Shortest refutation of independent and entangled states of the quantum hypothesis

We assume the method and apparatus of Meth8/VŁ4 with `T`autology as the designated *proof* value, `F` as contradiction, `N` as truthity (non-contingency), and `C` as falsity (contingency). The 16-valued truth table is row-major and horizontal.

LET: p, q, r, s: $\Phi_{\blacksquare}$, $\Phi_{\bullet}$, $\psi_{\blacksquare}$, $\psi_{\bullet}$; ~ Not; & And; + Or; - Not Or;
> Imply, greater than; < Not Imply, less than; = Equivalent; @ Not Equivalent;
% possibility, for one or some; # necessity, for all or every;
(p@p) ordinal 0, `F`; (%p>#p) ordinal 1; (%p<#p) ordinal 2; (p=p) ordinal 3, `T`;
(~(p<(p@p))&~(p>(%p>#p))) probability on interval]0,1[.

From: quantamagazine.org/entanglement-made-simple-20160428/ [Frank Wilczek]

Independent: $(\Phi_{\blacksquare} + \Phi_{\bullet})(\psi_{\blacksquare} + \psi_{\bullet}) = (\Phi_{\blacksquare}\ \psi_{\blacksquare} + \Phi_{\blacksquare}\ \psi_{\bullet} + \Phi_{\bullet}\ \psi_{\blacksquare} + \Phi_{\bullet}\ \psi_{\bullet})$ (1.1)

(p+q)&(r+s) ; `FFFF FTTT FTTT FTTT` (1.2)

Entangled: $(\Phi_{\blacksquare}\ \psi_{\blacksquare} \qquad + \Phi_{\bullet}\ \psi_{\bullet})$ (2.1)

(p&r)+(q&s) ; `FFFF FTFT FFTT FTTT` (2.2)

We apply the probability characteristic to respectively Eqs. 1.2 and 2.2 on interval]0,1[.

(p=((p+q)&(r+s)))>(~(p<(p@p))&~(p>(%p>#p))) ; `FTFT FFTF FFTF FFTF` (1.3)

(p=((p&r)+(q&s)))>((p>(p@p))& (p<(%p>#p))) ; `FTTF FFTF TFTF TFTF` (2.3)

Eqs. 1.2, 1.3, 2.2, and 2.3 as rendered are *not* tautologous. This refutes quantum entanglement.

Remark: What follows is that the plethora of experiments allegedly supporting entanglement are not based on tautologies of bivalent mathematical logic.