

Wheeling & KV in degree 2 and 3

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Wheeling in Degree 2

The wheeling element:
 $R = \exp_v \left(\frac{1}{\sqrt{8}} \phi - \frac{1}{\sqrt{24}} \psi + \dots \right)$

$$\begin{aligned} \underbrace{\begin{array}{c} x \\ \parallel \\ \odot \end{array}} \underbrace{\begin{array}{c} y \\ \parallel \\ \odot \end{array}} - \underbrace{\begin{array}{c} x+y \\ \parallel \\ \odot \end{array}} &= \frac{1}{2} \left(\begin{array}{c} x \quad y \\ \parallel \quad \parallel \\ \quad \quad \quad \end{array} - \begin{array}{c} x \quad y \\ \diagdown \quad \diagup \\ \quad \quad \quad \end{array} \right) \\ &- \frac{1}{24} \underbrace{\begin{array}{c} x \quad y \\ \quad \quad \quad \odot \end{array}} \end{aligned}$$

→ This must be 0 mod link relations

→ And it is

Wheeling in Degree 3

$$\begin{aligned} \underbrace{\begin{array}{c} x \\ \parallel \\ \odot \end{array}} \underbrace{\begin{array}{c} y \\ \parallel \\ \odot \end{array}} - \underbrace{\begin{array}{c} x+y \\ \parallel \\ \odot \end{array}} &= \text{deg 2} + \frac{1}{3} \underbrace{\begin{array}{c} x \quad x \quad y \\ \parallel \parallel \parallel \\ \quad \quad \quad \end{array}} - \frac{1}{6} \underbrace{\begin{array}{c} x \quad x \quad x \\ \parallel \parallel \parallel \\ \quad \quad \quad \end{array}} - \frac{1}{6} \underbrace{\begin{array}{c} y \quad y \quad y \\ \parallel \parallel \parallel \\ \quad \quad \quad \end{array}} \\ &- \frac{1}{6} \underbrace{\begin{array}{c} x \quad y \quad x \\ \parallel \parallel \parallel \\ \quad \quad \quad \end{array}} - \frac{1}{6} \underbrace{\begin{array}{c} y \quad x \quad y \\ \parallel \parallel \parallel \\ \quad \quad \quad \end{array}} + \frac{1}{3} \underbrace{\begin{array}{c} x \quad y \quad y \\ \parallel \parallel \parallel \\ \quad \quad \quad \end{array}} \\ &- \frac{1}{24} \left(\underbrace{\begin{array}{c} x \quad x \quad y \\ \quad \quad \quad \odot \\ \parallel \quad \parallel \end{array}} + \underbrace{\begin{array}{c} y \quad x \quad y \\ \quad \quad \quad \odot \\ \parallel \quad \parallel \end{array}} \right) \end{aligned}$$

→ This must be 0 mod link relations

→ And it is

(it seems that the wheels start coupling into the picture only in degrees ≥ 4)