

# Visualization of Quantal Entangled States

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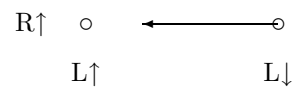
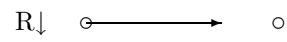
The singlet entangled state

$$(|\uparrow\downarrow\rangle - |\downarrow\uparrow\rangle)/\sqrt{2}$$

also called

$$(|L\uparrow, R\downarrow\rangle - |L\downarrow, R\uparrow\rangle)/\sqrt{2}$$

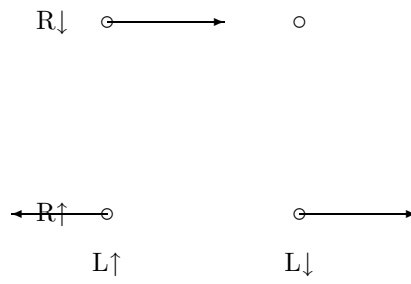
is represented by



The entangled state used in Hardy's test of quantum mechanics, namely

$$-\frac{1}{2}|L\uparrow, R\uparrow\rangle + \sqrt{\frac{3}{8}}|L\uparrow, R\downarrow\rangle + \sqrt{\frac{3}{8}}|L\downarrow, R\uparrow\rangle.$$

is represented by



Meanwhile, the non-entangled state

$$\begin{aligned} & \frac{1}{\sqrt{10}} (e^{+i\pi/4}|\mathbf{L}\uparrow, \mathbf{R}\uparrow\rangle + e^{-i\pi/4}|\mathbf{L}\downarrow, \mathbf{R}\uparrow\rangle + 2i|\mathbf{L}\uparrow, \mathbf{R}\downarrow\rangle + 2|\mathbf{L}\downarrow, \mathbf{R}\downarrow\rangle) \\ & = \frac{1}{\sqrt{10}} (e^{+i\pi/4}|\mathbf{L}\uparrow\rangle + e^{-i\pi/4}|\mathbf{L}\downarrow\rangle) (|\mathbf{R}\uparrow\rangle + 2e^{+i\pi/4}|\mathbf{R}\downarrow\rangle) \end{aligned}$$

is represented by

