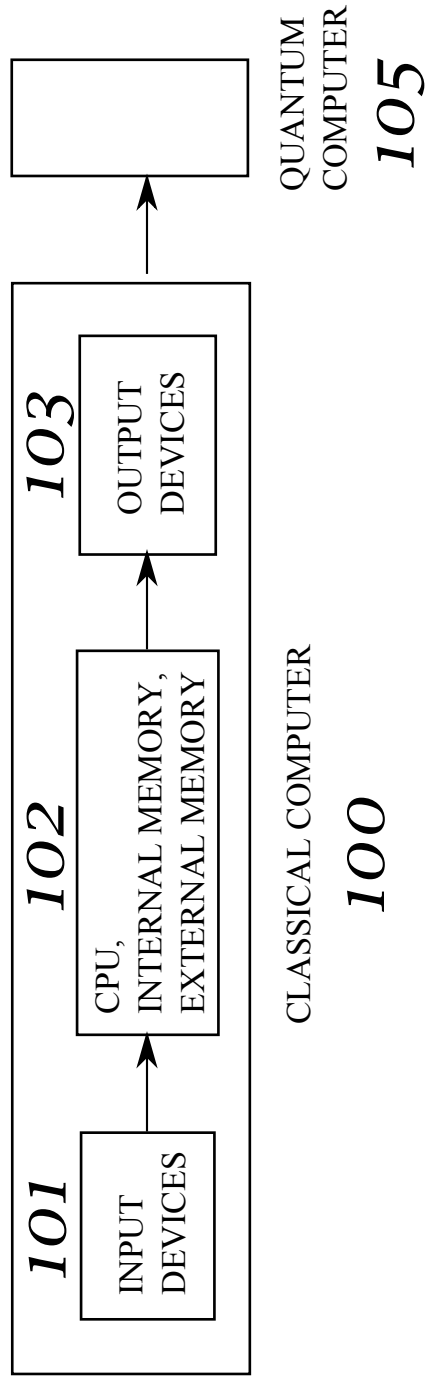


*Figure 1*



## *Figure 2*

$$|z_0|^2 + |z_1|^2 + \langle \chi | \chi \rangle = 1 \quad \mathbf{201}$$

$$p = |z_0|^2 + |z_1|^2, \quad q = 1 - p \quad \mathbf{202}$$

$$|s\rangle_{\mu,\nu,\omega} = \begin{array}{c} z_0 |\psi_0\rangle_\mu \\ |0\rangle_\nu \\ |0\rangle_\omega \end{array} + \begin{array}{c} z_1 |\psi_1\rangle_\mu \\ |1\rangle_\nu \\ |0\rangle_\omega \end{array} + \begin{array}{c} |\chi\rangle_{\mu,\nu} \\ |1\rangle_\omega \end{array} \quad \mathbf{203}$$

$$|t\rangle_{\mu,\nu,\omega} = \frac{1}{\sqrt{p}} \left[ \begin{array}{c} z_0 |\psi_0\rangle_\mu \\ |0\rangle_\nu \\ |0\rangle_\omega \end{array} + \begin{array}{c} z_1 |\psi_1\rangle_\mu \\ |1\rangle_\nu \\ |0\rangle_\omega \end{array} \right] \quad \mathbf{204}$$

$$\begin{aligned} [|t\rangle \langle t|]_{\mu,\nu,\omega} |s\rangle_{\mu,\nu,\omega} &= \sqrt{p} |t\rangle_{\mu,\nu,\omega} \\ [|0\rangle \langle 0|]_\omega |s\rangle_{\mu,\nu,\omega} &= \sqrt{p} |t\rangle_{\mu,\nu,\omega} \end{aligned} \quad \mathbf{205}$$

$$\begin{aligned} [|t\rangle \langle t|]_{\mu,\nu,\omega} |t\rangle_{\mu,\nu,\omega} &= |t\rangle_{\mu,\nu,\omega} \\ [|0\rangle \langle 0|]_\omega |t\rangle_{\mu,\nu,\omega} &= |t\rangle_{\mu,\nu,\omega} \end{aligned} \quad \mathbf{206}$$

$$\langle t | s \rangle = \sqrt{p} \quad \mathbf{207}$$

$$\text{tr}_{\mu,\omega} \left\{ |t\rangle \langle t|_{\mu,\nu,\omega} \right\} = P(0) |0\rangle \langle 0|_\nu + P(1) |1\rangle \langle 1|_\nu \quad \mathbf{208}$$

$$P(0) = |z_0|^2/p, \quad P(1) = |z_1|^2/p \quad \mathbf{209}$$

$$|z_1|^2 = \frac{P(1)}{P(0)} |z_0|^2 \quad \mathbf{210}$$

# Figure 3

$$G = (pa_{n-1}, \dots, pa_1, pa_0) \in \mathcal{B}_n = (2^{\{0..n-1\}})^n \quad 301$$

$$P(\mathcal{F}|D) = \frac{\prod_j \left\{ \sum_{pa_j} 1_{\mathcal{F}_j}(pa_j) \theta(pa_j \subset \{< j\}) \beta_j(pa_j) \right\}}{(num)_{\mathcal{F} \rightarrow \mathcal{B}_n}} \quad 302$$

$$\bar{P}(\mathcal{F}|D) = \frac{\sum_{\sigma \in Sym_n} \prod_{j=0}^{n-1} h(j^\sigma | \{< j\}^\sigma)}{(num)_{\mathcal{F} \rightarrow \mathcal{B}_n}} \quad 303$$

$$j \in \{0..n-1\}, \quad S \subset \{0..n-1 \setminus j\}, \quad |S| = \ell \quad 304$$

$$h(j|S) = \sin(\theta_{j|S}), \quad R_y^{j|S} = \exp(-i\sigma_Y \theta_{j|S}) \quad 305$$

$$N_2(\beta; \ell) = n \binom{n-1}{\ell}, \quad \epsilon = \frac{1}{\prod_{\ell=0}^{n-1} N_2(\beta; \ell)} \quad 306$$

$$|\{1, 0^{\lambda-1}\}\rangle = \left\{ \begin{array}{l} |10^{\lambda-1}\rangle + |010^{\lambda-2}\rangle \\ + |0^2 10^{\lambda-3}\rangle + \dots + |0^{\lambda-1} 1\rangle \end{array} \right\} \quad 307$$

$$V_0^{(\lambda)} : |0^\lambda\rangle \mapsto \frac{1}{\sqrt{\lambda}} |\{1, 0^{\lambda-1}\}\rangle \quad 308$$

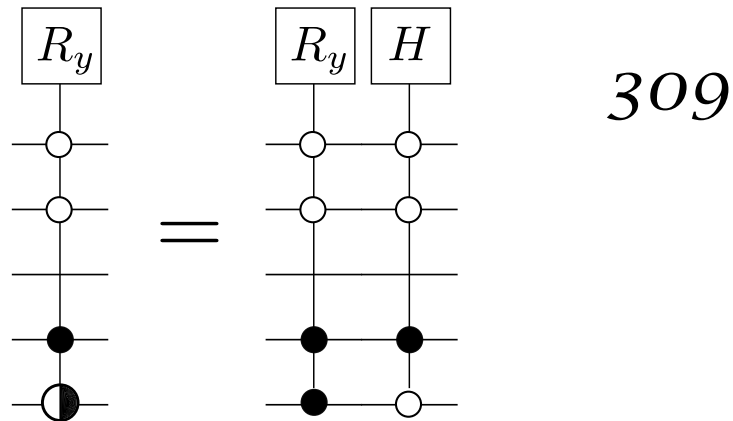
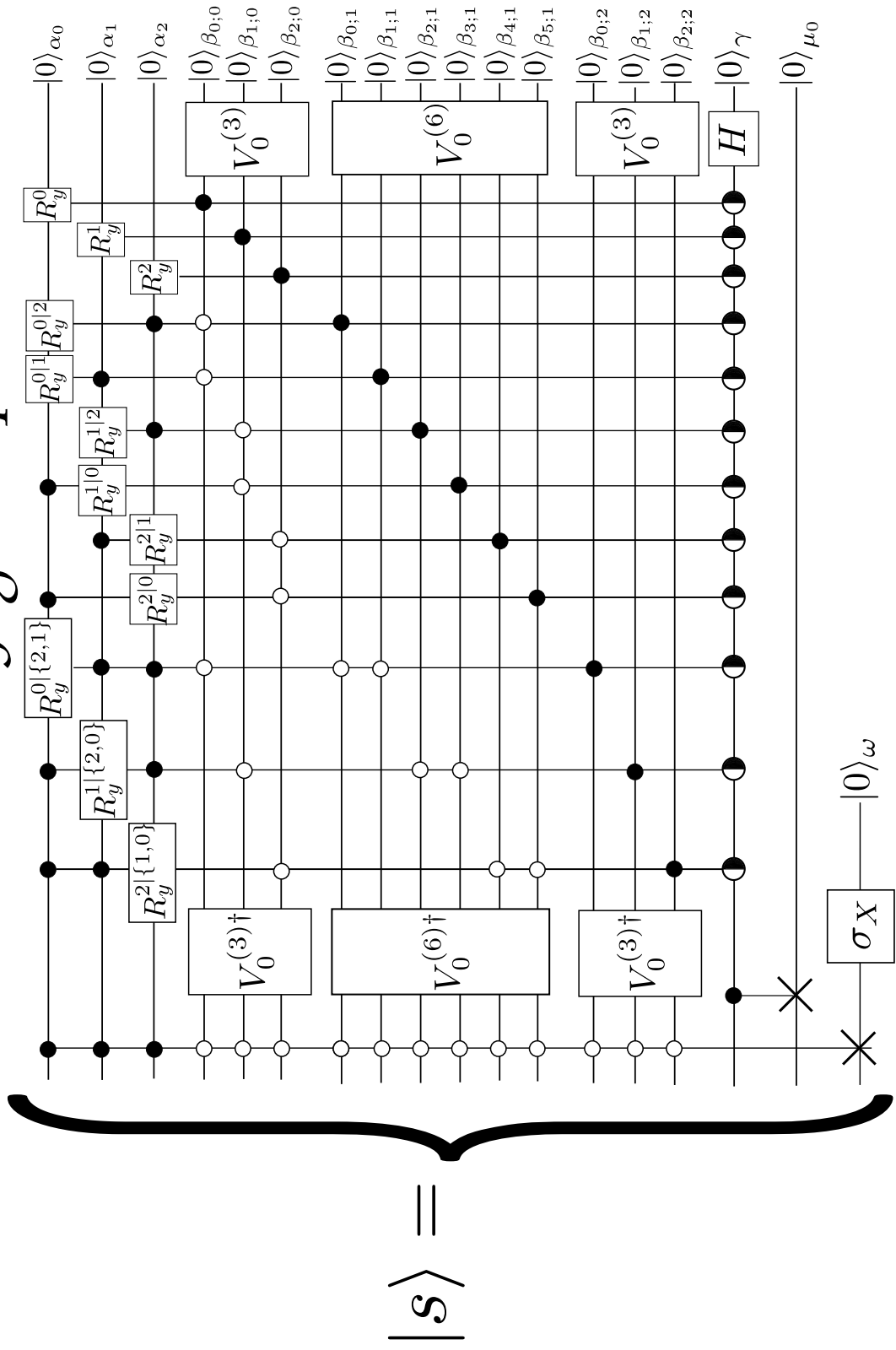


Figure 4



## *Figure 5*

$$|s\rangle_{\mu,\nu,\omega} = \begin{array}{c} z_1 |\psi_1\rangle_\mu \\ |1\rangle_\nu \\ |0\rangle_\omega \end{array} + \begin{array}{c} z_0 |\psi_0\rangle_\mu \\ |0\rangle_\nu \\ |0\rangle_\omega \end{array} + \begin{array}{c} |\chi\rangle_{\mu,\nu} \\ |1\rangle_\omega \end{array} \quad 501$$

$$|\psi_1\rangle_\mu = \begin{array}{c} |0^3\rangle_\alpha \\ |1\rangle_{\mu_0} \end{array} \quad \left| \quad \right. \quad |\psi_0\rangle_\mu = \begin{array}{c} |0^3\rangle_\alpha \\ |0\rangle_{\mu_0} \end{array} \quad 502$$

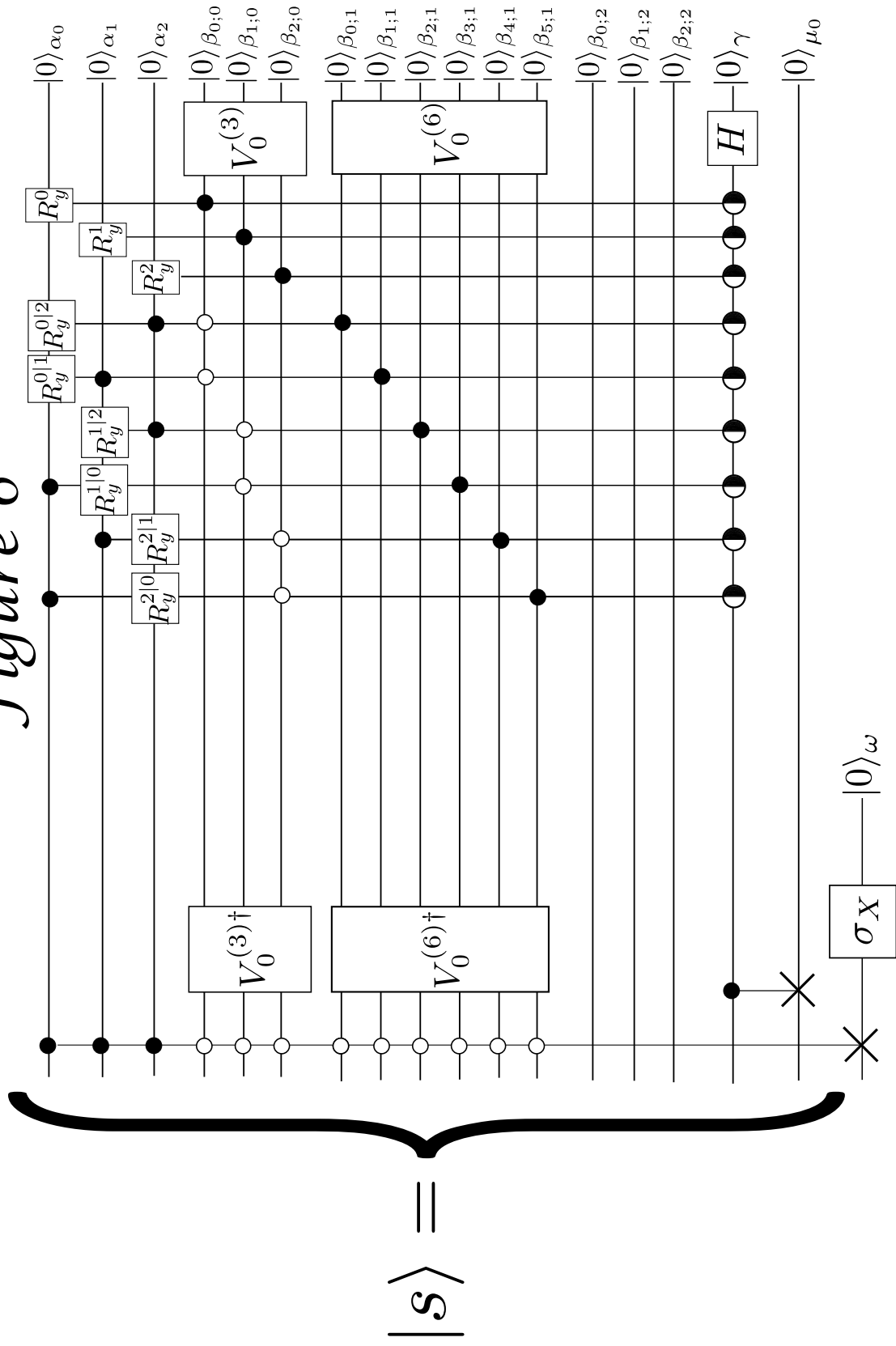
$$|1\rangle_\nu = \left[ \begin{array}{c} |0^3\rangle_{\beta;0} \\ |0^6\rangle_{\beta;1} \\ |0^3\rangle_{\beta;2} \\ |1\rangle_\gamma \end{array} \right] \quad \left| \quad \right. \quad |0\rangle_\nu = \left[ \begin{array}{c} |0^3\rangle_{\beta;0} \\ |0^6\rangle_{\beta;1} \\ |0^3\rangle_{\beta;2} \\ |0\rangle_\gamma \end{array} \right] \quad 503$$

$$\begin{aligned} z_1 &= \frac{\epsilon}{\sqrt{2}} \sum_{\sigma} \sin(\theta_{2^\sigma|\{1^\sigma, 0^\sigma\}}) \sin(\theta_{1^\sigma|0^\sigma}) \sin(\theta_{0^\sigma}) \\ &= \frac{\epsilon}{\sqrt{2}} \sum_{\sigma} h(2^\sigma|\{1^\sigma, 0^\sigma\}) h(1^\sigma|0^\sigma) h(0^\sigma) \end{aligned} \quad 504$$


$$z_0 = \frac{\epsilon n!}{\sqrt{2^{n+1}}} \quad 505$$

$$\frac{|z_1|}{|z_0|} = \sqrt{\frac{P(1)}{P(0)}} \quad 506$$

Figure 6



*Figure 7*



The image shows the user interface for the qJennings software. At the top left, the text "qJennings" is displayed in a stylized font. To its right is a small photograph of a man in a suit, likely the developer, standing next to a banner that says "THINK". Below the title, the version "Ver. 1.6" is shown. The interface is divided into two main sections: "Inputs" and "Outputs".

**Inputs**

File Prefix	<input type="text"/>
Number of Nodes	4
Maximum Number of Parents	2
Estimate of $ z_1 ^2 /  z_0 ^2$	<input type="text"/>
Maximum Number of Grover Steps	<input type="text"/>
Gamma Tolerance (degs)	<input type="text"/>
Delta Lambda (degs)	<input type="text"/>

**Outputs**

$ z_0 ^2$	<input type="text"/>
Starting Gamma (degs)	<input type="text"/>
Final Gamma (degs)	<input type="text"/>
Number of Grover Steps	<input type="text"/>
Number of Qubits	<input type="text"/>
Number of Elem. Ops.	<input type="text"/>