Step on to step 2 on

$\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab} = \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ba}$

"2" bends go nuts

$\cdot\, 2^{ab}$

$\cdot\, (-1)^{ab}$

$\cdot\, \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}\, \cdot\, 2^{ab}$

We want to build the Biscuits category

Start with $\mathcal{B}$ ⊂ Vect(M)

Build out $\mathcal{B}\otimes\mathcal{B}$ = Vect(M×M)

this process is not linear enough

We can take right or left bubbles

All the products commute except for $\cdot\, 2^{ab}$ and $\cdot\, (-1)^{ab}$

$\cdot\, 2^{ab}$ and $\cdot\, (-1)^{ab}$ commute

the total $\sum_{ab}$ diagram is invariant under the right or left bubble

the $\cdot\, 2^{ab}$ also commute with the resolution $\cdot\, \frac{1}{\sqrt{2}}$

Total normalization of the two sphere of the form

$\cdot\, \frac{1}{\sqrt{2}}$

as we wrote, we can use pick one or the other normalization

Total sphere transformation is

$\cdot\, \frac{1}{\sqrt{2}}$

Now compute is

$\cdot\, \frac{1}{\sqrt{2}}$

is the previous transformation

Target $\frac{1}{\sqrt{2}}(-1)^{ab}$

Can have multiple ways of building for this, or the "Feynman rules" of these cases.

Now we want to move to the left cap

$\cdot\, \frac{1}{\sqrt{2}}$ $\cdot\, \frac{1}{\sqrt{2}}(-1)^{ab}$

Let $\cdot\, \frac{1}{\sqrt{2}}$ and $\cdot\, (-1)^{ab}$

$\cdot\, (-1)^{ab}\, \frac{1}{\sqrt{2}}(-1)^{ab}$

Define this bubble transformation

$\cdot\, \frac{1}{\sqrt{2}}(-1)^{ab}$

The next step is to extract the rest of the information for F to have

$\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{aa} = 1$

$\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab} = (-1)^{ab}$

$\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{aba} = 1$ (left & right cancel each other out)

$\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{aba} = 1$

$\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab} \longrightarrow$

$\frac{1}{\sqrt{2}}\sum_{ab}(-1)^{ab}$ $\cdot\, \frac{1}{\sqrt{2}}(-1)^{ab}$

$\cdot\, \frac{1}{\sqrt{2}}(-1)^{ab}$

$\cdot\, \frac{1}{\sqrt{2}}(-1)^{ab}$

$\cdot\, (-1)^{ab}$

$\cdot\, (-1)^{ab}$

So $\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab} = (-1)^{ab}$

$\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab} \longrightarrow$

Step computing the F symbols in an simple S category the resolution (Stitch, $\frac{1}{\sqrt{2}}$ and the bubble $\frac{1}{\sqrt{2}}$ are the same as the big string in number)

$\cdot\, \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}$

$\cdot\, \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}\, \frac{d_b}{d_a}$ $\qquad$ so $\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab} = \frac{d_b}{d_a}$

Now

want to find F so that

$\cdot\, \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}$ $\cdot\, \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}$

We do this by adding the F into the system

$\cdot\, \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}$ $\qquad$ $\frac{d_b}{d_a}$ on left side

LHS:

$\cdot\, (-1)^{(a+\gamma)(b+\delta)}$

$= \frac{1}{\sqrt{2}}(-1)^{(a+\gamma)(b+\delta)}$

$\cdot\, \frac{1}{\sqrt{2}}(-1)^{(a+\gamma)(b+\delta)}\sum_{\alpha\beta}(-1)^{(\alpha+1)(\beta+1)}$

$= \frac{1}{\sqrt{2}}(-1)^{(a+\gamma)(b+\delta)}\sum_{\alpha\beta}(-1)^{(\alpha\beta+\alpha+\beta+1)}$

$\cdot\, (-1)^{(a+\gamma)(b+\delta)}$

$\cdot\, (-1)^{(a+\gamma)(b+\delta)}\sum_{\alpha\beta}\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{(a+\alpha)\beta}$

RHS: $\sum_{\alpha\beta}\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}$

$\cdot\, \left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}\, (-1)^{ab}$

$\cdot\, \frac{1}{\sqrt{2}}\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}(-1)^{a(\alpha+\beta)}$

$\cdot\, \frac{1}{\sqrt{2}}\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}(-1)^{a(\alpha+\beta)}$

$\cdot\, \frac{1}{\sqrt{2}}\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right](-1)^{a(\alpha+\beta)}$

$\cdot\, \sum\left[F^{\cdot\cdot\cdot}_{\cdot\cdot\cdot}\right]_{ab}(