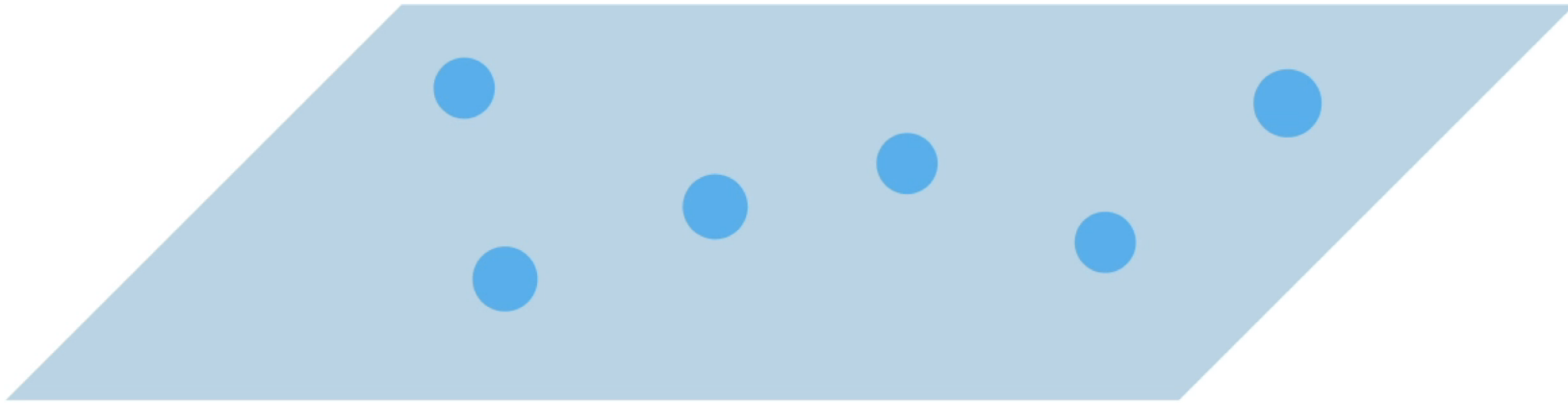# Attila Geresdi

Quantum Computation on Anyons

Reminder: DiVincenzo criteria

- **Scalable system of quantum objects that can be entangled**

- **Ability of state initialization**

- **Several gate operations before the system loses coherence**

- **Universal set of gates**

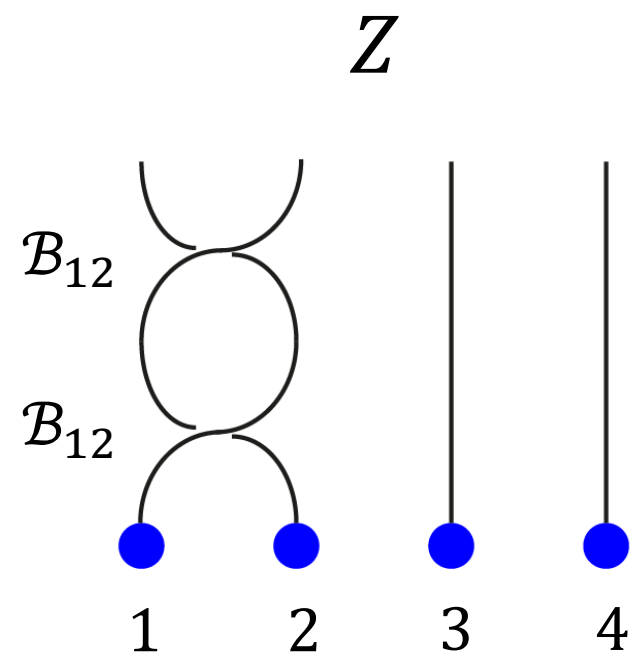- **Ability of qubit state measurement**

State initialization

Quantum gates: Braiding
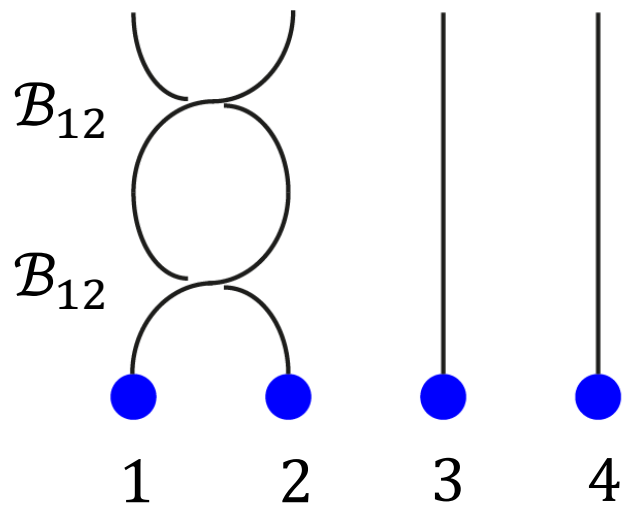
Quantum gates: Braiding

Quantum gates: Braiding

Example single qubit gates

$$Z$$

$\mathcal{B}_{12}$

$\mathcal{B}_{12}$

1　2　3　4

Example single qubit gates

Z

$\mathcal{B}_{12}$

$\mathcal{B}_{12}$

1   2   3   4
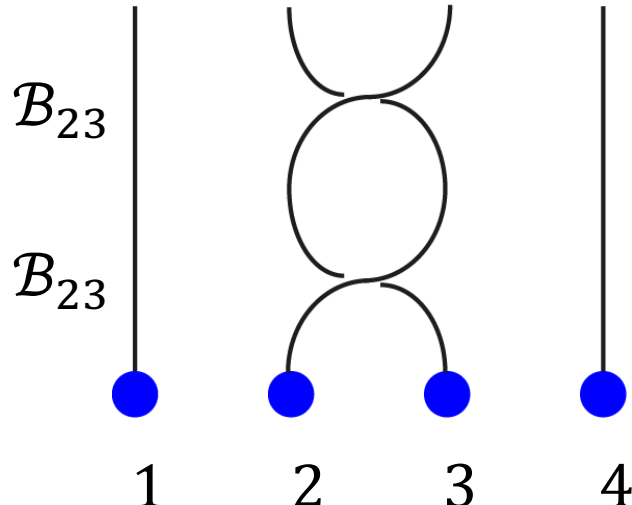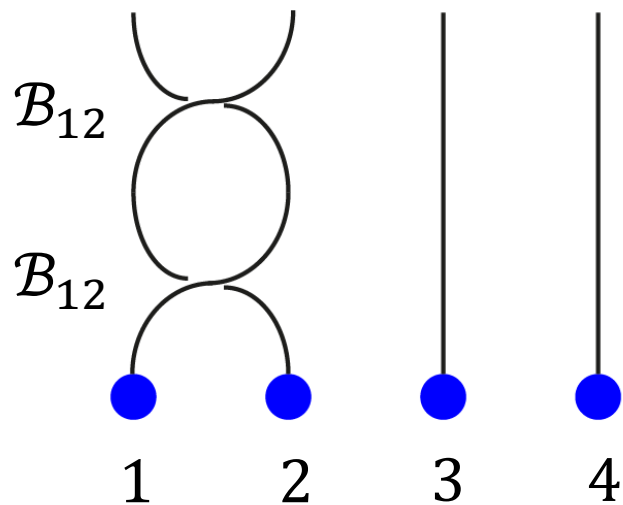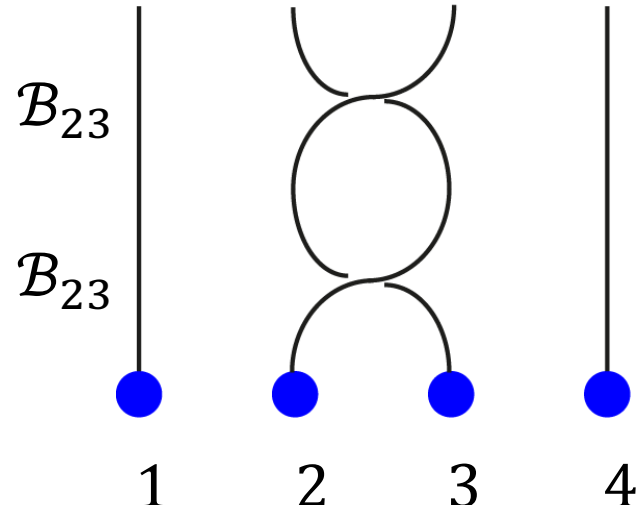
X

$\mathcal{B}_{23}$

$\mathcal{B}_{23}$

1   2   3   4
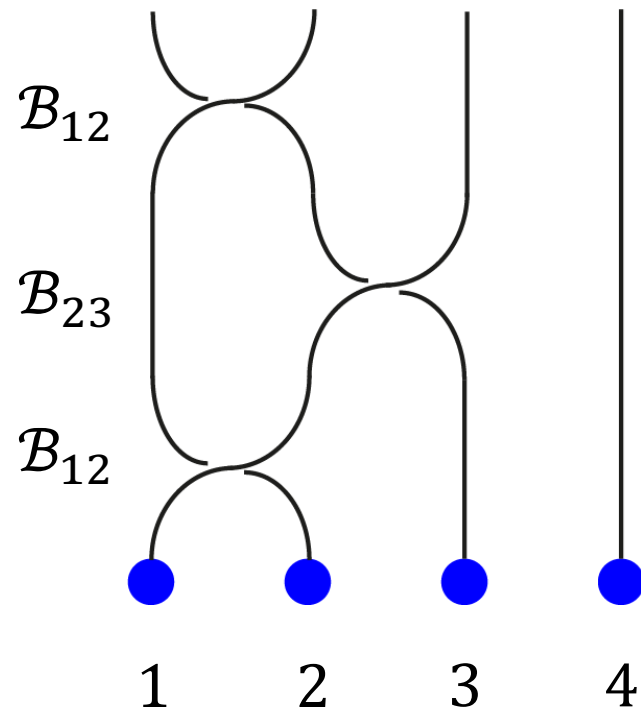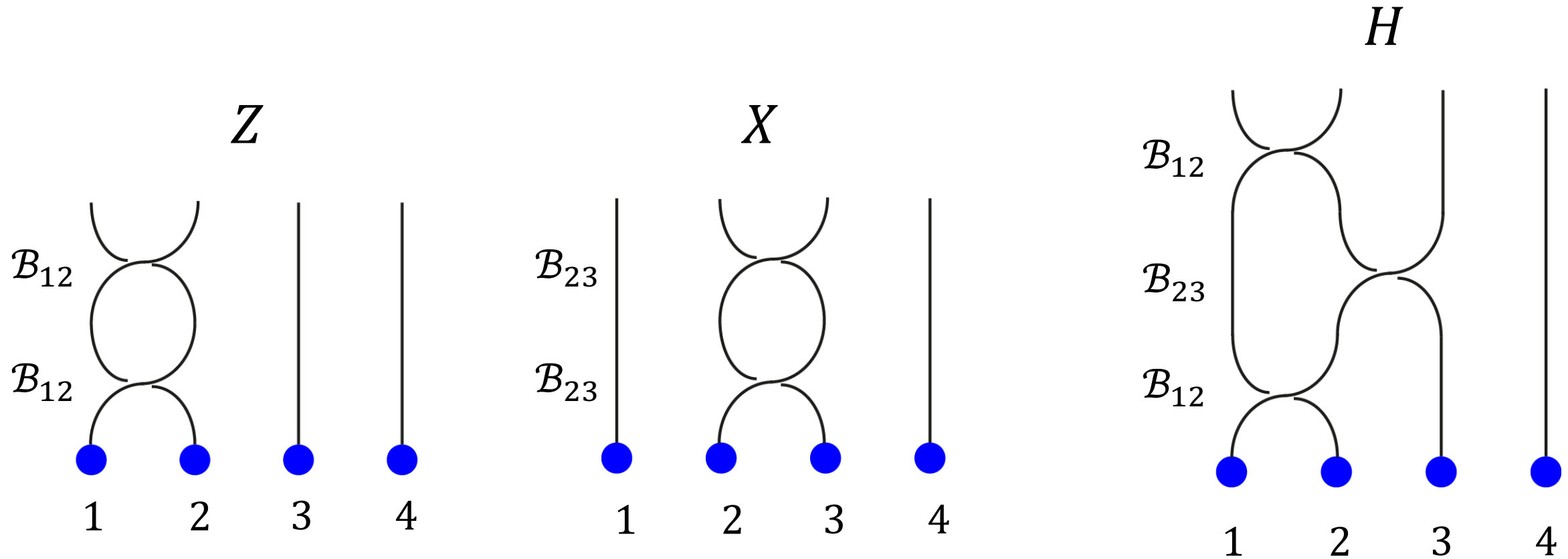
Example single qubit gates
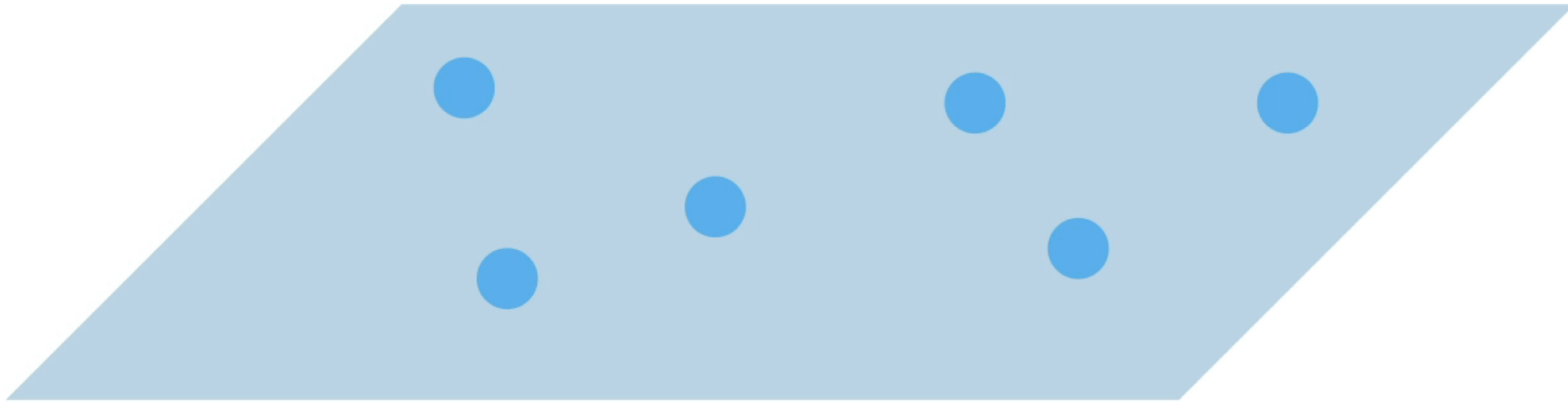
Example single qubit gates

Zero gate error:
Braids are discrete, therefore the qubit rotation is always precise

Caveat: Phase gate is missing from the universal gate set.

Qubit state measurement:
Fusion

Qubit state measurement: Fusion

Fusion rules → charge sensor → 0   empty space (0 charge) / 1   single electron (1 charge)