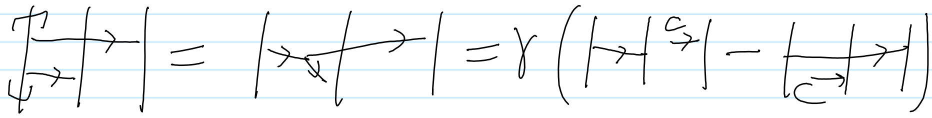
2Dv Relations

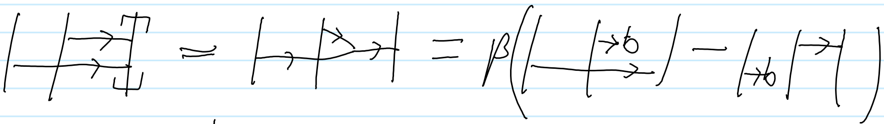
April-09-15 8:51 AM

(150409) 2D1co: b: bracket trace; c: cobracket trace $c_ic_j = 0$; $\langle b,c\rangle = \delta$. Relations: locality and $[a_{ij},a_{ik}] =?$, $[a_{ij},a_{jk}] =?$, $[a_{ik},a_{jk}] =?$, $[b_i,a_{ij}] =?$, $[b_j,a_{ij}] =?$, $[c_i,a_{ij}]$, $[c_j,a_{ij}] =?$, $[b_i,c_i] =?$.

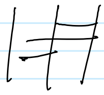
swap ij not

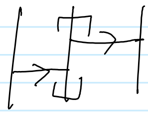
$[a_{ij},a_{ik}] =$ 

$= \gamma(c_k a_{ij} - c_j a_{ik})$

$[a_{ik},a_{jk}] =$ 

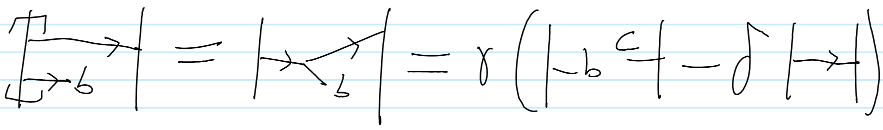
$= \beta(b_j a_{ik} - b_i a_{jk})$

6T:  $\to [a_{ij},a_{ik}]+[a_{ij},a_{jk}]+[a_{ik},a_{jk}]=0$

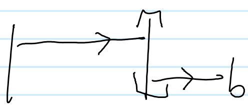
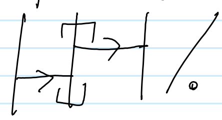
$[a_{ij},a_{jk}] =$  $= -[a_{ij},a_{ik}]-[a_{ik},a_{jk}] =$

$= -\gamma(c_k a_{ij} - c_j a_{ik}) - \beta(b_j a_{ik} - b_i a_{jk})$

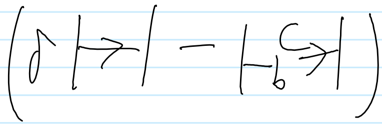
$= (\gamma c_j - \beta b_j)a_{ik} + \beta b_i a_{jk} - \gamma c_k a_{ij}$

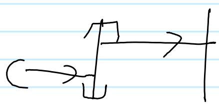
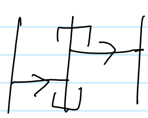
$[b_i,a_{ij}] =$ 

$= \gamma(b_i c_j - \delta a_{ij})$

$[b_j,a_{ij}] =$  $=$ using $-$  $/\circ$ $a_{ik}\to b_i$, $a_{jk}\to b_j$, $c_k\to\delta$

$= -(\gamma c_j - \beta \cancel{b_j})b_i - \cancel{\beta b_i} b_j + \gamma\delta a_{ij}$

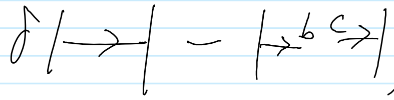
$= \gamma(\delta a_{ij} - b_i c_j) = \gamma$ 

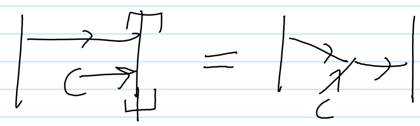
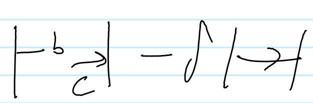
$[c_i,a_{ij}] =$  $=$ using  $/\circ$ $a_{ik}\to c_k$, $b_i\to\delta$ $/\, j\to i$

$a_{ij} \to c_j$ /. $k \to j$

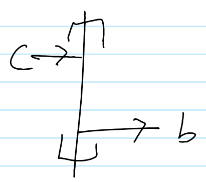
$= (\cancel{\gamma c_j} - \beta b_j) c_k + \beta\delta a_{jk} - \cancel{\gamma c_k c_j}$ /. $j \to i,\ k \to j$

$= \beta\delta a_{jk} - \beta b_j c_k$ /. $j \to i,\ k \to i$

$= \beta(\delta a_{ij} - b_i c_j) = \beta\Big(\delta$  $\Big)$

$[c_j, a_{ij}] =$  $= \beta\Big($  $\Big)$

$= \beta(b_i c_j - \delta a_{ij})$

$[b_i, c_i] =$  $= -[c_i, a_{ij}]$ /. $a_{ij} \to b_i,\ c_j \to \delta$

$= \beta(\delta b_i - b_i \delta) = 0.$

In summary:

(150409) 2Dv: b: bracket trace; c: cobracket trace; $\langle b, c\rangle = \delta$. Relations: locality and $[a_{ij}, a_{ik}] = \gamma(c_k a_{ij} - c_j a_{ik})$, $[a_{ik}, a_{jk}] = \beta(b_j a_{ik} - b_i a_{jk})$, $[a_{ij}, a_{jk}] = (\gamma c_j - \beta b_j) a_{ik} + \beta b_i a_{jk} - \gamma c_k a_{ij}$, $[b_i, a_{ij}] = \gamma(b_i c_j - \delta a_{ij})$, $[b_j, a_{ij}] = \gamma(\delta a_{ij} - b_i c_j)$, $[c_i, a_{ij}] = \beta(\delta a_{ij} - b_i c_j)$, $[c_j, a_{ij}] = \beta(b_i c_j - \delta a_{ij})$, $[b_i, c_i] = 0$.

Replacing $c \to c/\gamma$, $b \to b/\beta$, $\delta \to \frac{\delta}{\beta\gamma}$ we get:

(150409) 2Dv: b: bracket trace; c: cobracket trace; $\langle b, c\rangle = \delta$. Relations: locality and $[a_{ij}, a_{ik}] = \cancel{\gamma}(c_k a_{ij} - c_j a_{ik})$, $[a_{ik}, a_{jk}] = \cancel{\beta}(b_j a_{ik} - b_i a_{jk})$, $[a_{ij}, a_{jk}] = (\cancel{\gamma} c_j - \cancel{\beta} b_j) a_{ik} + \cancel{\beta} b_i a_{jk} - \cancel{\gamma} c_k a_{ij}$, $[b_i, a_{ij}] = \cancel{\gamma}(b_i c_j - \delta a_{ij})$, $[b_j, a_{ij}] = \cancel{\gamma}(\delta a_{ij} - b_i c_j)$, $[c_i, a_{ij}] = \cancel{\beta}(\delta a_{ij} - b_i c_j)$, $[c_j, a_{ij}] = \cancel{\beta}(b_i c_j - \delta a_{ij})$, $[b_i, c_i] = 0$.

So it is:

(150409) 2Dv: b: bracket trace; c: cobracket trace; $\langle b,c\rangle=\delta$. Relations: locality, $[a_{ij},a_{ik}]=c_ka_{ij}-c_ja_{ik}$, $[a_{ik},a_{jk}]=b_ja_{ik}-b_ia_{jk}$, $[a_{ij},a_{jk}]=(c_j-b_j)a_{ik}+b_ia_{jk}-c_ka_{ij}$, $[b_i,a_{ij}]=b_ic_j-\delta a_{ij}$, $[b_j,a_{ij}]=\delta a_{ij}-b_ic_j$, $[c_i,a_{ij}]=\delta a_{ij}-b_ic_j$, $[c_j,a_{ij}]=b_ic_j-\delta a_{ij}$, $[b_i,c_i]=0$.

By scaling a_{ij}, b_i, c_j together, may assume $\delta\in\{0,1\}$.

Missing so far: $[a_{12}, a_{21}]$: