Polarizer simulation method.

The realistic simulation of the polarizer define two results:

- The output taken by the photon (e or o)
- The time taken for the crossing (which will be a coefficient to be multiplied with a time constant)

This is done in 2 steps:

- 1: Calculation of an amplitude value depending on the hidden variables of the photon and the angle of the polarizer.
- 2: A test with two threshold values equal to PI/4 and PI/2.

Step 1:

Calculation of the amplitude for the threshold test.

The photon is modelled using 3 variables noted **p, q, r**

With:

p : Angle of polarization.
q and r : Two other angles, of which the nature has not yet been determined.

The value of these three variables are defined by the source during emission with random values between [0..PI] (and uniform distribution).

The amplitude value, noted **e,** is defined as follows:

By setting:

d = p - a_pol

(p: photon polarization)
(a_pol: angle of the polarizer)

Then e is defined as:

e = d/2 + q/6 + r/12

(q and r: local variables associated with the photon)

The amplitude of this value varies between 0 and 3*PI/4, of which 2/3 depends on the difference in polarization angle of the photon / polarizer angle.

Note: if the d value is negative, the polarizer having a periodic PI period operation, the d + PI value is used.

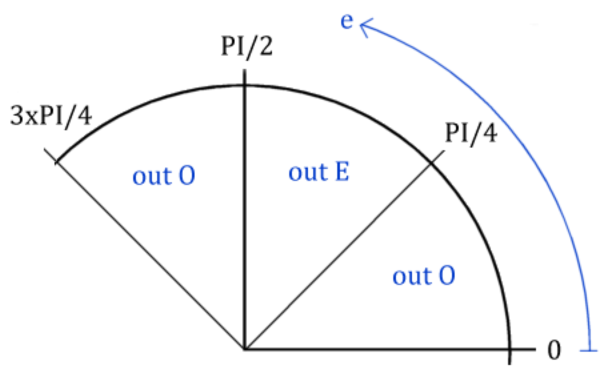
Step 2:

Determination of the output.

It is done with a test comparing the value e with two thresholds values PI/4 and PI/2

If e between PI/4 and PI/2, the output is e, otherwise it is o. (note: this choice is arbitrary).

Here is an explanatory graph:



Coded in C language, this produces the following code:

```
#define OUT_O 0                     // value used to code o out
#define OUT_E 1                     // value used to code e out

int out;
float d, e;

d = pho.p - a_pol;                  // a_pol is polarizer angle
if (d < 0)
  d = d + PI;                       // use positive modulus PI value

e = d/2 + pho.q/6 + pho.r/12;

if ((e >= PI/4) && (e < PI/2))
  out = OUT_E;                      // e in PI/4..PI/2 range
else
  out = OUT_O;
```

Note: pho.p, pho.q, pho.r represent the variables p, q, r associated with the photon.

Analogy: A climber on a ladder.

A mechanical analogy can be made in order to fully understand the process.

Imagine a climber on a scale with 3 steps noted o, e, o spaced of PI/4.

The climber is initially on the first step o, and can lift the foot to a height equal to maximum 3*PI/4.
With one step He can climb 0, 1, or 2 steps.

The output taken by the photon will be the step on which it sets foot.

Calculation of the polarizer crossing time.

When it leaves the polarizer, the polarization of the photon is adjusted to the e or o output.

A transit time can be defined by calculating the variation in polarization that the photon have undergone between its input and output from the polarizer.

The crossing time is then proportional to this repolarization value. (To be multiplied by a constant)
This repolarization can reach a maximum of PI / 2.

Note1: Using a nonlinear, sigmoid-shaped time with an inflection point in PI/4, allow to produce detection correlations in $\sin^2$ if the size of the pairing window is not enlarged. (Setting 'st1 delay' in the test program).

Note2: The analogy of the climber for time is more complex, because the angles e and o at the exit of the polarizer are different. (It would be necessary to imagine perpendicular steps, and to define a time of rotation of the foot).

Physical interpretation:

Although the algorithm is simple, giving a physical interpretation is much less easy.

The difference in the photon / polarizer polarization angle is the most determining factor (2/3). It results from potential differences between fields E and B perpendicular to the trajectory.

The q and r values associated with the photons make it possible to generate the equivalent of superimposed states for a set of pre-polarized photons, allowing them to maintain variable individual behaviour and not depending only on their polarization p.

A precise interpretation may be the subject of a future study.
Not being a physicist, it will take time. A study of Maxwell's work could perhaps allow to find matches with the model.