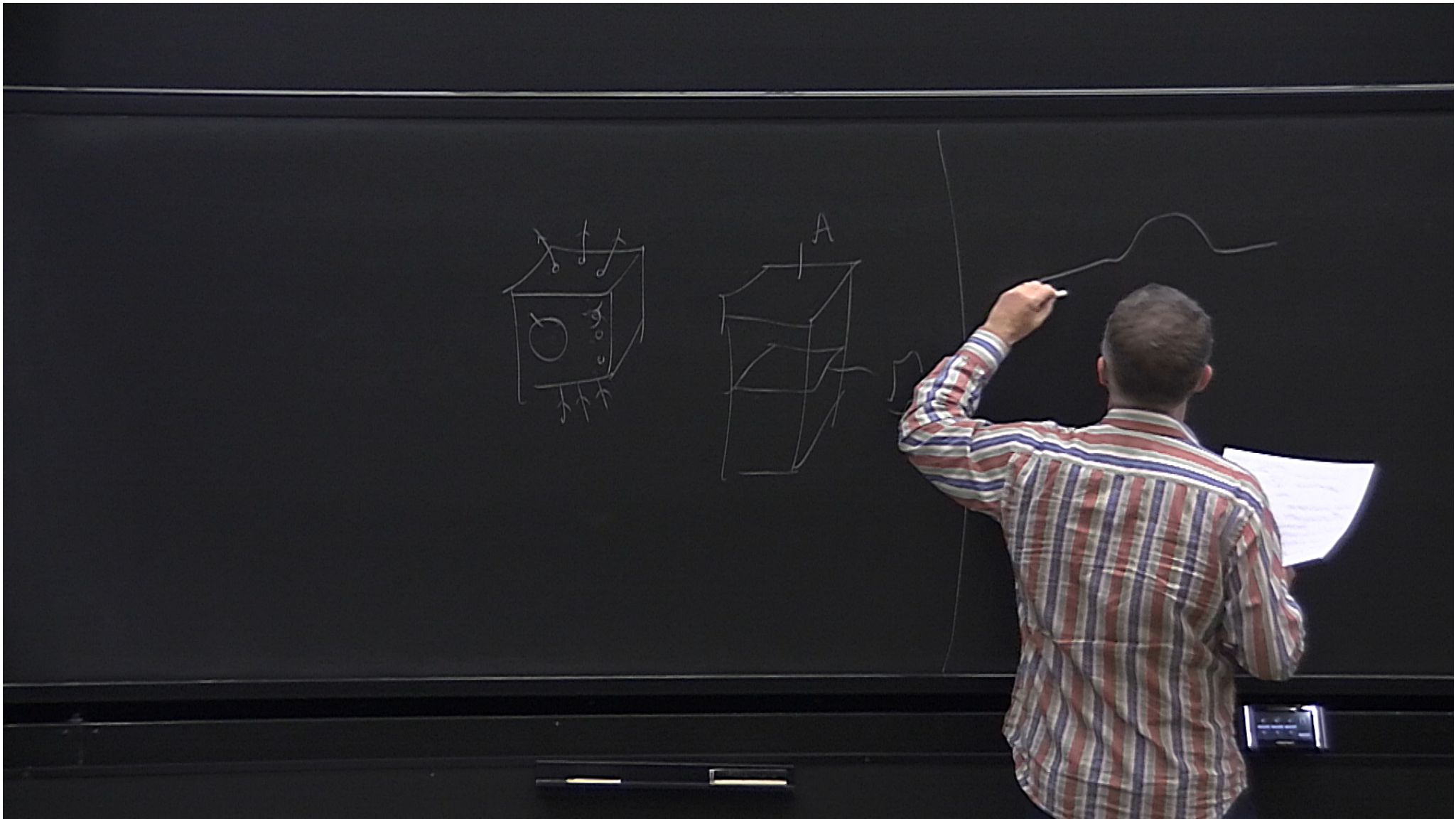


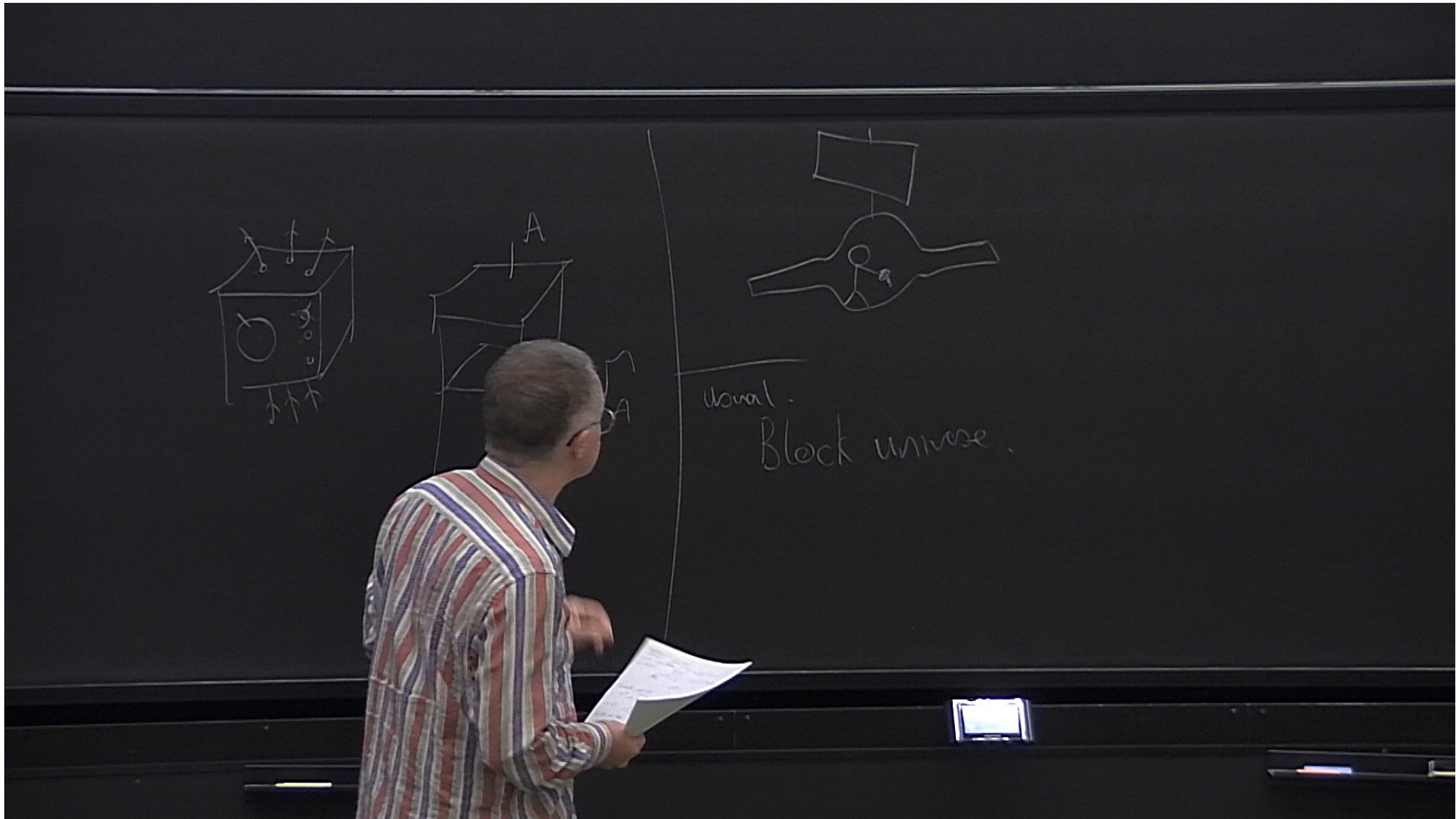
Title: Operational General Relativity - Lecture 5

Date: Nov 10, 2017 02:00 PM

URL: <http://pirsa.org/17110060>

Abstract:







noise.

$$T^{mv}[\text{ship}] = \rho[\text{ship}] U^m[\text{ship}] U^v[\text{ship}]$$

$$T^{mv}[\text{wind}] = \rho[\text{wind}] U^m[\text{wind}] U^v[\text{wind}]$$

$$\nabla_\mu T^{\mu\nu}_{\text{ship}} = G^\nu, \quad \nabla_\mu T^{\mu\nu}_{\text{wind}} = -G^\nu, \quad G^{\mu\nu} = \text{Pf}\left(T^{\mu\nu}_{\text{ship}} + T^{\mu\nu}_{\text{wind}}\right)$$

$$\nabla_\mu T^{\mu\nu}[\text{ship}] = G^\nu, \quad \nabla_\mu T^{\mu\nu}[\text{wind}] = -G^\nu,$$

where G^μ is controlled by X^μ

and (for example)

$$G^\mu = X^\mu X^\alpha \rho[\text{wind}] U_\alpha[\text{wind}]$$

$$-G^{\nu}, \quad G^{\mu\nu} = 8\pi \left(T^{\mu\nu}_{\text{(ship)}} + T^{\mu\nu}_{\text{(wind)}} \right)$$

χ^{μ} is an agency field.

$$G^m = X^m X^\alpha \rho[\text{wind}] U_\alpha[\text{wind}]$$

Proceed as follows. Have some set Σ . Define $\underline{X} = (X^1, X^2, \dots, X^N)$

Write

$$X^n = \frac{\partial X^n}{\partial x^m} X^m$$

$$G^m = X^m X^\alpha \rho[\text{wind}] U_\alpha[\text{wind}]$$

Proceed as follows. Have some set $\underline{S}$. Define $\underline{X} = (X^1, X^2, \dots, X^N)$

Write

$$X^n = \frac{\partial X^n}{\partial x^m} X^m \quad (\text{Westman Sorensen})$$

Define $\underline{Q} = (X^n : n=1 \text{ to } N)$

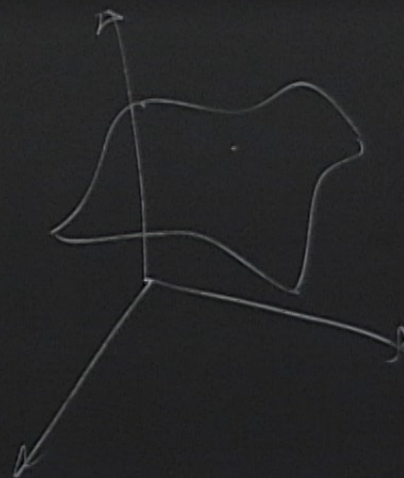
will say that, at $\underline{S}$, we set sail to $\underline{Q}$

d}

Define $\underline{X} = (X^1, X^2, \dots, X^N)$

(Westman Sorego)

will say that, at $\underline{S}$, we set sail to $\underline{Q}$



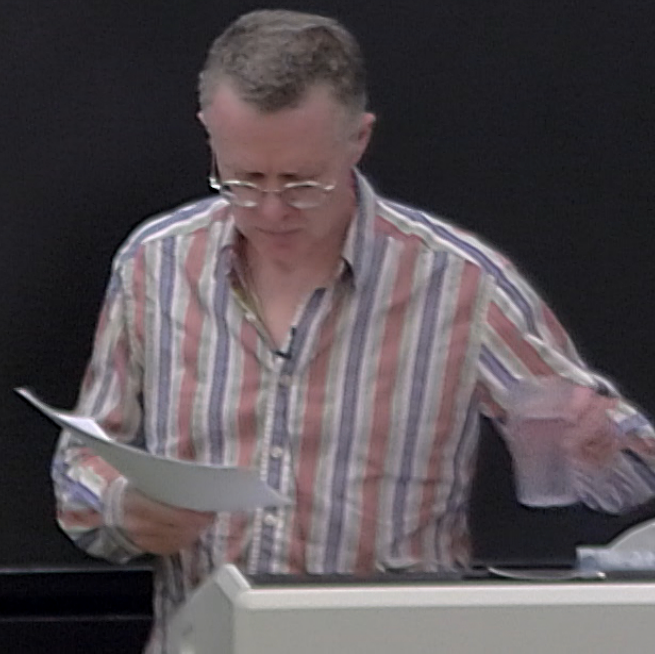
May have agency field

$$X^{n_1 n_2 \dots n_r}$$

we can define

$$X^{n_1 n_2 \dots n_r} = \frac{\partial X^{n_1}}{\partial x^{n_1}} \frac{\partial X^{n_2}}{\partial x^{n_2}} \dots \frac{\partial X^{n_r}}{\partial x^{n_r}} X^{n_1 n_2 \dots n_r}$$

$$\underline{Q} = (x^{n_1, n_2, \dots, n_r}, \text{all } n_1, \dots, n_r)$$



An agent strategy for region A

specify a choice (that we would make) at each $\underline{S} \in A$

$$\sigma_A = \{ (\underline{S}, \underline{q}) : \forall \underline{S} \in A \}$$

An agent strategy for region A

specify a choice (that we would make) at each $\underline{S} \in A$

$$\underline{Q}_A = \{ (\underline{S}, \underline{Q}) : \forall \underline{S} \in A \}$$

we demand that $(\underline{S}(p), \underline{Q}(p)) \in \underline{Q}_A$ where $(\underline{S}(p), \underline{Q}(p))$ calculated from $\tilde{y}_A \in y_A$

Time direction field

Agents' influence is time asymmetric.

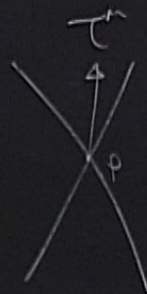
Need a time direction field



Time direction field

Agents' influence is time asymmetric.

Need a time direction field



τ^n pick out forward light cone.

symmetric -

If $T^M(p)$ is a time divⁿ field

and

$$\underline{T}^M = \sigma_\nu^M T^\nu \quad \sigma_\nu^M \in \Sigma^+$$

then $\underline{T}^M$ is physically equivalent.

$$G = X^m X^a \rho[\text{wind}] U_a[\text{wind}]$$

Representing solns with agency

$$\tilde{\mathcal{V}}_A = \left\{ (p, \phi, \chi, \tau) : \forall p \in \mathcal{M}_A \right\}$$

$$\text{vartheta} = \Theta = (\sigma, \phi) \in G^+ \quad \sigma \in \Sigma^+ \quad \phi = G_{\text{diff}}^0$$

$$G = X^m X^\alpha \rho[\text{wind}] U_\alpha[\text{wind}]$$

Representing solns with agency

$$\tilde{\mathcal{V}}_A = \{ (p, \phi, \chi, \tau) : \forall p \in \mathcal{M}_A \}$$

$$\text{varthetaeta} = \Theta = (\sigma, \phi) \in G^+ \quad \sigma \in \Sigma^+ \quad \phi = G_{\text{diffco}}$$

$$\Theta^* \tilde{\mathcal{V}}_A = \{ (p, \phi^* \phi, \phi^* \chi, \sigma \phi^* \tau) : \forall p \in \phi(\mathcal{M}_A) \}$$

Pure soln

$$\psi_A = \{ \Theta^* \tilde{\psi}_A : \Theta \in G^+ \}$$

Boundary cond's

$= G_{\text{diffeo}}$

$$\Theta = (\text{direction, smoothness}, \Phi, \Pi, \chi, \tau)$$

$$\textcircled{1} \quad \mathcal{V}_A = \left\{ (p, \phi^* \phi, \phi^* \chi, \sigma \phi^* \tau) : \forall p \in \phi(\mathcal{M}_A) \right\}$$

Causality

future

Physicality cond.

① probs between O & I

② no signalling to past.

wiring $\rightarrow$ Paria

$\eta_{\mu\nu}$ $\rightarrow$ QFT Paria style causality cond.

$g_{\mu\nu}$