

$$\text{lhs1} = R_1[1, i^+, i] - (g_{i^+, i^+} - 1/2)$$

$$\text{lhs2} = \text{lhs1} // \cdot \left\{ g_{i^+, \beta_-} \mapsto T^{-1} \delta_{i^+, \beta} + g_{i^{++}, \beta}, g_{i, \beta_-} \mapsto \delta_{i, \beta} + g_{i^+, \beta} \right\}$$

$$\text{Simplify}[\text{lhs2}]$$