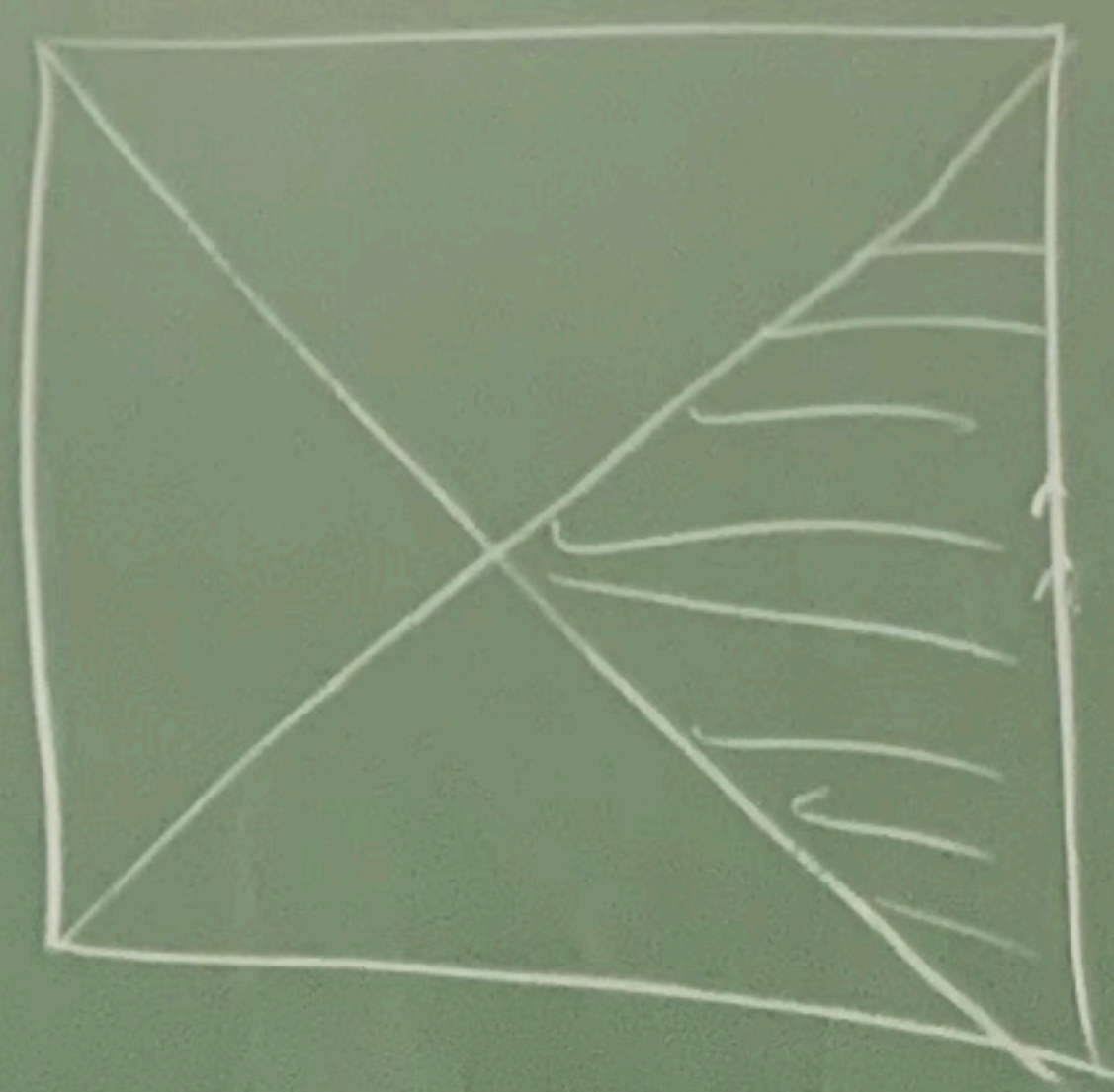
OTOC $\langle [a(t), b(t)]^2 \rangle \rightarrow$ shock waves

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$$\rho = \frac{e^{-\beta \hat{H}}}{Z}$$



type I $|4\rangle = \frac{1}{\sqrt{Z}} \sum_i e^{-\frac{\beta E_i}{2}} |E_i\rangle |\tilde{E}_i\rangle \Rightarrow S_{ent} = \frac{A}{4G} + S_{QFT}$

type III \rightarrow type II₁

~~$$A \times A_0 \times \mathbb{R}_t$$~~

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$$S_{\text{sdS}} = S_{\text{dS}} - \beta M + \frac{A_{\text{hor}}}{4G}$$

Inflationary dS \Leftrightarrow Quantum Chaos

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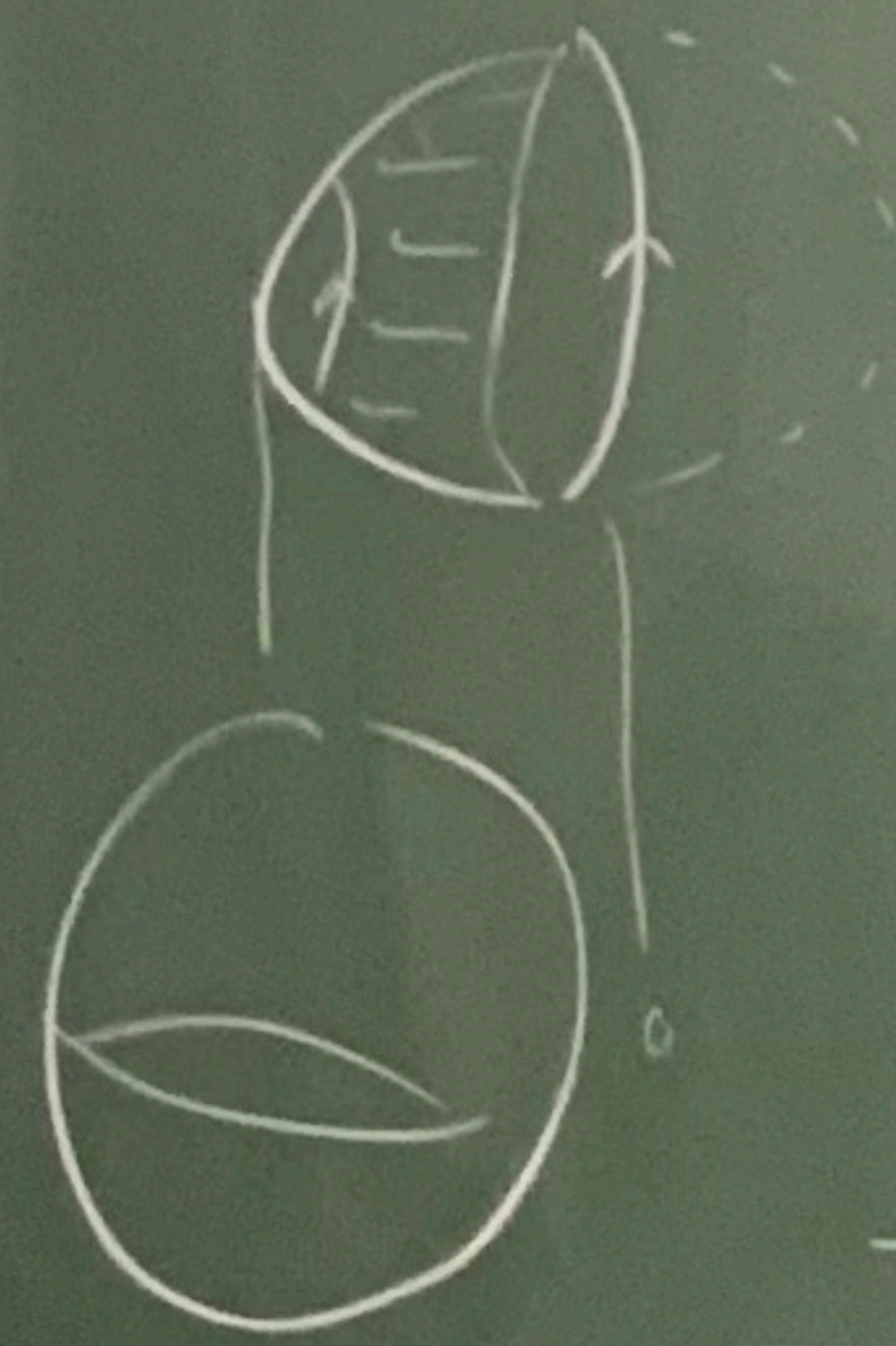
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Operator Algebras & Information in dS.

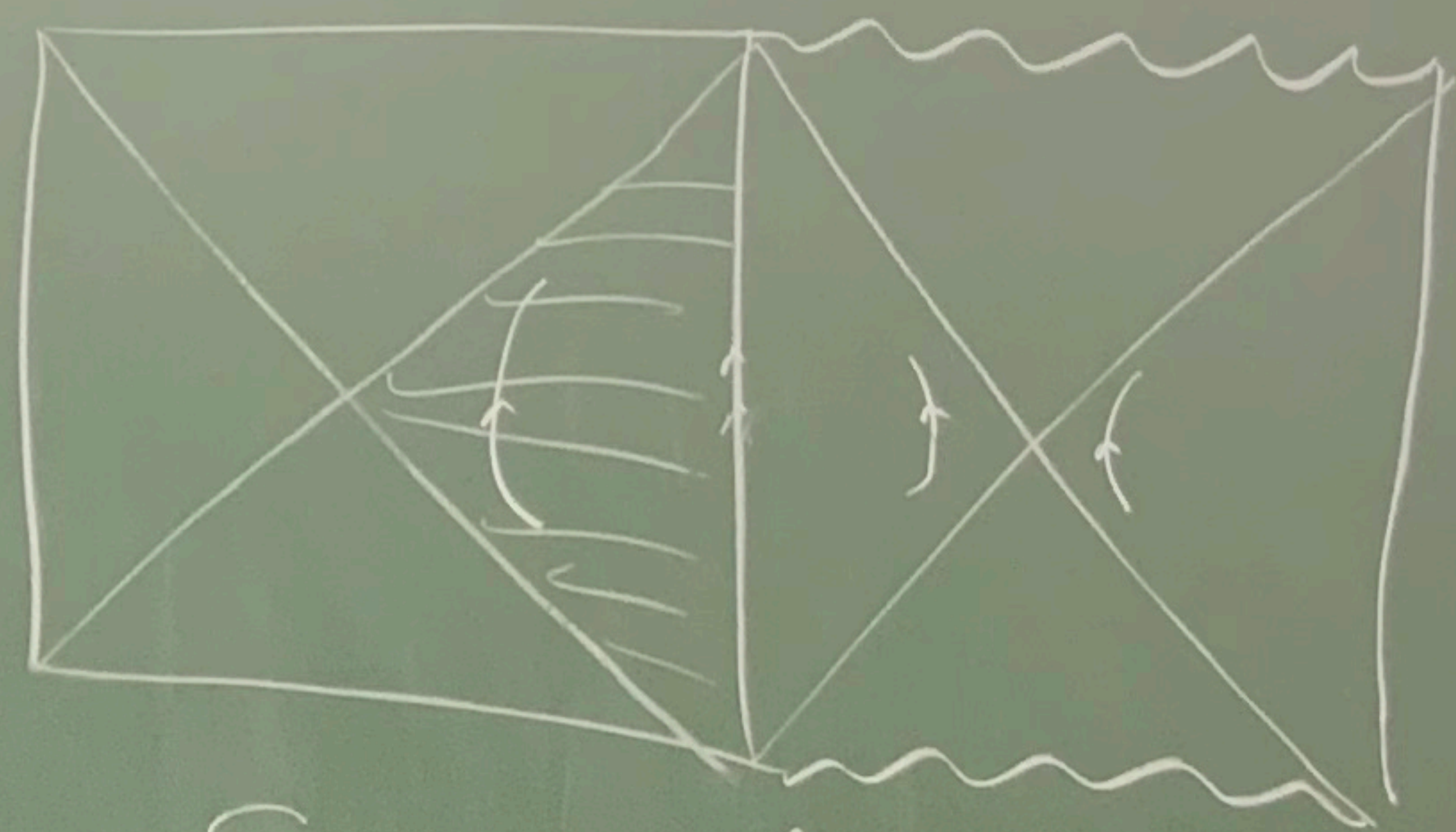
Jeremy van der Heyden



$$\rho = \frac{e^{-\beta \hat{H}}}{Z}$$

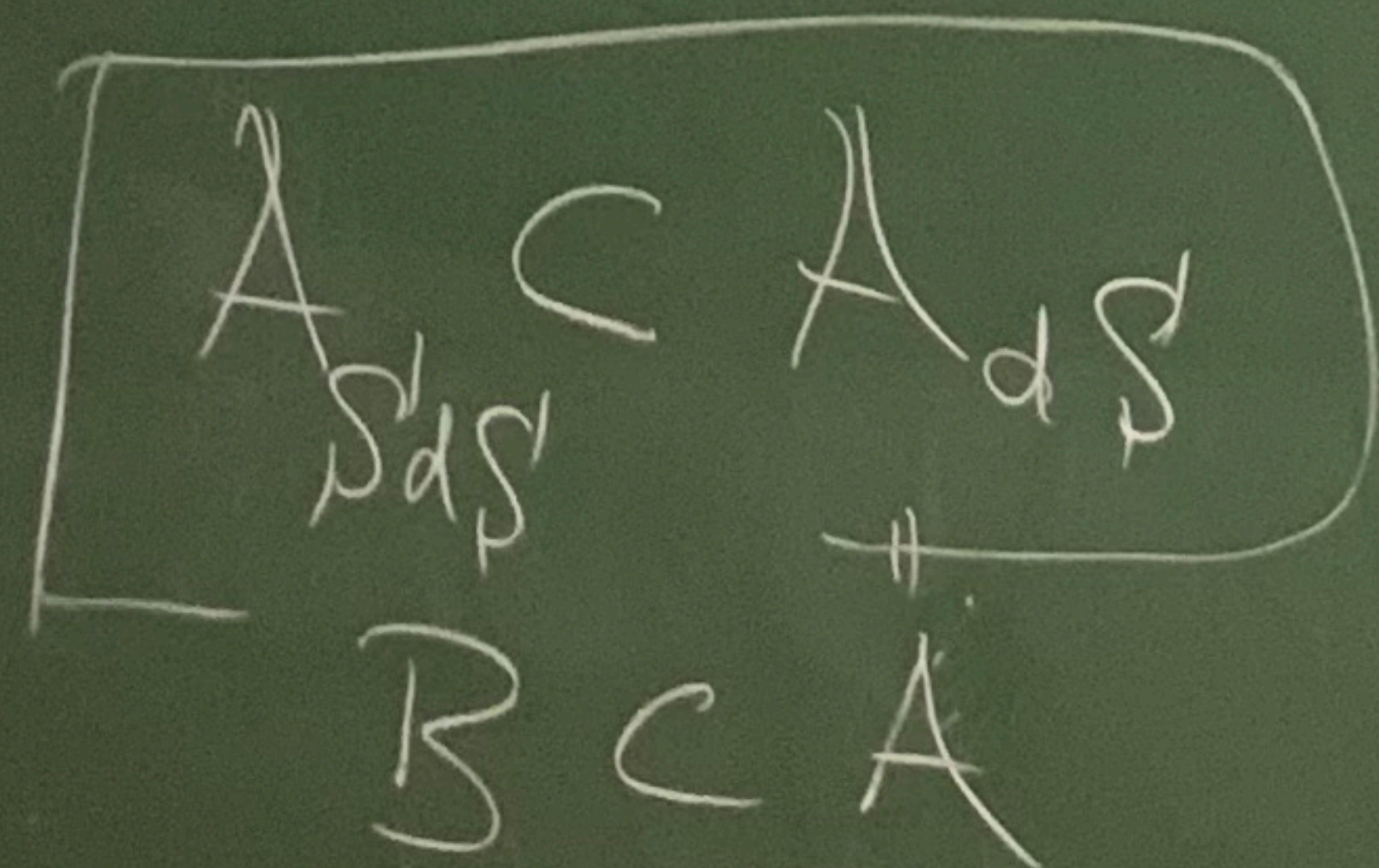
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type I



$$S_{ent} = \frac{A}{4G} + S_{QFT}$$

type III \rightarrow type II₁



~~$A \times A_0 \times \mathbb{R}_t$~~

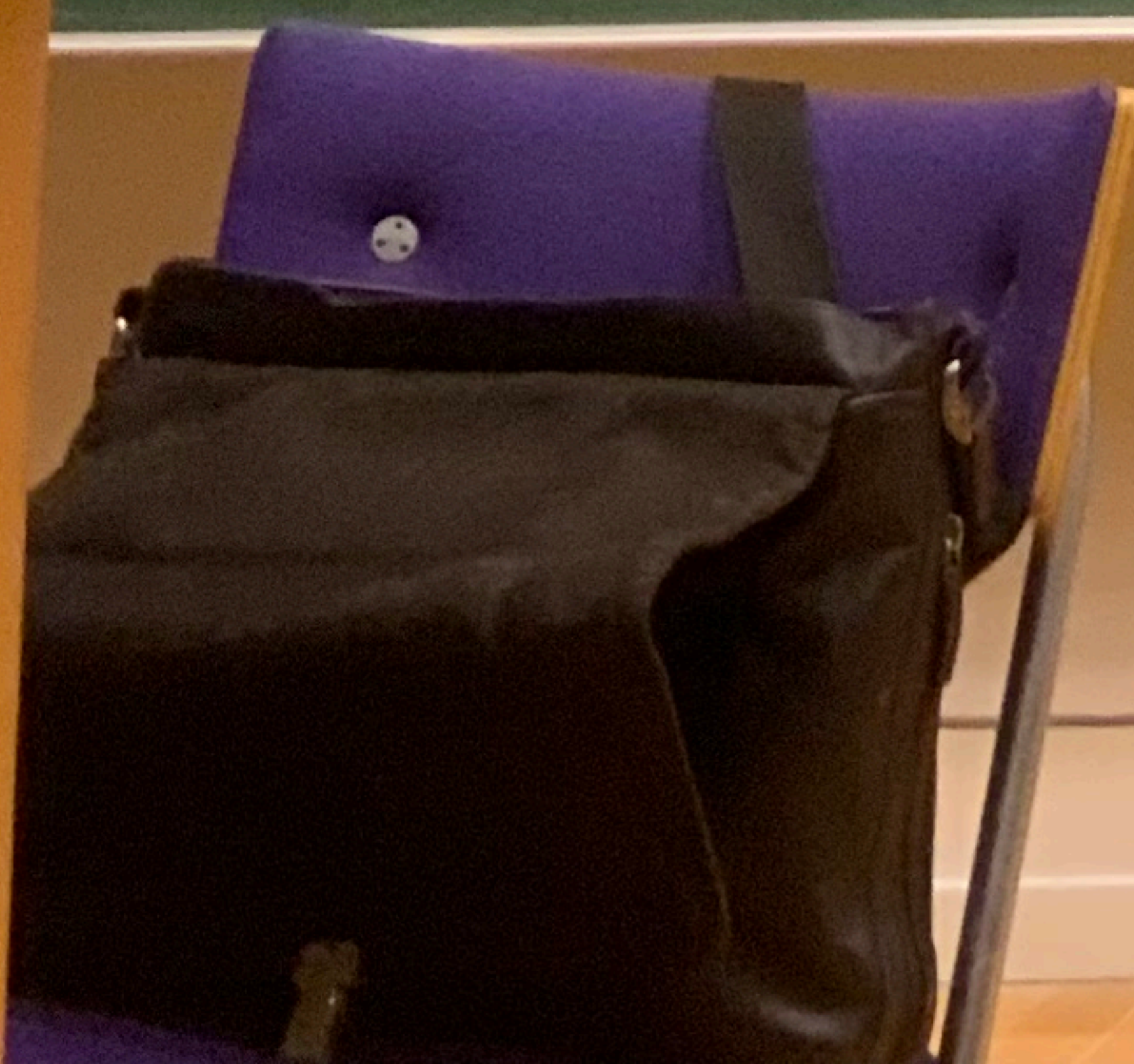
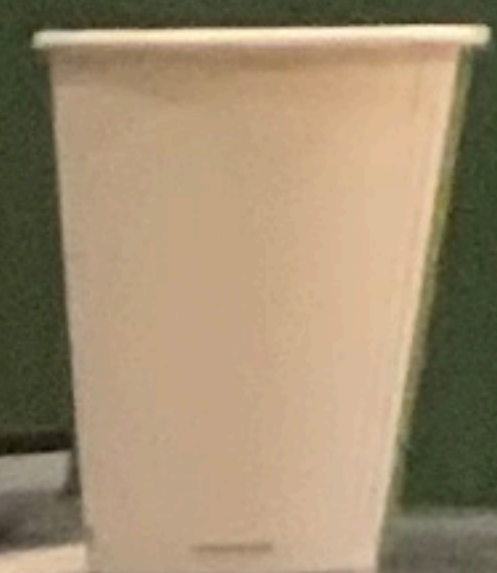
Same index

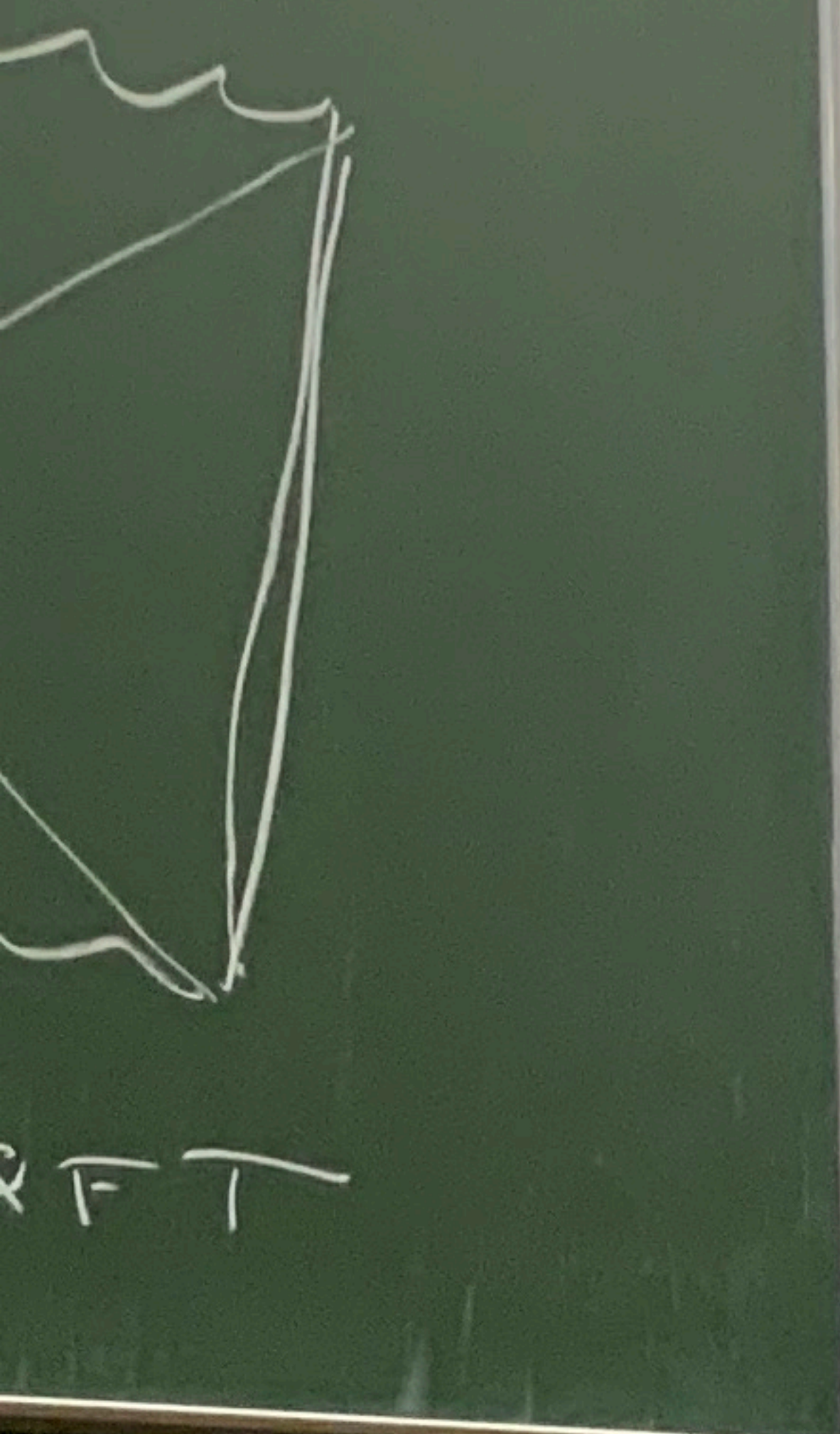
$$[A, B] = \frac{\dim \mathcal{H}_A}{\dim \mathcal{H}_B} = e^{(S_{dS} - S_{dS})} = e^{\beta M}$$

$$\sum_i \dots$$

$$\lim_{d \rightarrow \infty} \dots$$

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S_{dS})

$$\sum_i a_i O_i^R$$

$$\lim_{d \rightarrow \infty} M_{d \times d}$$

Temperley-Lieb algebra

$$e_i^2 = \delta e_i$$

$$e_0: \mathcal{H}_A \rightarrow \mathcal{H}_B$$

$$E(a) \in \mathcal{B}$$

$$e_0 |a\rangle = |E(a)\rangle$$

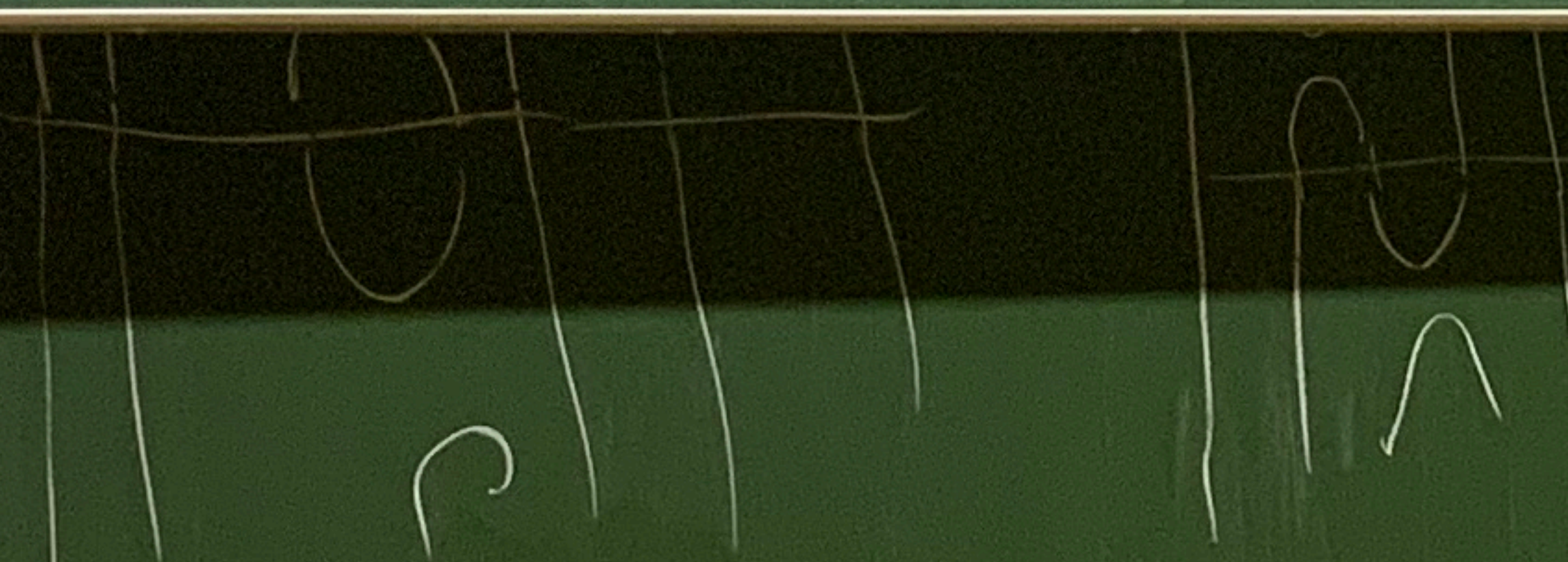
$$a |4\rangle, a \in A$$

$$b |4\rangle, b \in B$$

$$\mathcal{B} \supset \mathcal{A} \supset \mathcal{A}_0 \supset \mathcal{A}_1 \supset \mathcal{A}_2 \supset \mathcal{A}_3$$

$$A_i = \langle A, e_0 \rangle$$

$$A \supset A'$$



$$|\psi_{\max}\rangle = \frac{1}{\sqrt{d}} \sum_{i=1}^d |i\rangle |i\rangle$$

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OTOC $\langle [a(t), b(0)]^2 \rangle \rightarrow$ shadow