

$$\begin{array}{ccc}
 A_{\text{inf}} & W(R) = A_{\text{inf}} & \xrightarrow{\theta} \bigoplus_{\mathbb{E}_p} \\
 \lim_{\leftarrow} \mathbb{Z}_p/p = R & \downarrow & \downarrow \mathbb{E}_p \\
 & W(R)/p = R & \longrightarrow \mathcal{O}_{\mathbb{E}_p}/p
 \end{array}
 \quad \ker \theta = (u).$$

$$\mathcal{O}_{\mathbb{E}_p} = \widehat{\mathbb{Z}_p} = \varprojlim \mathbb{Z}_p/p^n$$

$$(u, p) \subset A_{\text{inf}} \rightarrow \mathcal{O}_{\mathbb{E}_p}/p = \widehat{\mathbb{Z}_p}/p$$

$$\begin{array}{ccc}
 & \exists & \\
 & \cdots \searrow & \nearrow \\
 & A &
 \end{array}$$

- полное

$$A_{\text{crys}} = \left(\text{PD-оболочка} (A_{\text{inf}}, (u)) \right)^{\wedge}$$

$$A_{\text{crys}} \twoheadrightarrow \mathcal{O}_{\mathbb{E}_p}.$$

Th (Fountain)

(a) $\overline{\mathbb{Z}}_p \xrightarrow{d_{\text{DR}}} \Omega^1 \overline{\mathbb{Z}}_p / \mathbb{Z}_p$

(b) $\mu_{p^\infty} \subset \overline{\mathbb{Z}}_p^* \xrightarrow{d \log} \Omega \overline{\mathbb{Z}}_p / \mathbb{Z}_p$
 $x \otimes y \rightarrow x \frac{dy}{y}$

$\overline{\mathbb{Q}}_p / \overline{\mathbb{Z}}_p^{(1)} = \overline{\mathbb{Z}}_p \otimes_{\mathbb{Z}_p} \mu_{p^\infty} \rightarrow \Omega \overline{\mathbb{Z}}_p$

$\overline{\mathbb{Q}}_p / (\varepsilon_p - 1) \overline{\mathbb{Z}}_p^{(1)} \xrightarrow{\sim} \Omega \overline{\mathbb{Z}}_p / \mathbb{Z}_p$

Cr.-e.

$\overline{\mathbb{Z}}_p \otimes \Omega \mathbb{Z}_p(\mu_{p^\infty}) / \mathbb{Z}_p \rightarrow \Omega \overline{\mathbb{Z}}_p / \mathbb{Z}_p \rightarrow \Omega \overline{\mathbb{Z}}_p / \mathbb{Z}_p^{(1)}$

$\mathbb{Z}_p^{(1)} \otimes \mathbb{Q}_p / \mathbb{Z}_p =$
 $= \left(\varinjlim \mathbb{Z} / p^n \right) \otimes \mathbb{Z}_p^{(1)}$

$$C \otimes Q \Rightarrow \overline{Q}_p$$

$$0 \rightarrow C \rightarrow \boxed{\overline{\mathbb{Z}}_p \xrightarrow{d} \Omega \overline{\mathbb{Z}}_p} \rightarrow 0$$

ε^p

$$\Omega_{\overline{\mathbb{Z}}_p}^{\wedge}[-1] \rightarrow C^{\wedge} \rightarrow \mathcal{O}_{\mathbb{A}_p} \rightarrow \Omega_{\overline{\mathbb{Z}}_p}^{\wedge} \rightarrow$$

$$(\varepsilon_p - 1)^{-1} \overline{\mathbb{Z}}_p^{\wedge}(1) \rightarrow; \quad \overline{Q}_p^{\wedge}(1) \rightarrow \Omega_{\overline{\mathbb{Z}}_p}^{\wedge} \xrightarrow{\sim} (\varepsilon_p - 1)^{-1} \mathcal{O}_{\mathbb{A}_p}(1)[1]$$

=

0

$$0 \rightarrow (\varepsilon_p - 1)^{-1} \mathcal{O}_{\mathbb{A}_p}(1) \rightarrow C^{\wedge} \rightarrow \mathcal{O}_{\mathbb{A}_p}$$

$$\Omega_{\overline{\mathbb{Z}}_p}^{\wedge}[-1] = (u)/\mu^2$$

1.T.

$$A_{\text{inf}}/\mu^2 \xrightarrow{\sim} C^{\wedge}$$

$\tau(\text{Bei Linson-Bhat})$

$$L_{\Omega^1_{\bar{R}_P/\bar{R}_P}} = A_{\text{сгыз.}}$$

Кокасательный комплекс

$$A \rightarrow B$$

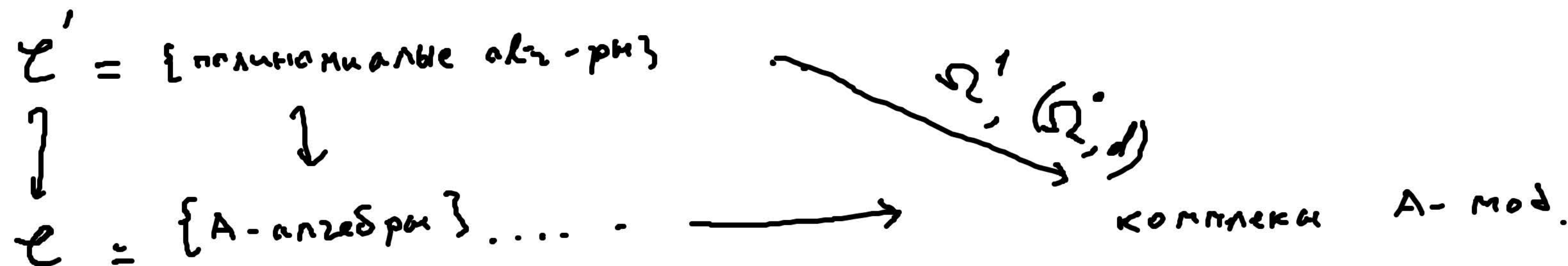
$$\text{spec } B \rightarrow \bar{A}_A$$

$$L_{B/A}$$

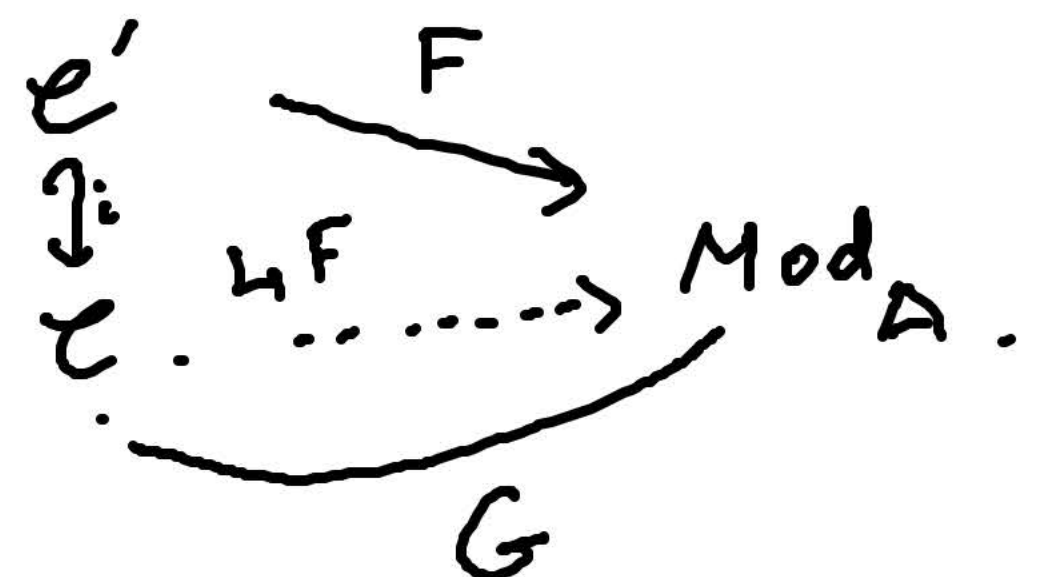
Если P — полинт-л алгебра, то

$$L_{P/A} = \Omega^1_{P/A}.$$

$$P \rightarrow B \rightsquigarrow \Omega^1_{P/A} \rightarrow L_{B/A}$$



$\perp$ прод-е Канна.

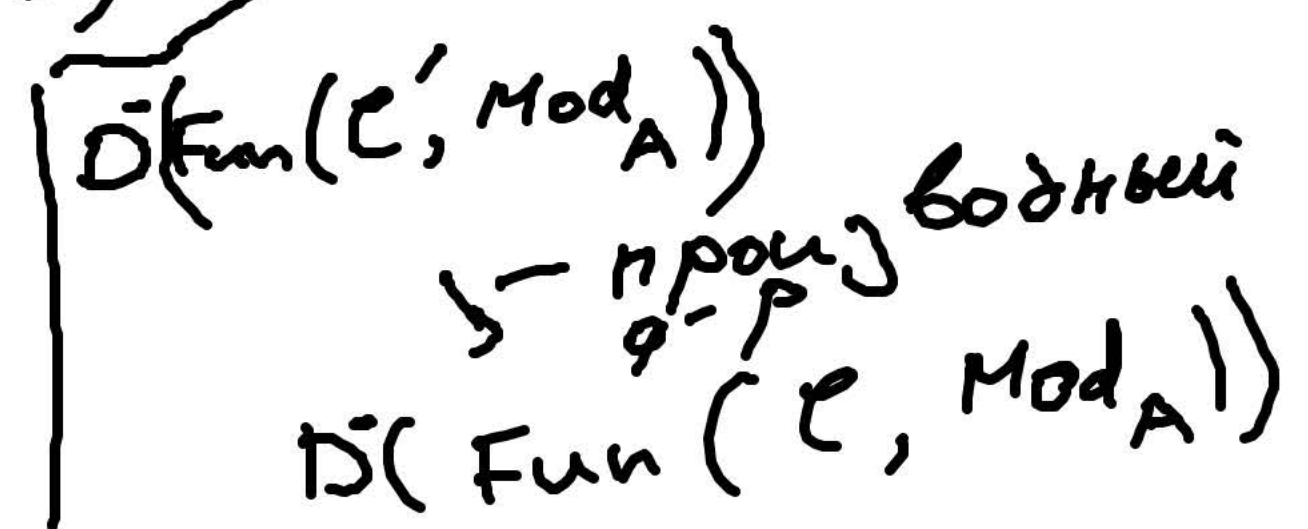
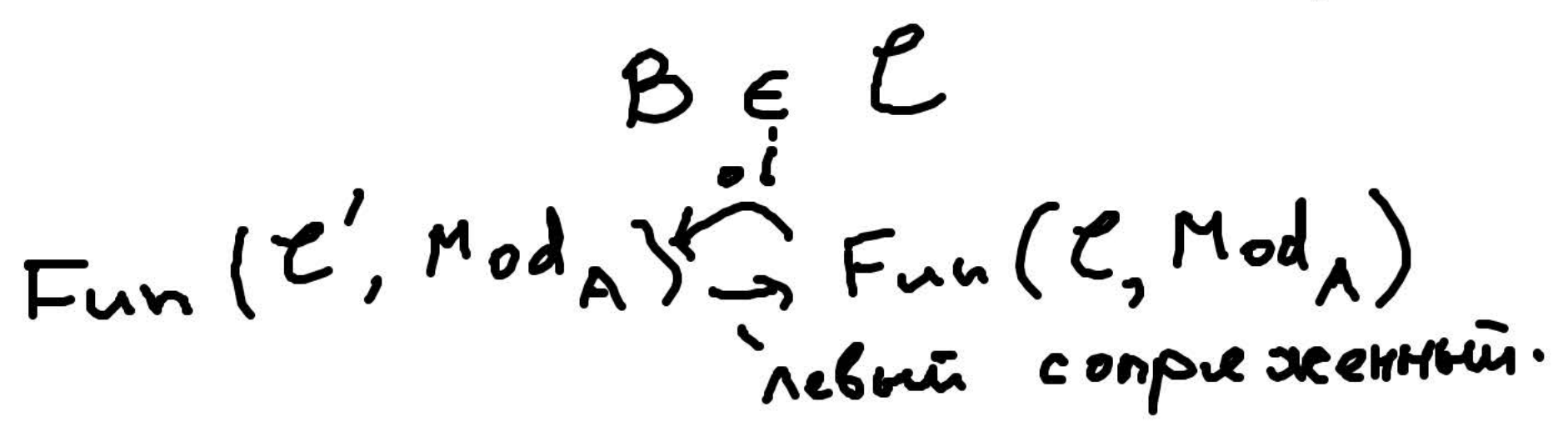


$F \longrightarrow G \cdot i$

$\exists! L F \rightarrow G$

$L F \circ i = F.$

$L F(B) = \text{colim}_{(P, P \rightarrow B)} F(P).$



$\text{Fun}(\mathcal{C}', \text{Mod}_A) \ni F_p$ — проективный об-т.

$$p \in \mathcal{C}' \quad F_p(p') = A[\text{Mor}_{\mathcal{C}'}(p, p')]$$

$$\hookrightarrow F_p(B) = A[\text{Mor}_{\mathcal{C}}(p, B)]$$

$$\text{Mor}(F_p, F) = F(p)$$

$$F \in D^-(\text{Fun}(\mathcal{C}', \text{Mod}_A)) \quad \hookrightarrow \bar{F} \in D^-(\text{Fun}(\mathcal{C}, \text{Mod}_A))$$

$$B \in \mathcal{C} \quad \hookrightarrow F(B) = \varinjlim_{(p \rightarrow B)} F(p)$$

Утв. $(\varinjlim_i p_i \rightrightarrows p_0) \rightarrow B$. Пусть $\forall p \in \mathcal{C}'$

$$\text{Mor}_{\mathcal{C}}(p, p_0) \rightarrow \text{Mor}_{\mathcal{C}}(p, B) \quad \text{изом на}$$

π_i

Тогда $\forall F \quad (F(p_2) \rightarrow F(p_1) \rightarrow F(p_0)) \xrightarrow{\pi_i} \hookrightarrow F_p(B)$

Cn-e. $\mathcal{C} = \mathcal{A}$ -алгебри, $\mathcal{C}' =$ полне алгебри.

$B \in \mathcal{C}$

$P_{\bullet} \rightarrow B$. Допустим, что

($\dots P_2 \rightarrow P_1 \rightarrow P_0 \rightarrow B$) циклически. Тогда $P_{\bullet} \rightarrow B$

резольвента

D-vo.

$\text{Mor}(P, P_{\bullet}) \rightarrow \text{Mor}(P, B)$

ω_j -м на π_i