After first BS$_M$:

$$|100\rangle \xrightarrow{\text{BS}_M} \cos(\theta_M)|100\rangle + \sin(\theta_M)|010\rangle$$

goes through previous device

Bob blocks photons:

Previously, hit the left detector (D$_1$).
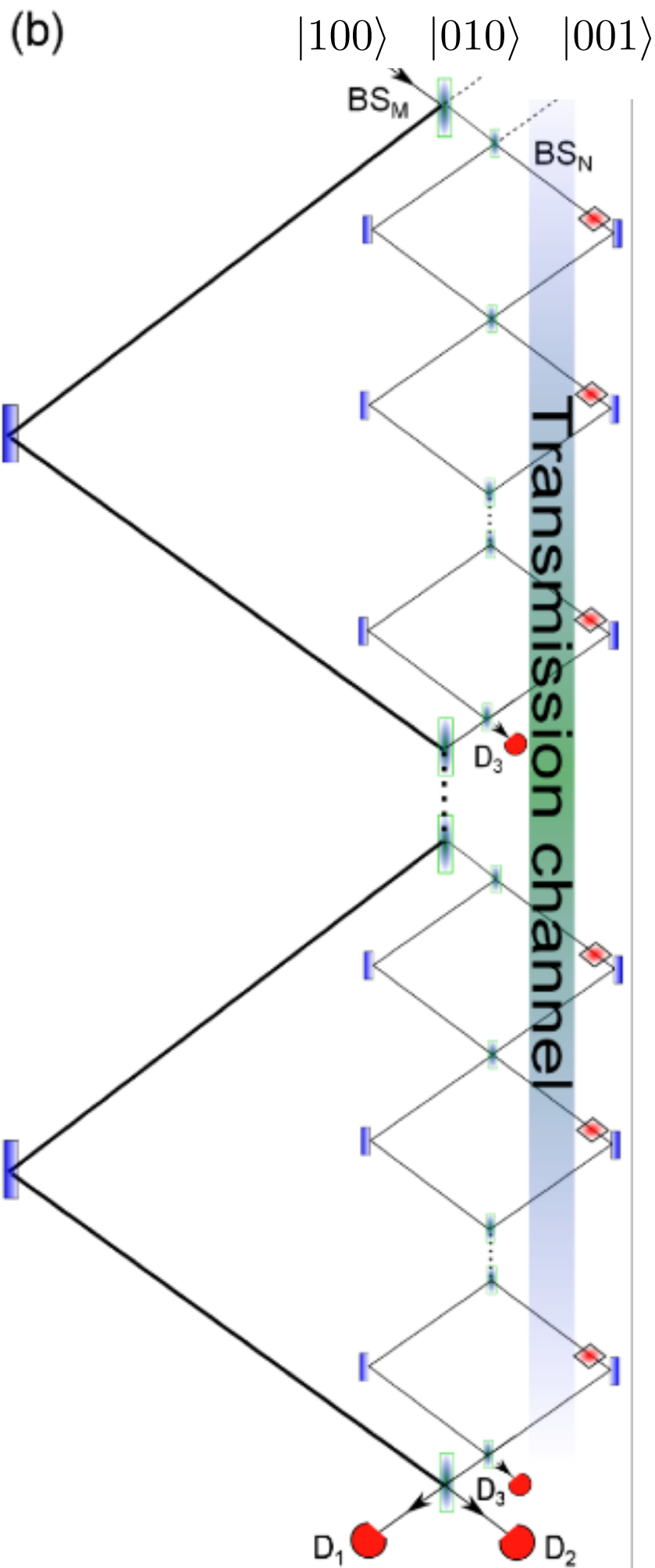Here, that is part of input to second BS$_M$:

$$\cos(\theta_M)|100\rangle + \sin(\theta_M)|010\rangle$$

Unchanged!

After Mth BS$_M$:

$$\cos(M\theta_M)|100\rangle + \sin(M\theta_M)|010\rangle = |010\rangle$$

D$_2$

(b)

$|100\rangle \quad |010\rangle \quad |001\rangle$

BS$_M$

BS$_N$

Transmission channel

D$_3$

D$_1$ D$_3$ D$_2$

After first BS$_M$:

$$|100\rangle \xrightarrow{\text{BS}_M} \cos(\theta_M)|100\rangle + \sin(\theta_M)|010\rangle$$

goes through
previous device

Bob permits photons:

Previously, hit the right detector (D$_2$).
Here, that is D$_3$. Input to second BS$_M$:

$$\cos(\theta_M)|100\rangle + \sin(\theta_M)|001\rangle$$

blocked by D$_3$
(Quantum Zeno Effect!)

After Mth BS$_M$:

$$\cos^{M-1}(\theta_M)(\cos(\theta_M)|100\rangle + \sin(\theta_M)|010\rangle)$$

$$\approx |100\rangle$$

D$_1$