6-2-2014 Avner Ash. Glennfest 12:00.

<u>Explicit</u> computation of p-adic variation of homology.

(distribution modules)

↑ compute.

(I) Congruence between Hecke eigenvalues.

in $H_\gamma(\Gamma, \underbrace{V_\lambda}_{\text{irred. rep'n with highest wt } \lambda})$ and $H_\delta(\Gamma, V_{\lambda'})$

mod p-power if $\lambda \equiv \lambda' ((p-1) \cdot p^\alpha.)$.

today's focus $\to \Gamma \subset SL_3(\mathbb{Z})$

$\lambda = (a, b, c) \in \mathbb{Z}^3$.

$a \geq b \geq c$.

To interpolate the coefficients,

replace V_λ (f.d. sp.)

by D_λ (∞-dim'l sp)

↑ modules of p-adic distributions

D_λ

- They are like Verma modules so can be defined for any p-adic λ.

- They are p-adic Banach spaces

p-adic functional analysis

- They vary p-adically analytically in λ.

- Have a comparison between
$$H_\gamma(\Gamma, D_\lambda)^{(\leq h)} \xrightarrow{\simeq} H_\gamma(\Gamma, V_\lambda)^{(\leq h)}$$
(induced by a homomorphism $D_\lambda \to V_\lambda$).

if λ is ~~the~~ a dominant integral weight.

If $h < m(\lambda)$

positive number

$\underline{GL_3}$, $p \geq 5$.

$\cup\!\mid$

B, upper triangular. $\quad {}^tB = B^{opp}$.

$\parallel$

unipotent · diagonal $\quad N \cdot T$

I, Iwahori subgp. $\subseteq GL_3(\mathbb{Z}_p)$.

$\nwarrow$ upper triangular mod p.

$\Gamma = \Gamma_0(M) \cap I$.

$X =$ "big cell" $\quad B(\mathbb{Z}_p)$

$=$ image of I in Y

$Y = N^{opp} \cdot GL_3(\mathbb{Q}_p) \backslash GL_3(\mathbb{Q}_p)$

$\lambda : T(\mathbb{Z}_p) \longrightarrow \mathbb{C}_p^\times$ conti. char.

torus action $\rightsquigarrow$ $A_\lambda = \{ f : X \to \cancel{\mathbb{Q}_p}\ \mathbb{C}_p : f(t \cdot x) = \lambda(t) \cdot f(x)$ and f is rigid analytic. $\}$

$$f\begin{pmatrix} 1 & x & y \\ 0 & 1 & z \\ 0 & 0 & 1 \end{pmatrix} = \sum c_{ijk} \cdot x^i \cdot y^j \cdot z^k$$

$$c_{ijk} \to 0.$$

(assuming λ is analytic)

$$\mathbb{D}_\lambda = \mathrm{Hom}_{\mathrm{cts}}(\mathbb{A}_\lambda, \mathbb{C}_p) \circlearrowleft \cancel{GL_3(\mathbb{Q}}\ \Gamma$$

$$\cup$$

$$\sum b_{rst} \cdot \delta_{rst}^{\lambda}$$

We need

1) A way to compute $H_3(\Gamma, A)$

for any module A.

2) A way to compute Hecke operators.

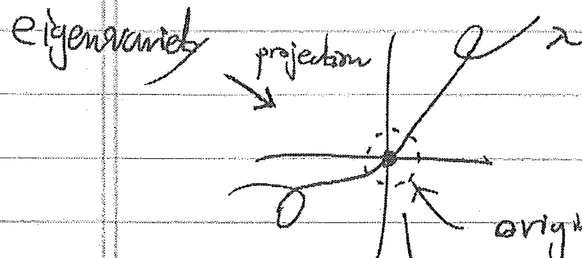
Joint with David Pollack. $h < \underbrace{m(\lambda)}_{\text{critical slope.}}$

3) A way to lift from $H_3(\Gamma, V_{\lambda_0})_{\le h}$

to $H_3(\Gamma, \mathbb{D}_{\lambda_0})_{\le h}$.

4) Deform from $H_3(\Gamma, \mathbb{D}_{\lambda_0})_{\le h} \ni f$, eigen

to nearby $H_3(\Gamma, \mathbb{D}_{\lambda}) \ni F$, eigen ?



origin = classical pt.

can get the tangent vector

(hopefully eigfns.)

idea. $\dfrac{F|U^n}{\alpha^n} \to$ eigenclass. $\quad fU = \alpha f$