

Alice

The diagram illustrates a quantum key distribution protocol involving Alice and Bob.

**Alice's Side:**

- Key  $A$ : A sequence of bits: 1 0 1 1 0 0 1 0 1 0 1 0
- Key  $X$ : A sequence of bits: 0 1 0 1 0 1 1 0 0 1 0 0
- Polarization: A sequence of symbols indicating photon polarization:  $\downarrow \nearrow \downarrow \searrow \leftrightarrow \nearrow \searrow \leftrightarrow \downarrow \nearrow \downarrow \leftrightarrow$
- Output: "polarized photons sent via quantum channel"

**Bob's Side:**

- Key  $Y$ : A sequence of bits: 1 1 0 1 0 0 0 0 1 0 0 1
- Measurement: A sequence of symbols indicating measurement basis:  $\otimes \otimes \leftrightarrow \otimes \leftrightarrow \leftrightarrow \leftrightarrow \leftrightarrow \times \leftrightarrow \leftrightarrow \times$
- Key  $B$ : A sequence of bits:  $\begin{matrix} 0 \\ / \end{matrix} 1 0 1 1 0 0 \begin{matrix} 1 \\ / \end{matrix} 0 \begin{matrix} 0 \\ / \end{matrix} 1 0 \begin{matrix} 1 \\ / \end{matrix} 1 0 \begin{matrix} 1 \\ / \end{matrix}$
- Measurement: A sequence of symbols indicating measurement basis:  $? \nearrow \downarrow \searrow \leftrightarrow ? ? \leftrightarrow ? ? \downarrow ?$
- Comparison:  $X = Y ?$  (with results:  $\text{X } \checkmark \checkmark \checkmark \checkmark \checkmark \text{X } \text{X } \checkmark \text{X } \text{X } \checkmark \text{X }$ )
- Final Key: 0 1 1 0 0 1 1

A dashed box encloses the polarization, output, and Bob's side, labeled "classical channel" on the right.

# Alice's Polarization Encoding

photon polarization	basis $X$	
bit $A$	0	1
	H	D
0	V	A
1	↑↓	↖↗

# Bob's Projective Measurement

B		basis Y	
		$\uparrow\downarrow$	$\leftrightarrow$
photon polarization	$\leftrightarrow$	0	?
	$\uparrow\downarrow$	1	?
	$\nearrow\searrow$	?	0
	$\nwarrow\nearrow$	?	1