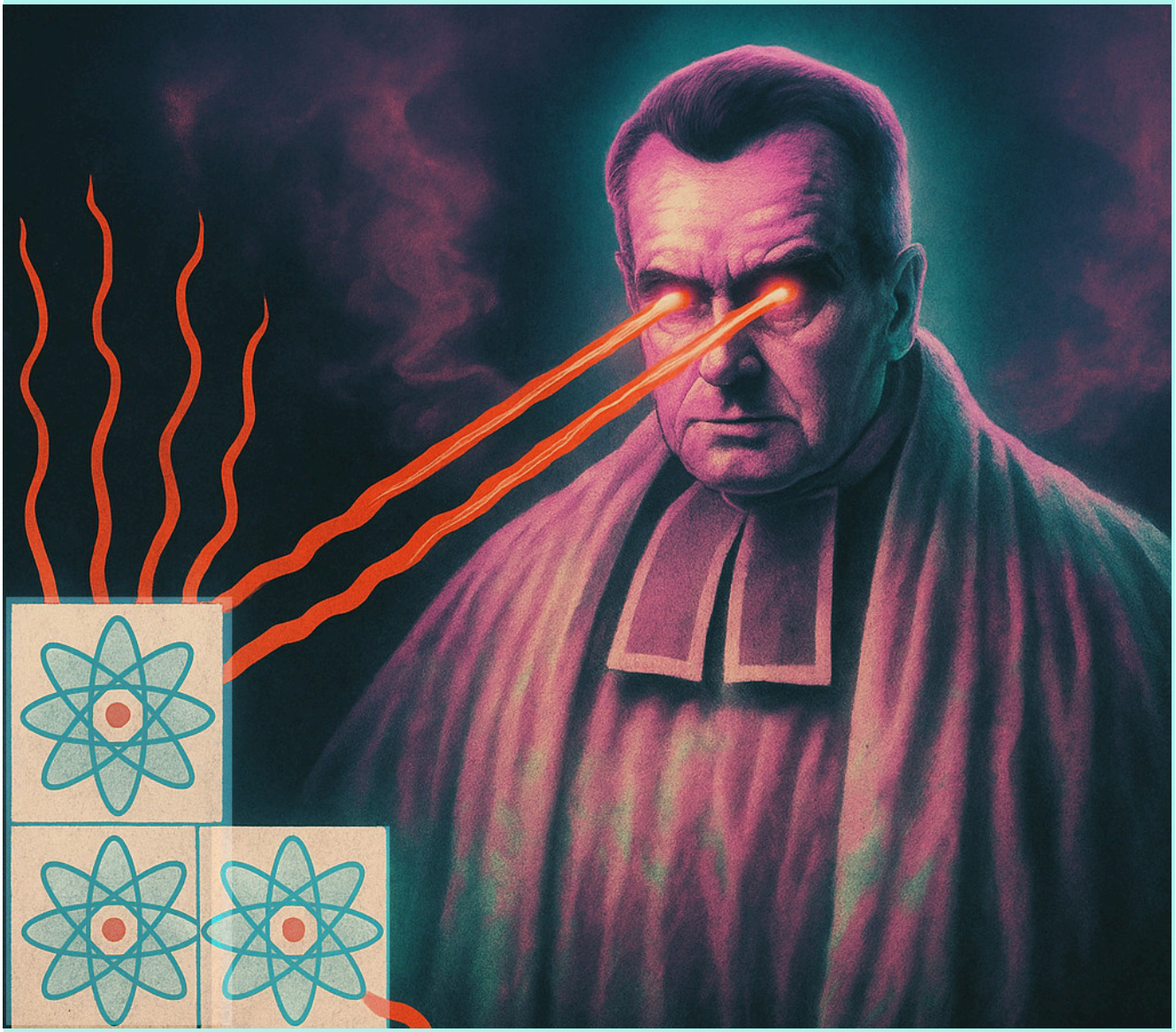
BAYESUVIUS QUANTICO

A VISUAL DICTIONARY OF QUANTUM BAYESIAN NETWORKS



ROBERT R. TUCCI

Bayesuvius Quantico,
a visual dictionary of Quantum Bayesian Networks

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This book is constantly being expanded and improved. To download the latest version, go to
`https://github.com/rrtucci/bayes-quantico`

Bayes Quantico
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$$P(y) = \sum_x P(y|x)P(x) \tag{19.1}$$

$$\langle y|\psi\rangle = \sum_x \underbrace{\langle y|A|x\rangle}_{A(y|x)} \langle x|\psi\rangle \tag{19.2}$$

$$\longleftarrow = \underset{\sum a}{\longleftarrow} = \sum_a |a\rangle\langle a| \tag{19.3}$$

$$\langle a|q\rangle = \sum_b \langle a|G|b\rangle \langle b|q\rangle \tag{19.4}$$

$$q_a = \sum_b G_a^b q_b \tag{19.5}$$

$$\underset{a}{\longleftarrow} q = \underset{a}{\longleftarrow} G \underset{\Sigma b}{\longleftarrow} q \tag{19.6}$$

$$\langle q|a\rangle = \sum_b \left\langle b|G^\dagger|a\right\rangle \langle q|b\rangle \tag{19.7}$$

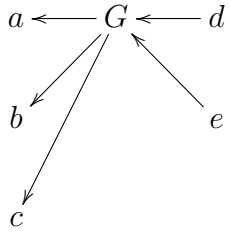
$$q^a = \sum_b (G^\dagger)_b^a q^b \tag{19.8}$$

$$q \underset{a}{\longleftarrow} = q \underset{\sum b}{\longleftarrow} G^\dagger \underset{a}{\longleftarrow} \tag{19.9}$$

$$\underset{a}{\longleftarrow} q = a \longleftarrow q \tag{19.10}$$

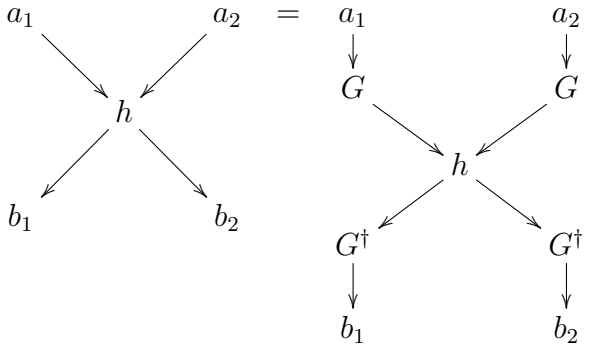
$$q \underset{a}{\longleftarrow} = q \longleftarrow a \tag{19.11}$$

$$G^{d,e}_{a,b,c} = \langle a,b,c|G|d,e\rangle = \quad (19.12)$$



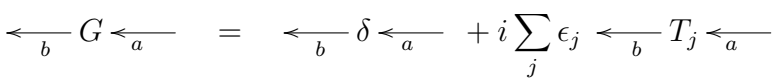
$$\langle b_1,b_2|h|a_1,a_2\rangle = \left\langle G^\dagger b_1, G^\dagger b_2|h|Ga_1,Ga_2\right\rangle \quad (19.13)$$

$$\quad (19.14)$$



$$G^a_b = \delta^a_b + i\sum_j \epsilon_j (T_j)^a_b \quad (19.15)$$

$$\quad (19.16)$$



Assume $T_j^\dagger = T_j$. To first order in ϵ_j,

$$0 = i\sum_j \epsilon_j \left(\begin{array}{ccccc} a_1 & & a_2 & a_1 & a_2 \\ \downarrow & & \downarrow & \downarrow & \downarrow \\ T_j & & \delta & \delta & T_j \\ & \searrow\ \swarrow & & \searrow\ \swarrow & \\ & h & & h & \\ & \swarrow\ \searrow & & \swarrow\ \searrow & \\ \delta & & \delta & \delta & \delta \\ \downarrow & & \downarrow & \downarrow & \downarrow \\ b_1 & & b_2 & b_1 & b_2 \end{array} \right) \tag{19.17}$$

$$- i\sum_j \epsilon_j \left(\begin{array}{ccccc} a_1 & & a_2 & a_1 & a_2 \\ \downarrow & & \downarrow & \downarrow & \downarrow \\ \delta & & \delta & \delta & \delta \\ & \searrow\ \swarrow & & \searrow\ \swarrow & \\ & h & & h & \\ & \swarrow\ \searrow & & \swarrow\ \searrow & \\ T_j & & \delta & \delta & T_j \\ \downarrow & & \downarrow & \downarrow & \downarrow \\ b_1 & & b_2 & b_1 & b_2 \end{array} \right) \tag{19.18}$$

from which we get one equation for each ϵ_j.

Chapter 20

Unitary Groups

Chapter 21

Wigner Coefficients

Chapter 22

Wigner-Ekart Theorem

Chapter 23

Young Tableau

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