

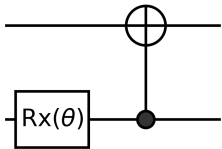
Matrix Representation

```
julia> Matrix(mat(circuit))
4x4 Array{Basic,2}:
 cos((1/2)*θ)      0  -I*sin((1/2)*θ)      0
      0  cos((1/2)*θ)      0  -I*sin((1/2)*θ)
      0  -I*sin((1/2)*θ)      0  cos((1/2)*θ)
 -I*sin((1/2)*θ)      0  cos((1/2)*θ)      0
```

Tagging

```
julia> circuit'
nqubits: 2
chain
└─ control(2)
   └─ (1,) X gate
      └─ put on (2)
         └─ rot(X gate, -θ)
```

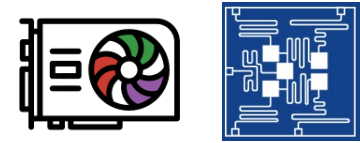
Quantum Algorithms



QBIR

```
julia> circuit = chain(2,
    put(2=>Rx(θ)),
    control(2, 1=>X))
nqubits: 2
chain
└─ put on (2)
   └─ rot(XGate, θ)
      └─ control(2)
         └─ (1,) X gate
```

Quantum Registers



```
instruct!(reg, Val{:Rx}(), (2,), θ)
instruct!(reg, Val{:X}(), (1,), (2,), (1,))
```

Arithmetics

```
julia> circuit * put(2, 1=>H)
nqubits: 2
chain
└─ put on (1)
   └─ H gate
      └─ chain
         └─ put on (2)
            └─ rot(X gate, θ)
               └─ control(2)
                  └─ (1,) X gate
```

Parameter Management

```
julia> dispatch!(circuit, φ)
nqubits: 2
chain
└─ put on (2)
   └─ rot(XGate, φ)
      └─ control(2)
         └─ (1,) X gate
```