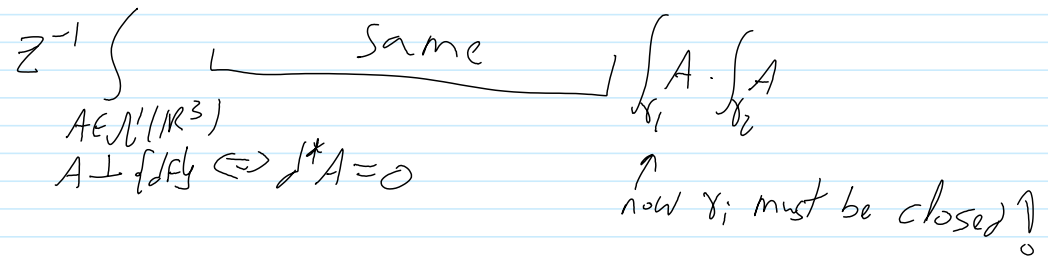


2/1 a o b 10

$$\Lambda: V \rightarrow V^*, \text{ symmetric k.p.d.}, \varphi_1, \varphi_2 \in V^*, Z := \int_{x \in V} dx e^{-\frac{1}{2} v \cdot \Lambda v},$$

$$\text{Then } Z^{-1} \int_{x \in V} dx e^{-\frac{1}{2} v \cdot \Lambda v} \varphi_1(v) \varphi_2(v) = \varphi_1 \Lambda^{-1} \varphi_2$$

$$Z(\varphi_1, \varphi_2) := Z^{-1} \int_{A \in \mathcal{L}'(\mathbb{R}^3)} \mathcal{D}A e^{\frac{i}{4\pi} \int_{\mathbb{R}^3} A \wedge dA} \int_{\gamma_1} A \cdot \int_{\gamma_2} A = C \langle \varphi_1, \Lambda^{-1} \varphi_2 \rangle$$



$$\{A \in \mathcal{L}'(\mathbb{R}^3) : \int^* A = 0\}^* = \mathcal{L}^2(\mathbb{R}^3) /$$

$$(\ker L)^* = \begin{matrix} v \xrightarrow{L} w & w \subset V & w^* = V^* / w^\perp \end{matrix}$$

$$\mathbb{R}, \int^* A$$

More precisely, $\Lambda: \{1\text{-forms}\} \rightarrow \langle \text{currents} \rangle$ $\downarrow d$ $\{2\text{-forms}\}$ $\int \alpha = \int j \cdot \vec{r}$ $\begin{matrix} \alpha \\ 0 \end{matrix}$

$\Lambda^{-1} \sim \int^{-1}: \langle \text{currents} \rangle \rightarrow \mathcal{L}^1$

$j \rightarrow$ the 1-form λ s.t.

$$\int_{\partial D} \lambda = \int_D d\lambda = \int_D j \cdot \vec{n}$$

$\Lambda^{-1}\gamma_2$: The 1-form λ whose integral around a small loop ∂D is 1 iff γ_2 pierces D positively.

$$\langle \gamma_1 | \Lambda^{-1} \gamma_2 \rangle = \ell(\gamma_1, \gamma_2) \quad \Downarrow$$

Claim IF $\alpha \in \mathcal{L}^2(\mathbb{R}^3)$ & $d\alpha = 0$, consider

$$\phi: \mathbb{R}_x^3 \times \mathbb{R}_y^3 \rightarrow S^2 \quad (x, y) \mapsto \frac{x-y}{\|x-y\|} \quad w \text{ vol. on } S^2$$

$\pi_{xy}: \mathbb{R}_x^3 \times \mathbb{R}_y^3 \rightarrow \mathbb{R}_x^3, \mathbb{R}_y^3$ projections
and set

$$\sigma = \int_{\mathbb{R}_y^3} (\phi^*(w) \wedge \pi_y^* \alpha) \in \mathcal{L}^1(\mathbb{R}_x^3)$$

then $d\sigma = \alpha$

↖ "a formula for d^{-1} "