

Title: TA Session: Boundary Conditions and Defects in the BV formalism

Speakers: Dylan Butson

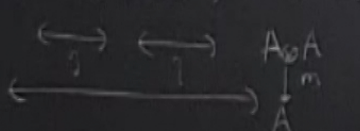

Collection: QFT for Mathematicians

Date: June 26, 2019 - 4:00 PM

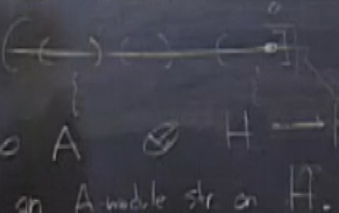
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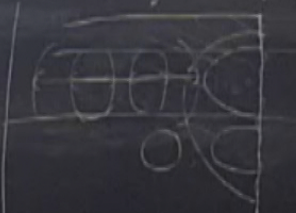
$QFT/M =$ " " P_0 -alg's $/M$
 $u \mapsto (\alpha(u)), \mathcal{E}, \mathcal{S}, \mathcal{D}$
 $[QFT/M =$ factorization BD_0 -alg's $/M$
 $u \mapsto (\alpha(u)), \mathcal{E}, \mathcal{S}, \mathcal{D} + \Delta$
 $QFT/M =$ " " E_0 -alg $/M$.
 $P_0 \rightarrow E_0$ analogous $P_1 \rightarrow E_1 \sim \text{Ass}$

$A \in$ Factorization E_1 -alg's $/N \hookrightarrow$ Fact alg's on $/M$
 $H \in$ Fact E_0 -alg $/N$
 $\text{Fact } P_1$ -alg $/N \hookrightarrow$ Fact P_0 -alg's $/M$
 Lyapunov \downarrow
 $\text{Fact } P_0$ -alg $/N$

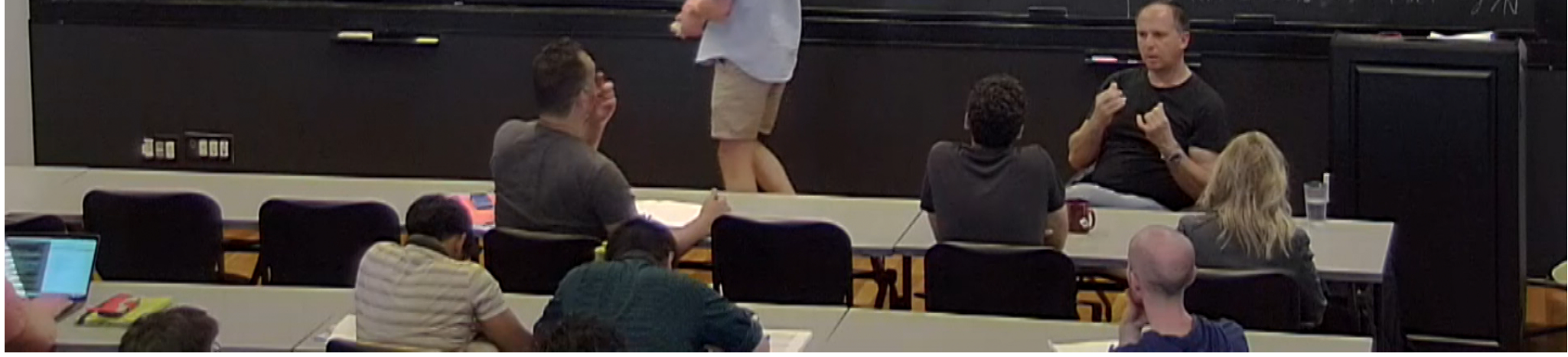
$TFT/M =$ loc const. Fact alg $/M$
 when $M = \mathbb{R}^n$, $\hookrightarrow E_n$ -alg



 \sim "top" OPE rep

On $\mathbb{R}_{>0}$, consider loc const Fact alg $M = \mathbb{R}_{>0} \times N$


 $\rho: A \otimes H \rightarrow H$
 an A -module str on H .


 \Rightarrow Part of data is Fact alg $/N$



Def: A (reg^d embedded) boundary condition for E
 is a Lagrangian sub-bundle $L \hookrightarrow E^{\circ}$ over $N = \mathcal{D}M$.

$$\frac{A}{N} : U_1 \rightarrow \mathcal{O}(L(U)) \text{ is fact } P_0 \rightarrow \mathcal{D}N$$

$$\begin{aligned} \Pi \in \text{PV}_*(L)[1] &= \mathcal{O}(TL)[1] \Rightarrow S \quad \{S^{\text{cov}}, S, \dots\} \\ \Sigma &= (TL, \underline{Q} = \xi S, -\xi) \Rightarrow T_{\Pi}L \end{aligned}$$

$\xrightarrow{\text{Poisson}} \Pi \text{ hdy}$

$$(\mathcal{E} \circ \mathcal{L}^{\circ}, L) \rightarrow \Pi$$

$$(L, \Pi) \rightarrow T_{\Pi}L = \mathcal{E}^{\circ}, \mathcal{E} = \mathcal{O}_{\Pi} \otimes \mathcal{E}^{\circ}$$

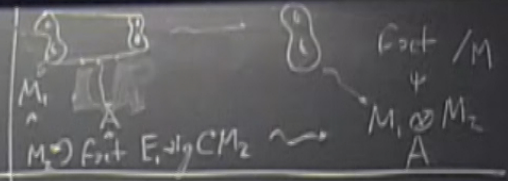
*Universal
Birkhoff
Theory*

P_0 even centre $\sim P_0$ of $\mathcal{D}N$.

$A \in \text{Factorization } E_1\text{-alg's } / N$

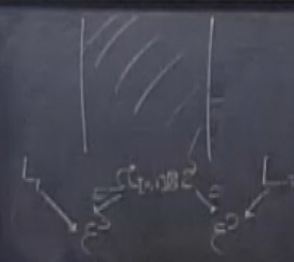
$$\frac{H \in \text{Fact } E_0\text{-alg } / N}{\text{Lagrangian } \downarrow}$$

$$\frac{\text{Fact } P_1\text{-alg } / N}{\text{Fact } P_0\text{-alg } / N}$$



$$L \times L = L \times \mathcal{E} \times L$$

\mathcal{O} -shifted \sim -1 -shifted



$$\begin{aligned} \Sigma &= T_0 \text{ Maps}(T_0 \mathbb{R}^n \times \mathbb{R}^n, T^*X) \\ \mathcal{E} &= T_0 \text{ Maps}(\Pi_{\text{hor}}, T^*X) \\ L &= T_0 \text{ Maps}(\Pi_{\text{hor}}, X) \\ L \times L &= T_0 \text{ Maps}(\Pi_{\text{hor}}, T^*X) \end{aligned}$$

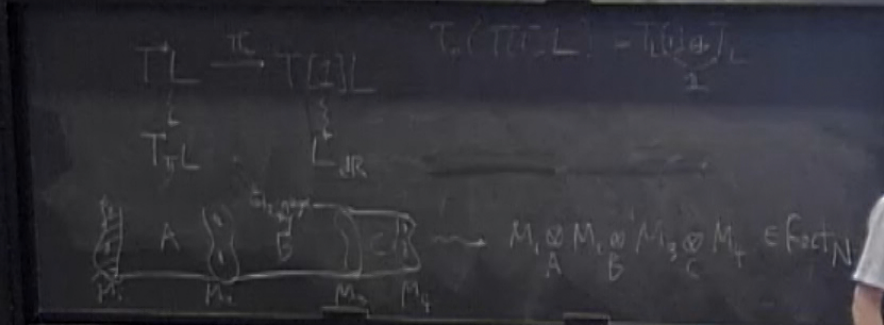


Defⁿ A (reg^d embedded) boundary condition for E
 \Rightarrow Lagrangian subbundle $L \hookrightarrow E^{\circ}$ over $N = \partial M$.

A: $U_1 \rightarrow \mathcal{O}(L|_{U_1})$ a fact $P_0 \rightarrow \mathcal{O}_N$

$$\Pi \circ PV_{\mathbb{R}}(L)[1] = \mathcal{O}(TL)[1] \cong S \quad \{S^{\oplus 2}, S, \dots\}$$

$$E^{\circ} = (TL, \underline{Q} = \{S, -\frac{3}{2}\}) \cong T_{\Pi} L \quad \text{Poisson}$$



$$E = T_0 \text{Maps}([0,1] \times \mathbb{R}^2, T^*(X))$$

$$E^{\circ} = T_0 \text{Maps}(\mathbb{R}^2, T^*(X))$$

$$L = T_0 \text{Maps}(\mathbb{R}^2, X) \quad \tilde{L} = T_0 \text{Maps}(\mathbb{R}^2, T^*(X))$$

$$L \times L = T_0 \text{Maps}(\mathbb{R}^2, T^*(X)), \quad L \times \tilde{L} = \text{Maps}(\mathbb{R}^2, \mathcal{O}(X))$$

for SQM \hookrightarrow superpotential W

$$L = \Omega^1_{\mathbb{R}^2} \otimes \mathcal{O} \quad T(L) = \mathcal{O}(L|L)$$

$$E^{\circ} = T_0 L = \Omega^1_{\mathbb{R}^2} \otimes (\mathcal{O} \oplus \mathcal{O}[1])$$

$$\text{Map}(\mathbb{R}^2, E^{\circ}) = \text{Map}(M^1, T_{\mathbb{R}^2} \mathbb{R}^2)$$

geom \hookrightarrow hW twist of $4d$ $N=4$

BC₀ \hookrightarrow choice of PL_{00} determines path integral contour for ch boundary theory at 0

