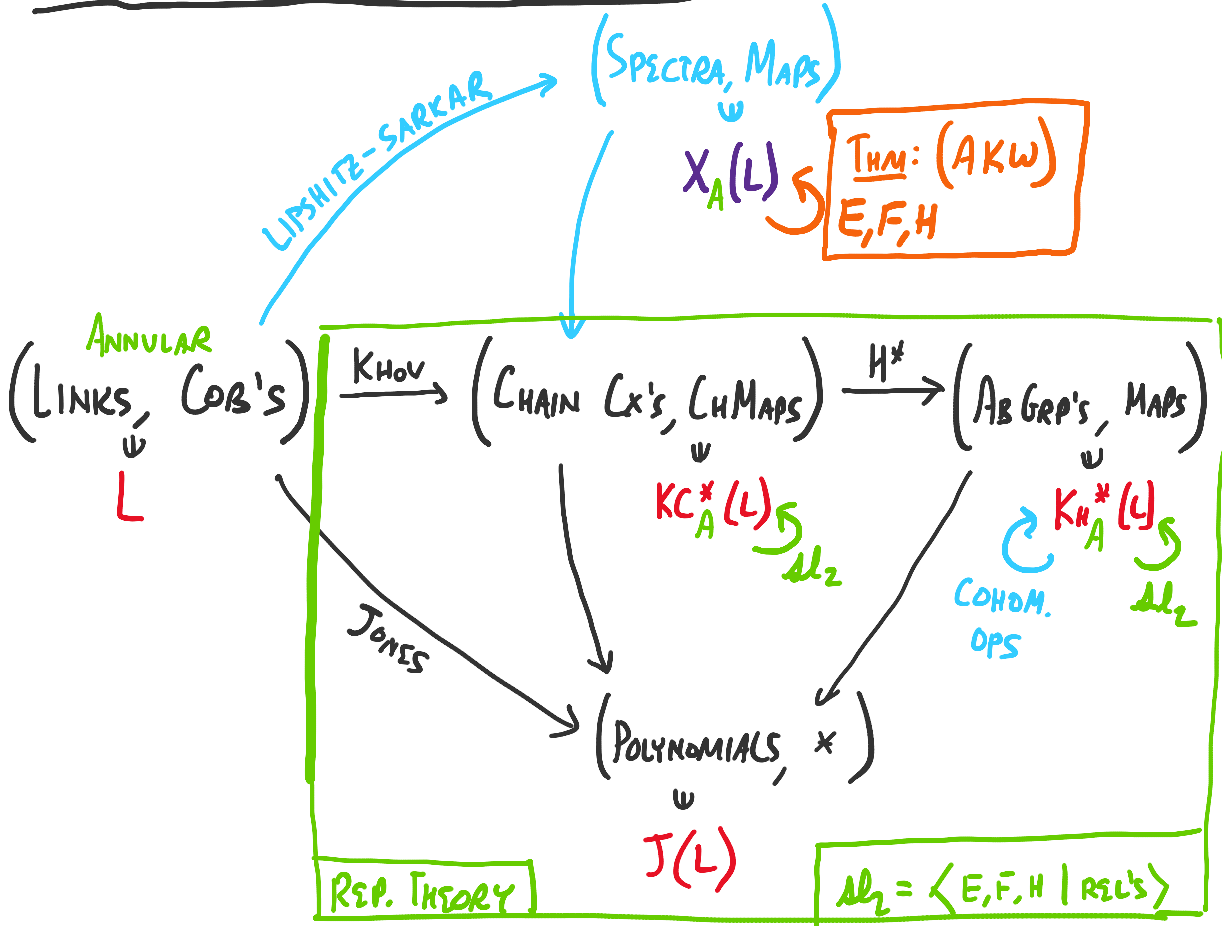


Overview

Monday, May 17, 2021 4:18 PM

(JOINT w/
ROSS AKHMECHET,
SLAVA KRUSHKAL)

ANNULAR KHOVANOV HOMOLOGY & \mathcal{A}_2



- COR: COHOM. OPS ON $KH_A(L)$ COMMUTE w/ \mathcal{A}_2 -ACTION
- EVIDENCE OF REP. THY VERSION OF $X_A(L)$??

Building a spectrum out of a chain complex

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(REALLY A CELL COMPLEX, WELL-DEFINED UP TO STABLE HTPY)

IDEA: (REVIEWING SOME OF ROBERT'S TALK)

CHAIN Cx

- GENERATORS
- DIFFERENTIALS

FRAMED FLOW CATEGORY

(INSPIRED BY MORSE THEORY)

- OBJECTS (CRIT. PTS)
- MORPHISMS
(MODULI SPACES OF FLOW LINES)
MANIFOLDS w/ CORNERS, EMBEDDED
+ FRAMED IN SOME CORNERS
 \mathbb{R}_c^k COHERENTLY:
 $\partial \mathcal{M} = \cup$ COMPOSITIONS
(BROKEN FLOW'S)

CELL Cx

- CELLS
- ATTACHING MAPS

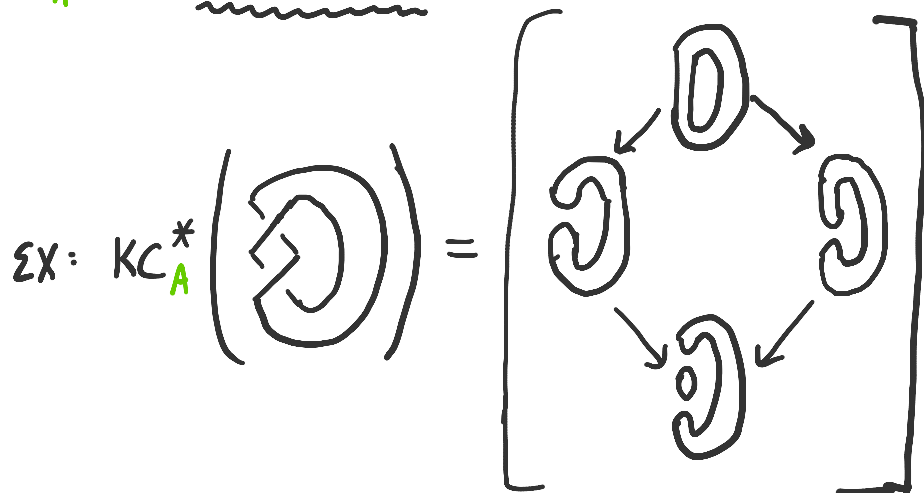
The helpful format for KC*

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(ANN.) KHOV. C_X : SKIEN $\left[\chi = \right] \left(\xrightarrow{d} \mathfrak{g}^u \right)$

$\implies L$ WITH N CROSSINGS HAS

$KC_A^*(L) = \text{CUBE-SHAPED } C_X \text{ WITH } 2^N \text{ VERTICES}$



FACT: \exists "CUBE Flow CAT." C_N (MORSE FLOWS FOR SOME f)

IN SHAPE OF N -DIM CUBE:

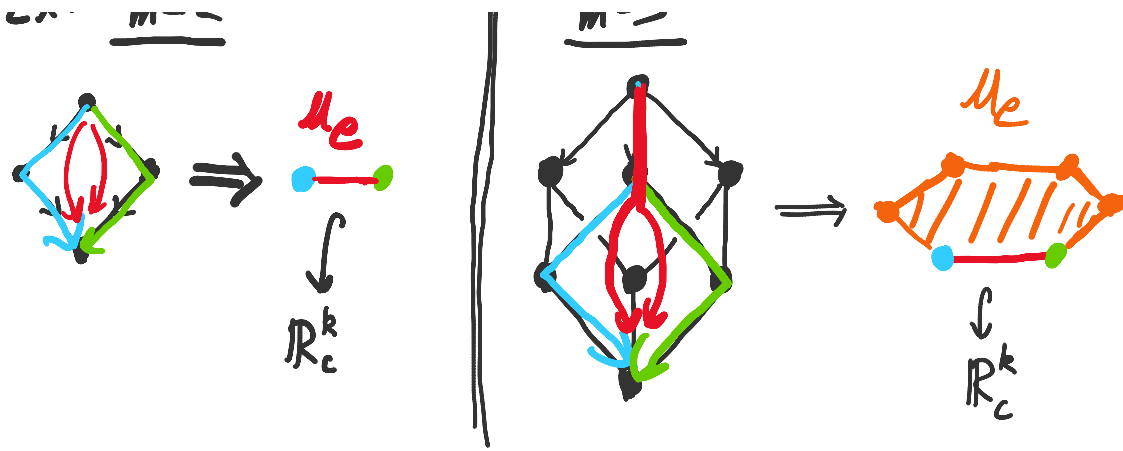
- EACH VERTEX = 1 OBJECT (CRIT. PT.)
- EACH EDGE = 1 (+)-FRAMED POINT (SINGLE FLOW LINE)
- m -DIM FACE = 1 (+)-FR $(m-1)$ -DIM. PERMUTOHEDRON \mathcal{M}_e (MODULI SPACE OF FLOWS)

EX: $\frac{m=2}{\quad}$



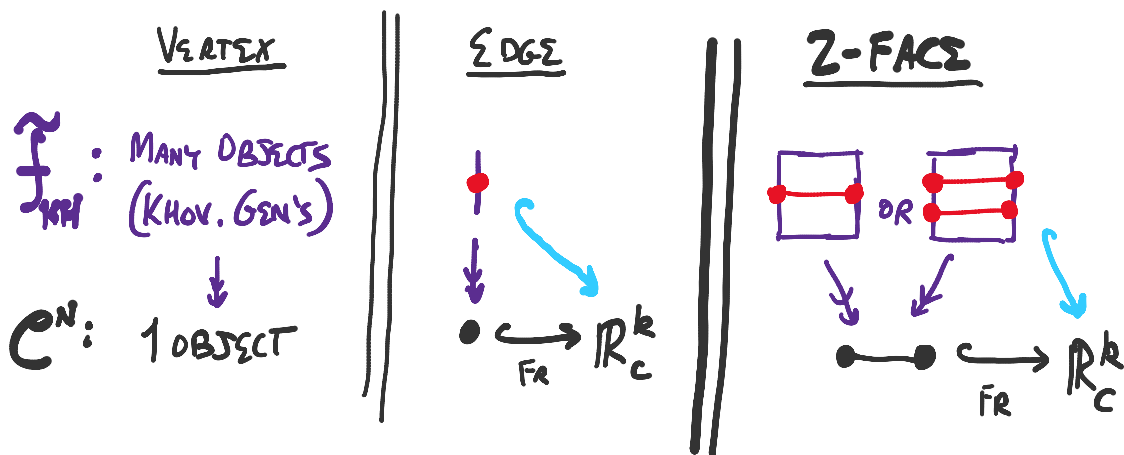
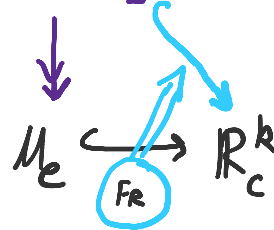
$\frac{m=3}{\quad}$





THM: (LIPSHITZ-SARKAR) $KC_A^*(L)$ CAN BE LIFTED TO A FR. FLOW CAT. $\tilde{\mathcal{F}}_{KH}$ THAT "TRIVIAALLY COVERS \mathcal{C}_N "

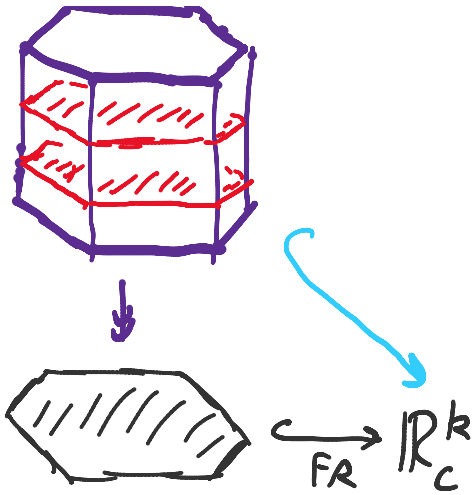
WE WILL VIEW THIS AS $\mathcal{M}_{KH} \hookrightarrow [\mathcal{M}_e \times I]$



3-FACE



KEY FACT:



KEY FACT:
 ALL FRAMINGS FOR \mathcal{M}_{KH}
 DETERMINED BY \mathcal{M}_e
 \Updownarrow
 NO SIGNS IN KC_A^*
 DIFFERENTIAL

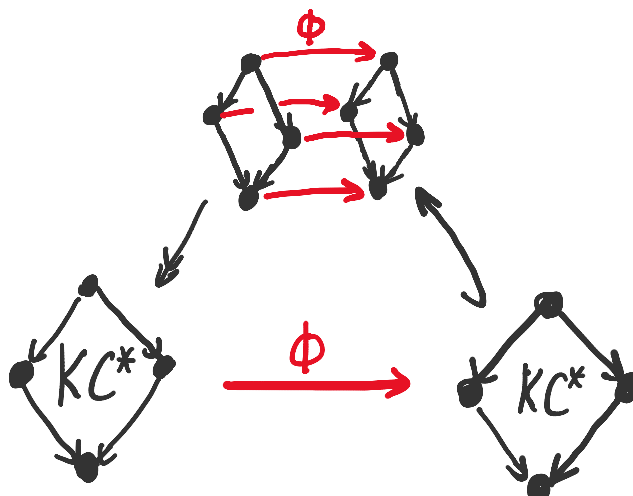
Incorporating a map with signs

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KEY FACT:

IF A CHAIN MAP ϕ RESPECTS THE CUBICAL STRUCTURE,
THEN $\text{CONE}(\phi) = (N+1)$ -DIM. CUBE-SHAPED CX WITH

EXACT TRIANGLE:



THEN

LIFTING $\phi \iff$ LIFTING $\text{CONE}(\phi)$.

GOOD NEWS: MANY MAPS ON KC^* , INCLUDING E, F, H FROM \mathcal{A}_2 , RESPECT CUBICAL STRUCTURE.

\implies CAN FOCUS ON LIFTING CUBE-SHAPED $\text{CONE}(\phi)$

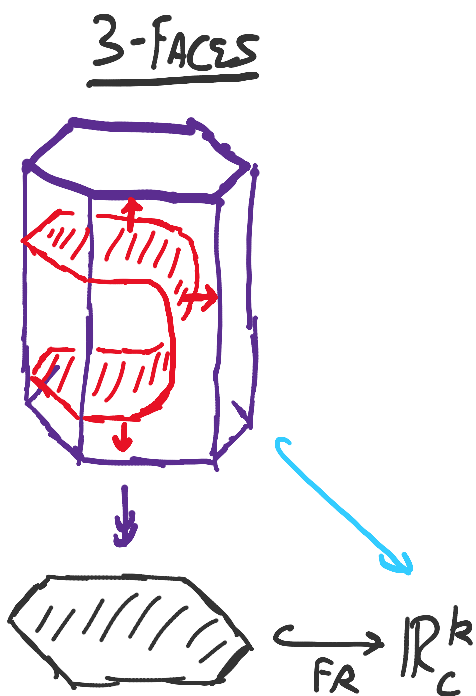
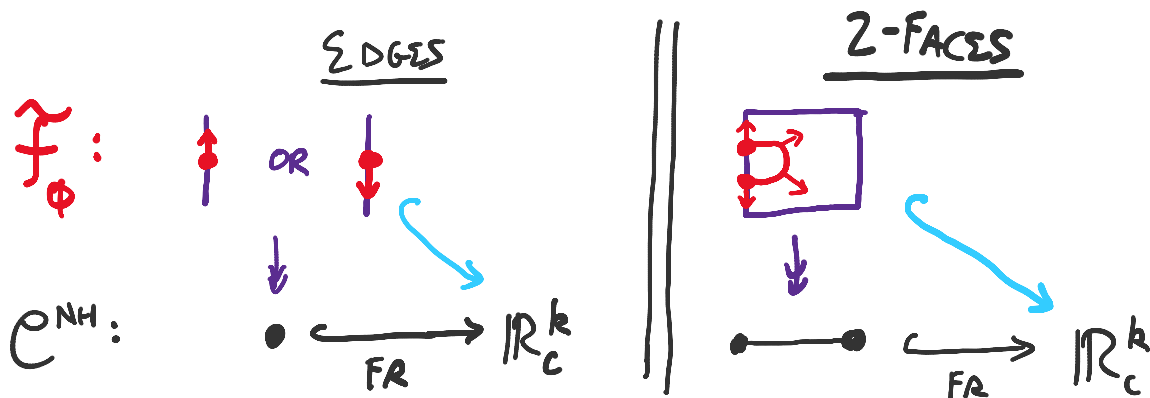
BAD NEWS: MANY MAPS ON KC^* , INCLUDING E, F, H FROM \mathcal{A}_2 , INVOLVE SIGNS AND CANCELLATIONS...

\implies LIFT CANNOT BE "TRIVIAL COVER" OF C^{N+1}

THM: (ARHMECHET - KRUSHKAL - W.)

FOR $\phi = E, F,$ OR H ACTING ON $KC_A^*(L)$, $\text{CONE}(\phi)$ CAN BE LIFTED TO A FRFL CAT. \tilde{F}_ϕ THAT "EMBEDS INTO $e^{NH} \times I$ ".

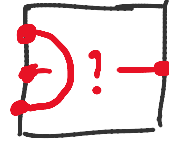
NEW PHENOMENA:



KEY FACT:
 ALL NEW \mathcal{M}_ϕ EMBED INTO $\mathcal{M}_e \times I$ WITH $\text{CODIM.} = 1$,
 ALLOWING A PONTRYAGIN-THOM ARGUMENT TO FILL THE $\partial \mathcal{M}$ 'S

THE TECHNICAL WORK IS TO ENSURE THE 2-FACES ACTUALLY

EMBED IN $\text{Cosim}^{-1} \dots$ NEVER FORCED INTO



THIS USES DETAILS ABOUT $E/F/H$, TOPOLOGY OF ANNULUS, ETC.