

Abstraction





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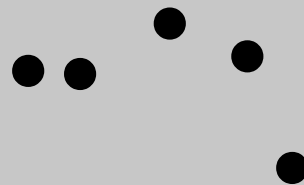
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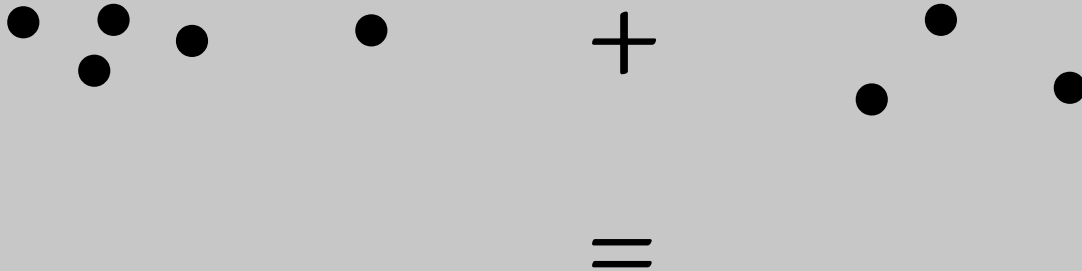
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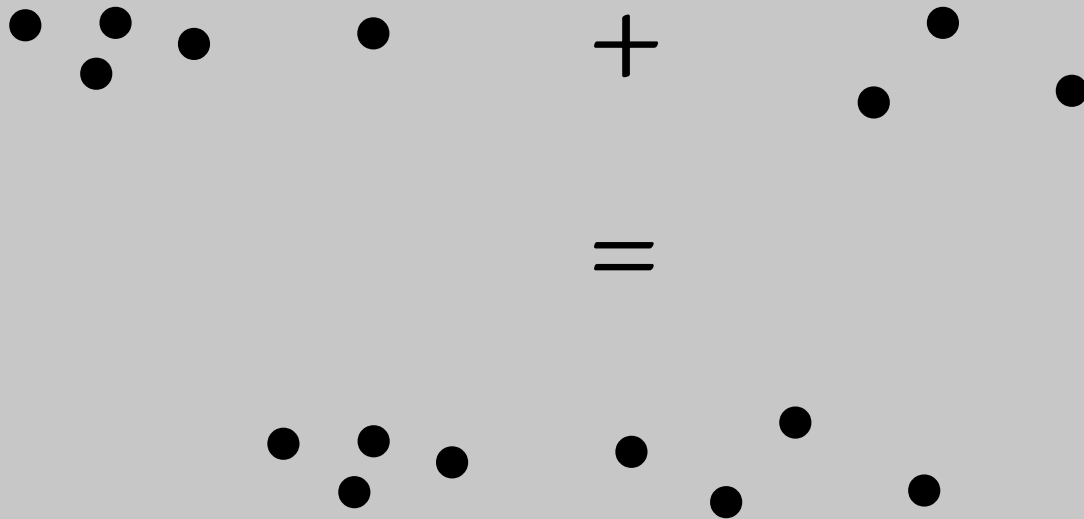


Addition

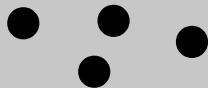


A visual representation of the addition $4 + 3 = 7$. The equation is shown using black dots and mathematical symbols on a light gray background. On the left, there are four dots arranged in a horizontal line. To their right is a plus sign $+$. Further right are three dots arranged in a triangular pattern (one at the top, two below it). To the right of these dots is an equals sign $=$. Finally, on the far right, there are seven dots arranged in a horizontal line.

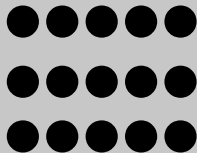
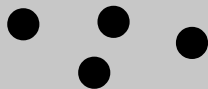
Addition



Multiplication



Multiplication



Rimes

Rimes

C'est l'histoire de Loulou Lapierre
Une p'tite mère ben ordinaire
Qui travaille à temps partiel
Comme femme de chambre dans un hôtel

Joyeux calvaire! - Les Cowboys Fringants

Rimes

C'est l'histoire de Loulou Lapierre
Une p'tite mère ben ordinaire
Qui travaille à temps partiel
Comme femme de chambre dans un hôtel

A
A
B
B

Joyeux calvaire! - Les Cowboys Fringants


Rimes

C'est l'histoire de Loulou Lapierre Une p'tite mère ben ordinaire Qui travaille à temps partiel Comme femme de chambre dans un hôtel	A A B B	
Joyeux calvaire! - Les Cowboys Fringants		
ولا في بهالجب مصاري ولا ممكن فيه ليرات ولا ممكن في اراضي ولا فيه مجوهرات	A B A B	
Ziad Rahbani - بلا ولا شي		

Rimes

C'est l'histoire de Loulou Lapierre Une p'tite mère ben ordinaire Qui travaille à temps partiel Comme femme de chambre dans un hôtel	A A B B	
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Ziad Rahbani - بلا ولا شي		
There's something in this sound that takes me far It's like a special song Can move my mood along But I cannot say you'll hear through my guitar	A B B A	
It Runs Through Me - Tom Misch		


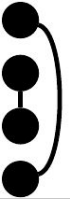
Rimes

C'est l'histoire de Loulou Lapierre Une p'tite mère ben ordinaire Qui travaille à temps partiel Comme femme de chambre dans un hôtel	A A B B	
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It Runs Through Me - Tom Misch		

Une petite histoire

TW: maths!

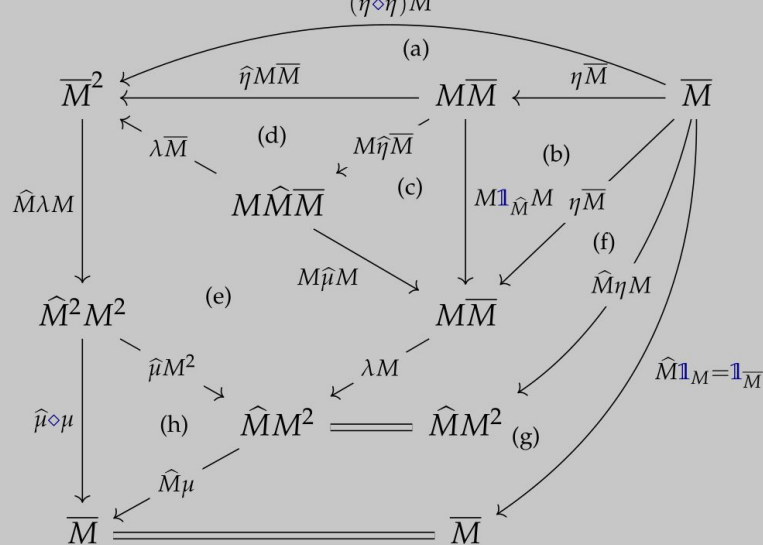
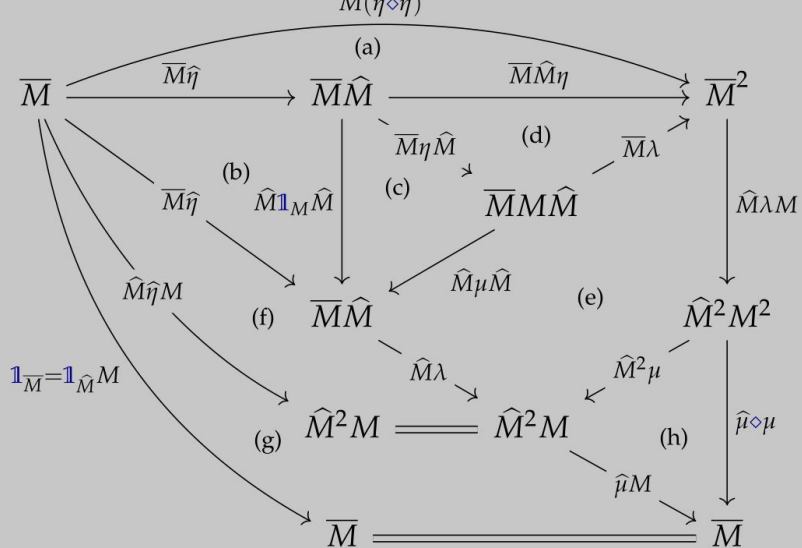
Théorème: Une loi distributive entre deux monades induit une structure de monade composée.

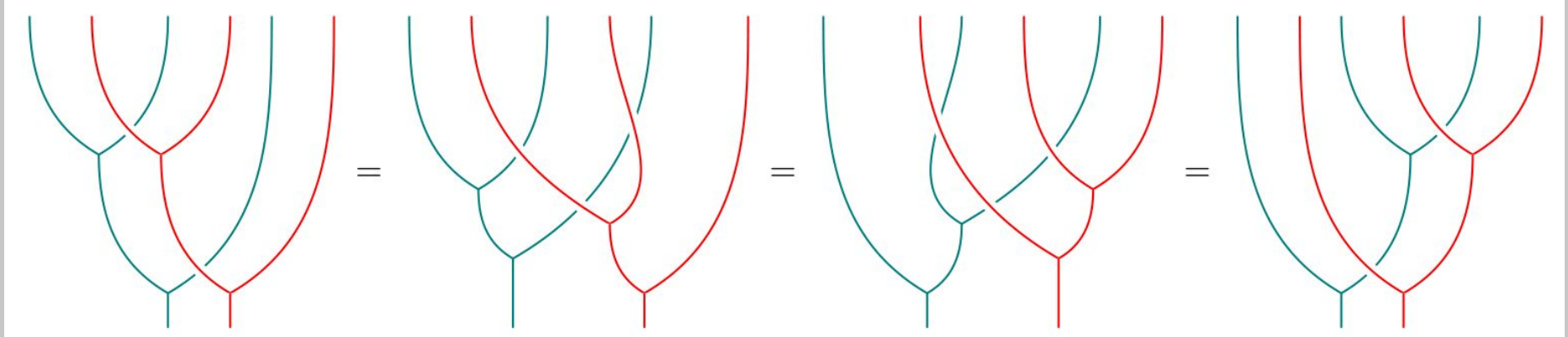
Théorème: Une loi distributive entre deux monades induit une structure de monade composée.

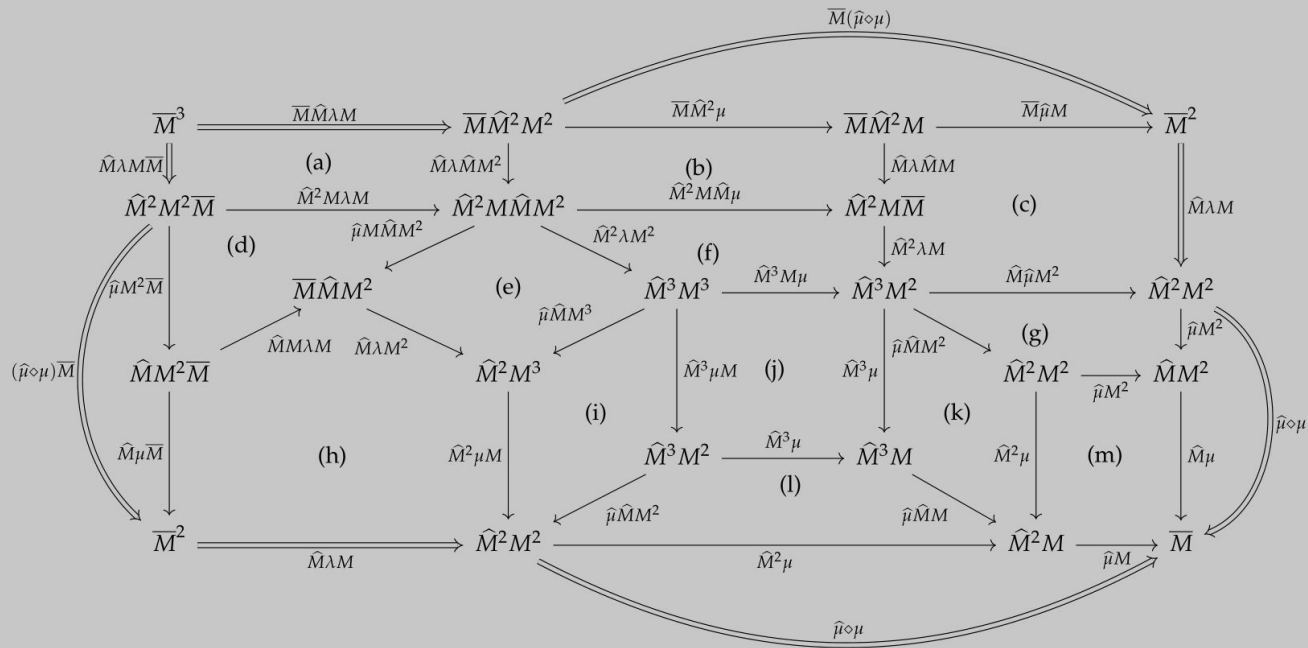
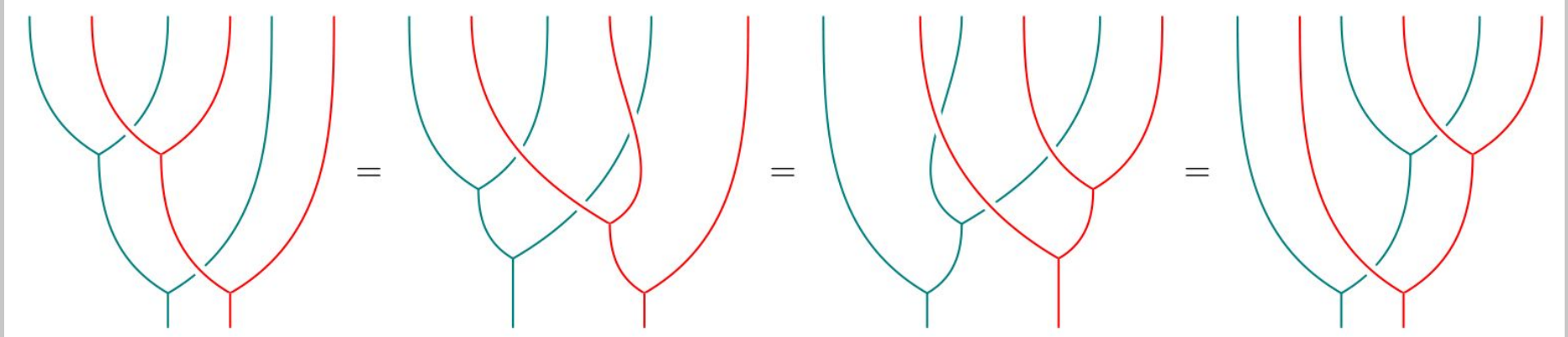
$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ \overline{M}(\hat{\eta} \diamond \eta) = \mathbb{1}_{\overline{M}}$$

$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ (\hat{\eta} \diamond \eta)\overline{M} = \mathbb{1}_{\overline{M}}$$

$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ (\hat{\mu} \diamond \mu)\overline{M} \circ \hat{M}\lambda M\overline{M} = (\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ \overline{M}(\hat{\mu} \diamond \mu) \circ \overline{M}\hat{M}\lambda M$$



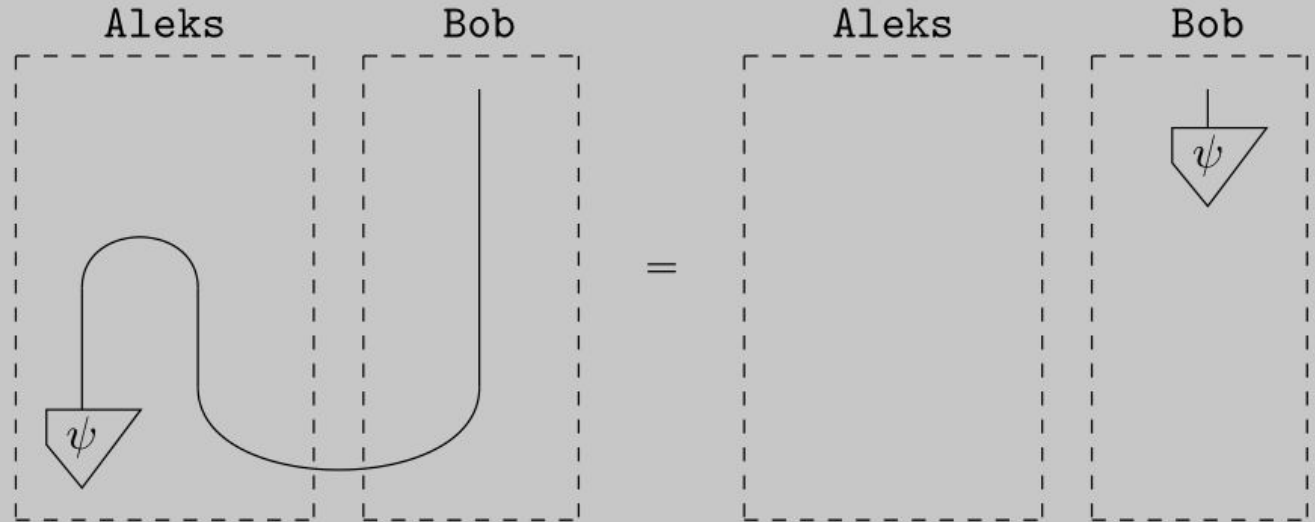
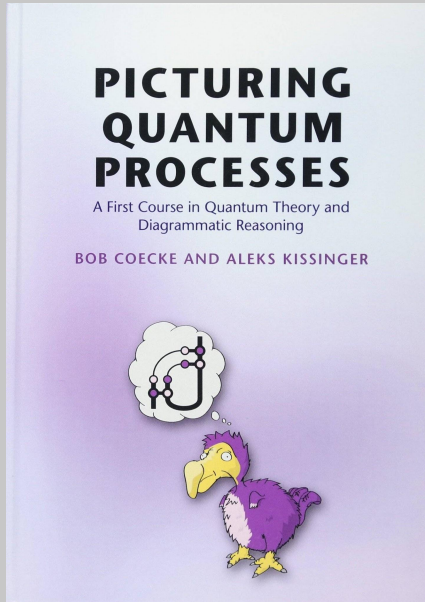




Examples

Procédés Quantiques

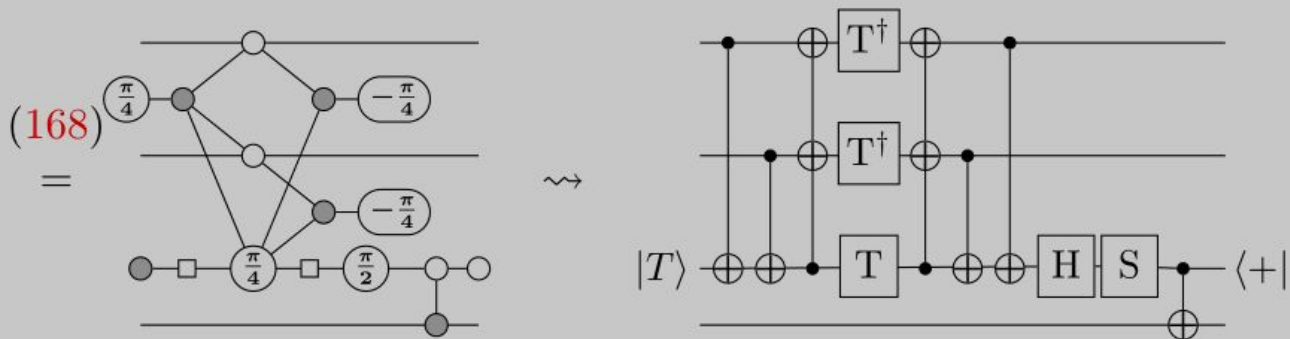
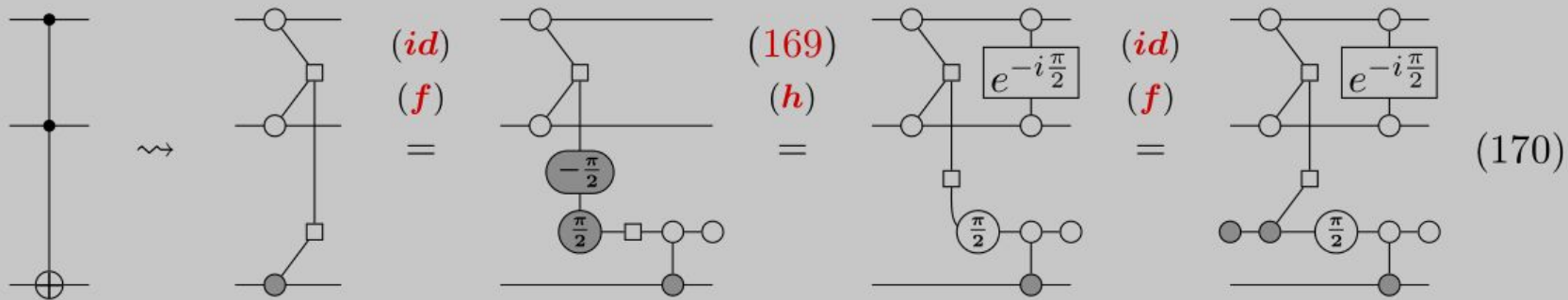
Quantum Teleportation



Liens: [article](#), [bouquin](#), [NLP quantique](#), [blog](#)

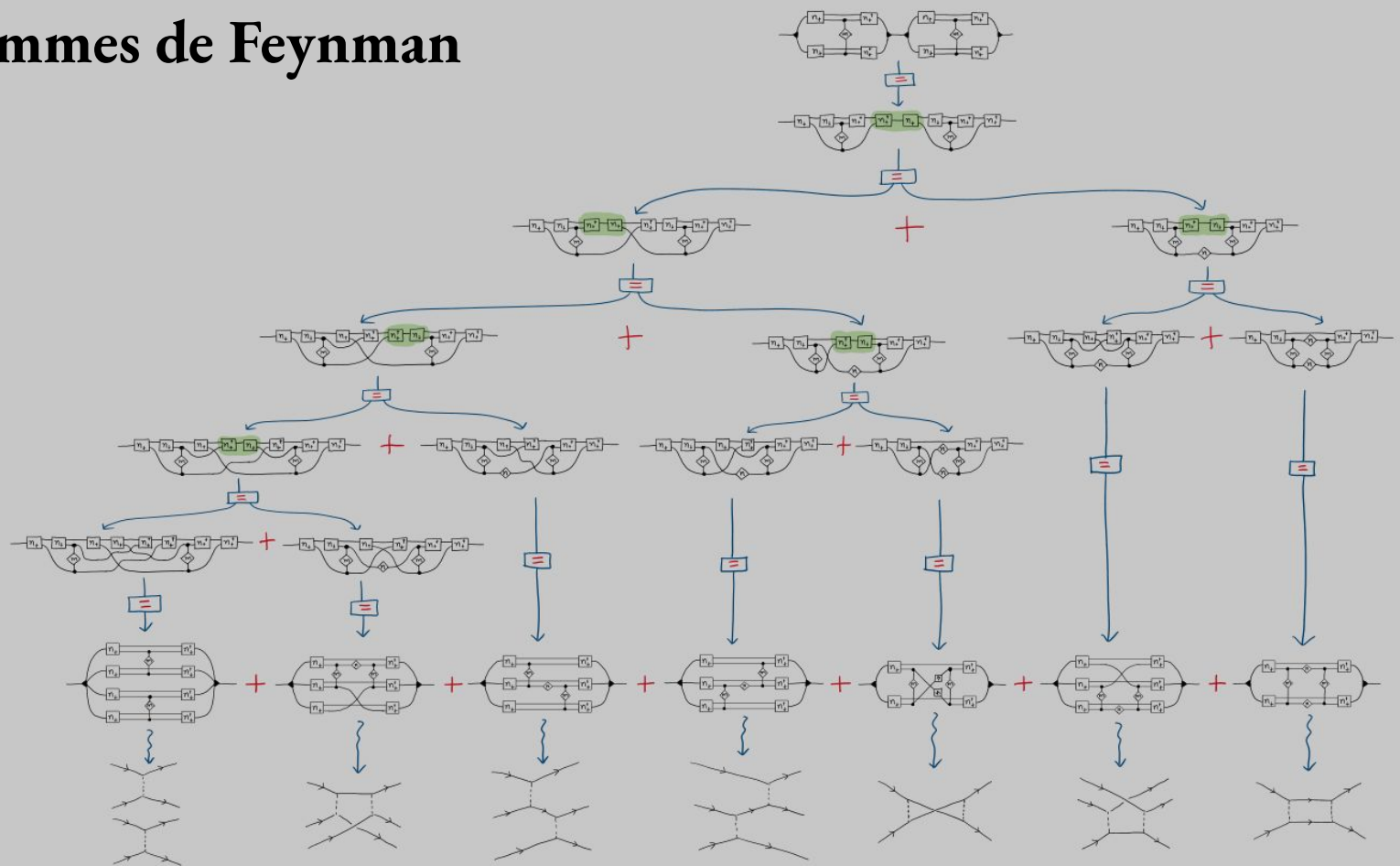
Circuits Quantiques

We can now rewrite the Toffoli gate to a more efficient construction:



Liens: [article](#), [communauté](#), [implémentation Julia](#), [implémentation Python](#)

Diagrammes de Feynman



Liens: [article](#)

Figure 1. Composition of categorical Feynman diagrams, cf. Section 4.4.

Automates

$$\begin{aligned}
 \langle e + f \rangle &= \text{Diagram 1} \stackrel{(C4)}{=}_{KAA} \text{Diagram 2} & \langle 0 \rangle &= \text{Diagram 3} \stackrel{(C3)}{=}_{KAA} \text{Diagram 4} \\
 \langle ef \rangle &= \text{Diagram 5} \stackrel{(C1)}{=}_{KAA} \text{Diagram 6} & \langle 1 \rangle &= \text{Diagram 7} \stackrel{(C2)}{=}_{KAA} \text{Diagram 8} \\
 \langle e^* \rangle &= \text{Diagram 9} \stackrel{(C5)}{=}_{KAA} \text{Diagram 10} & \langle a \rangle &= \text{Diagram 11} =: \text{Diagram 12} \quad (8)
 \end{aligned}$$

Diagram 1: A horizontal line with a circle. Two red boxes labeled 'e' and 'f' are above the circle, with red arrows pointing to it.

 Diagram 2: A horizontal line with two black dots. Between them are two boxes labeled 'e' and 'f' stacked vertically.

 Diagram 3: A horizontal line with a circle. A red dot is above the circle, with a red arrow pointing to it.

 Diagram 4: A horizontal line with two black dots.

 Diagram 5: A horizontal line with a circle. Two red boxes labeled 'e' and 'f' are above the circle, with red arrows pointing to it.

 Diagram 6: A horizontal line with two black dots. Between them are two boxes labeled 'e' and 'f' stacked vertically.

 Diagram 7: A horizontal line with a circle. A red circle is above the circle, with a red arrow pointing to it.

 Diagram 8: A horizontal line with two black dots.

 Diagram 9: A horizontal line with a circle. A red box labeled 'e' is above the circle, with a red arrow pointing to it.

 Diagram 10: A horizontal line with two black dots. Between them is a box labeled 'e'. There are curved arrows above and below the dots.

 Diagram 11: A horizontal line with a circle. A red box labeled 'a' is above the circle, with a red arrow pointing to it.

 Diagram 12: A horizontal line with a box labeled 'a'.

For example, $\langle ab(a + ab)^* \rangle =$

$$\text{Diagram 13} \stackrel{=}{=}_{KAA} \text{Diagram 14} \quad (9)$$

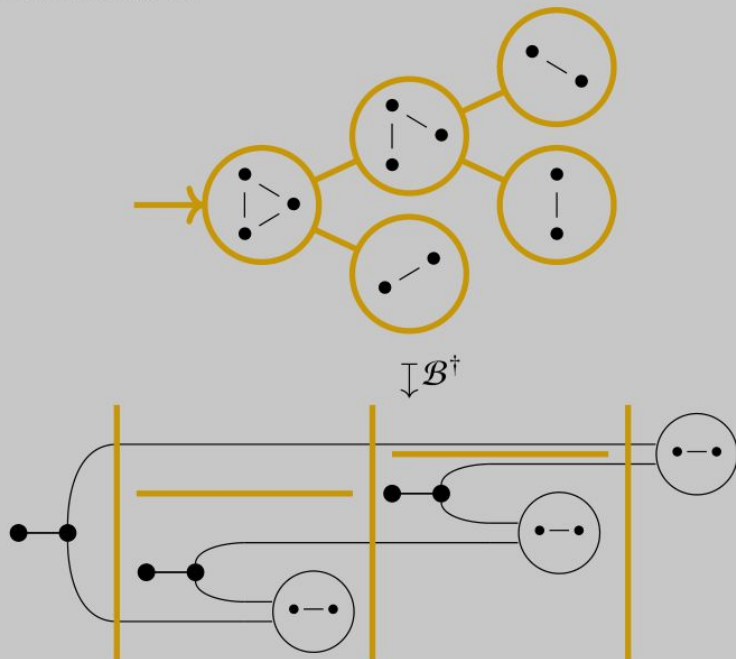
Diagram 13: A horizontal line with a circle. Two red boxes labeled 'a' and 'b' are above the circle, with red arrows pointing to it. There are red loops and arrows connecting the boxes.

 Diagram 14: A horizontal line with two black dots. Between them are two boxes labeled 'a' and 'b' stacked vertically. There are curved arrows above and below the dots.

Liens: [article](#), [article \(automates probabilistes\)](#)

Monoidal Width

Example 5.16. *The 3-clique has a branch decomposition as shown on the top. The corresponding monoidal decomposition is shown below it.*



Théorèmes

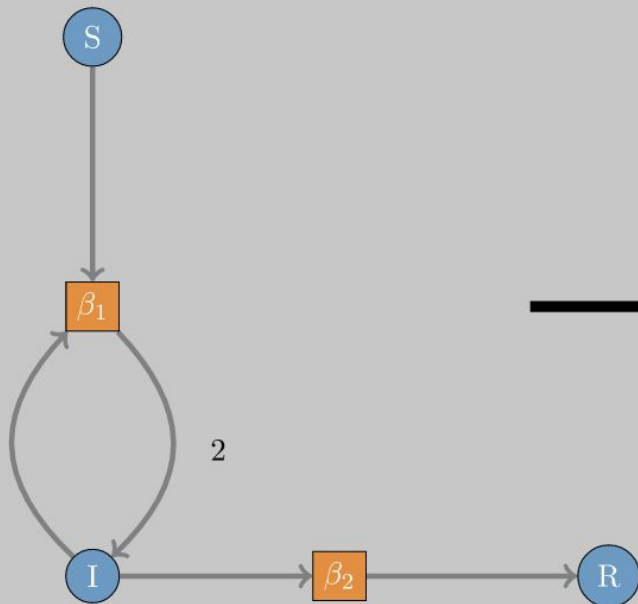
$$\begin{aligned} \text{twd}(G) &\leq \text{mtwd}(g) \leq 2 \cdot \text{twd}(G) \\ \frac{1}{2} \cdot \text{bwd}(G) &\leq \text{mwd}(g) \leq \text{bwd}(G) + 1 \\ \text{pwd}(G) &= \text{mpwd}(g) \end{aligned}$$

Liens: [article](#)

Modélisation Scientifique

Petri

Dynam



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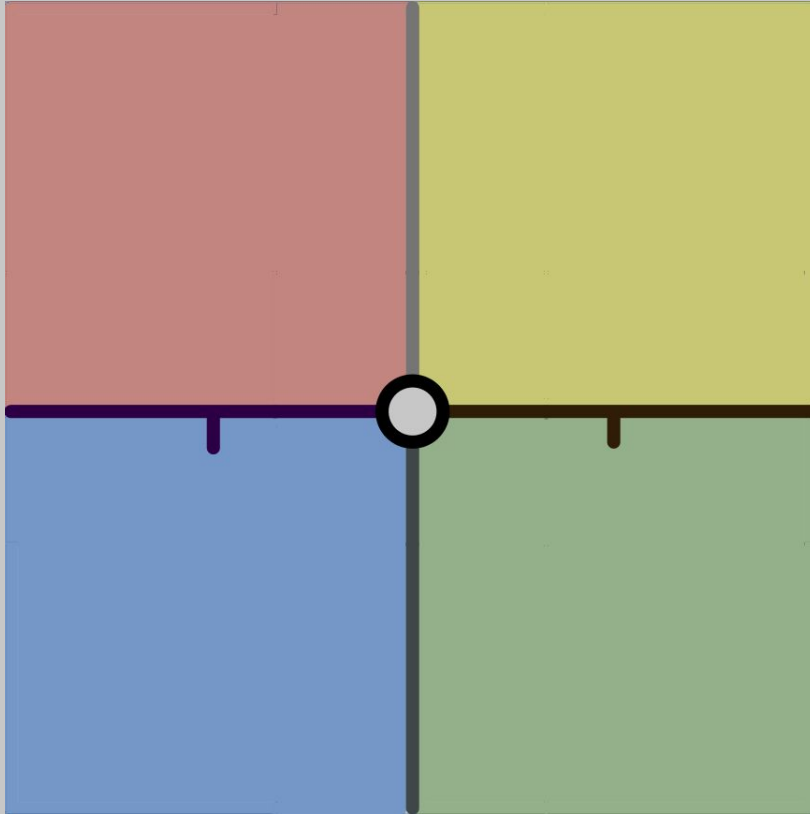
$$\dot{S} = \beta_1 SI$$

$$\dot{I} = \beta_1 SI - \beta_2 I$$

$$\dot{R} = \beta_2 I$$

Liens: [blogpost](#), [AlgebraicJulia](#)

Logique en Couleurs



$$\frac{a \text{ R } b}{f(a) \text{ S } g(b)}$$

Liens: [conférence](#), [article](#), [thésard](#)

Merci !