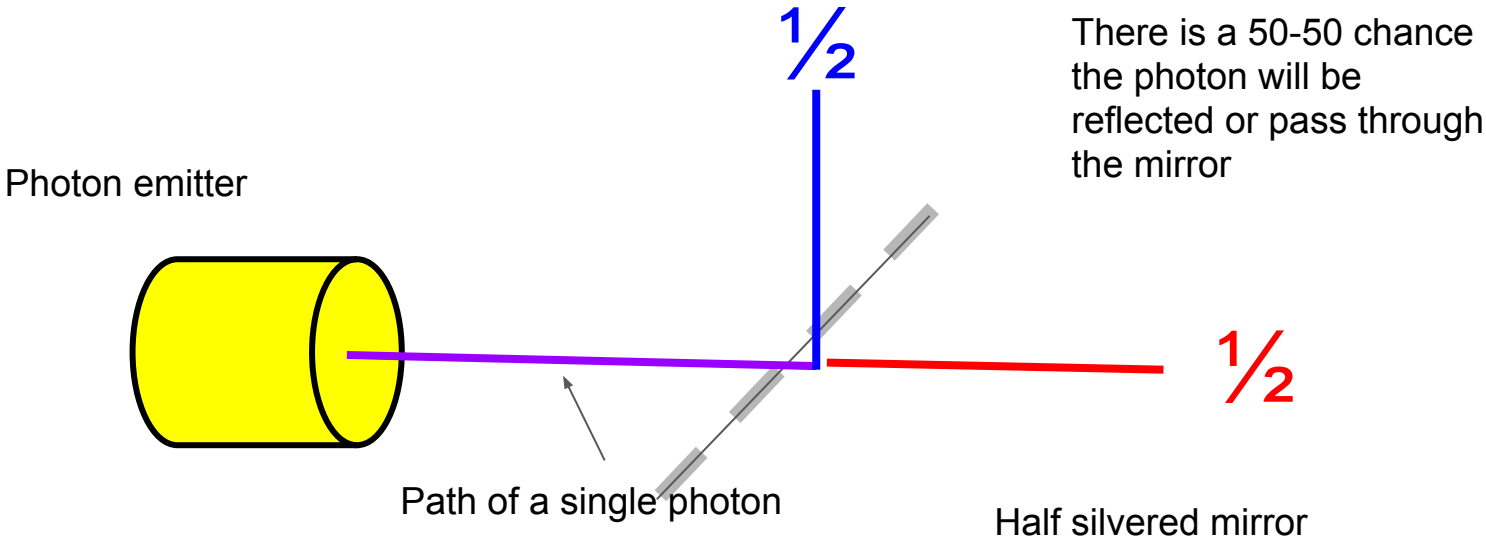
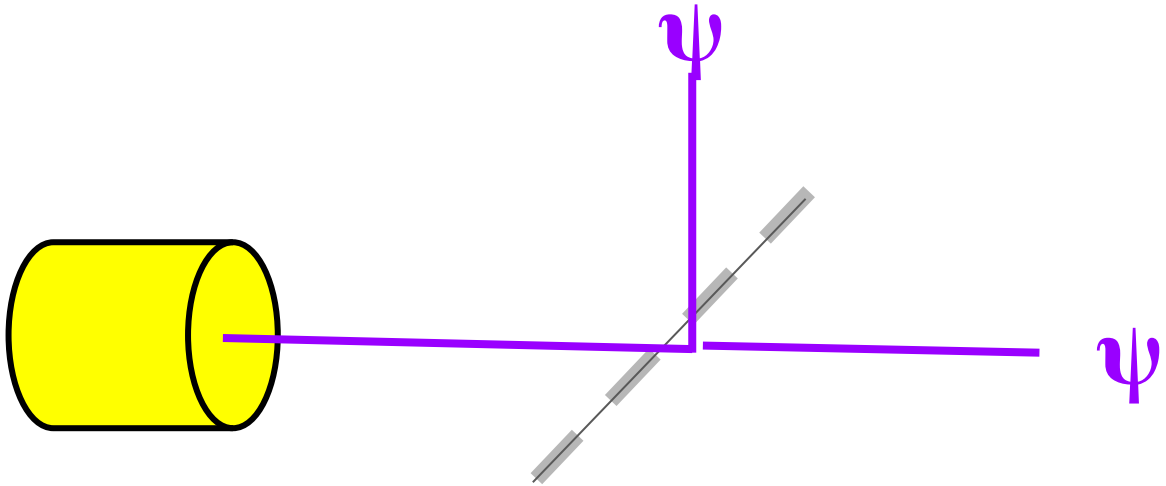
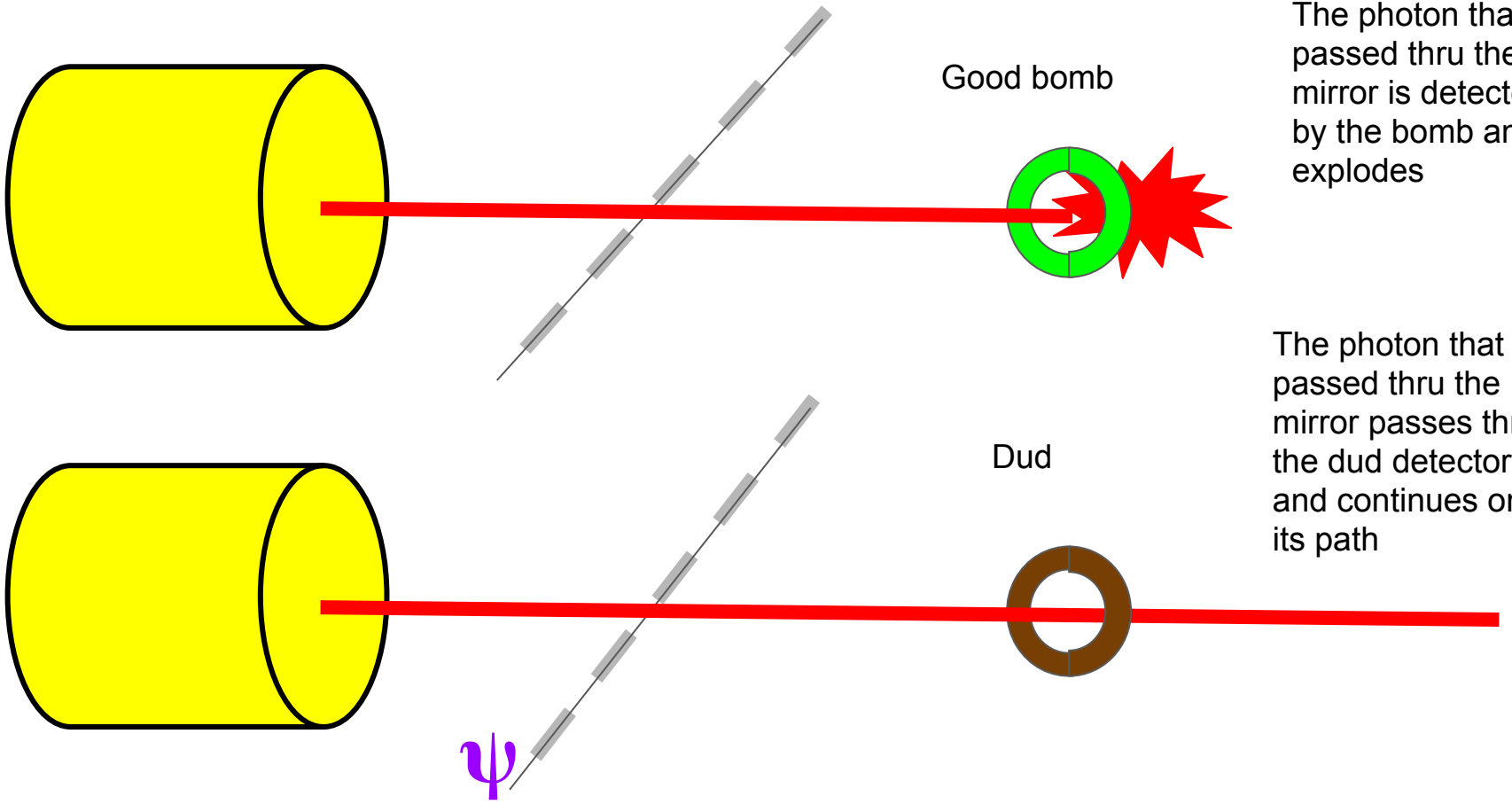
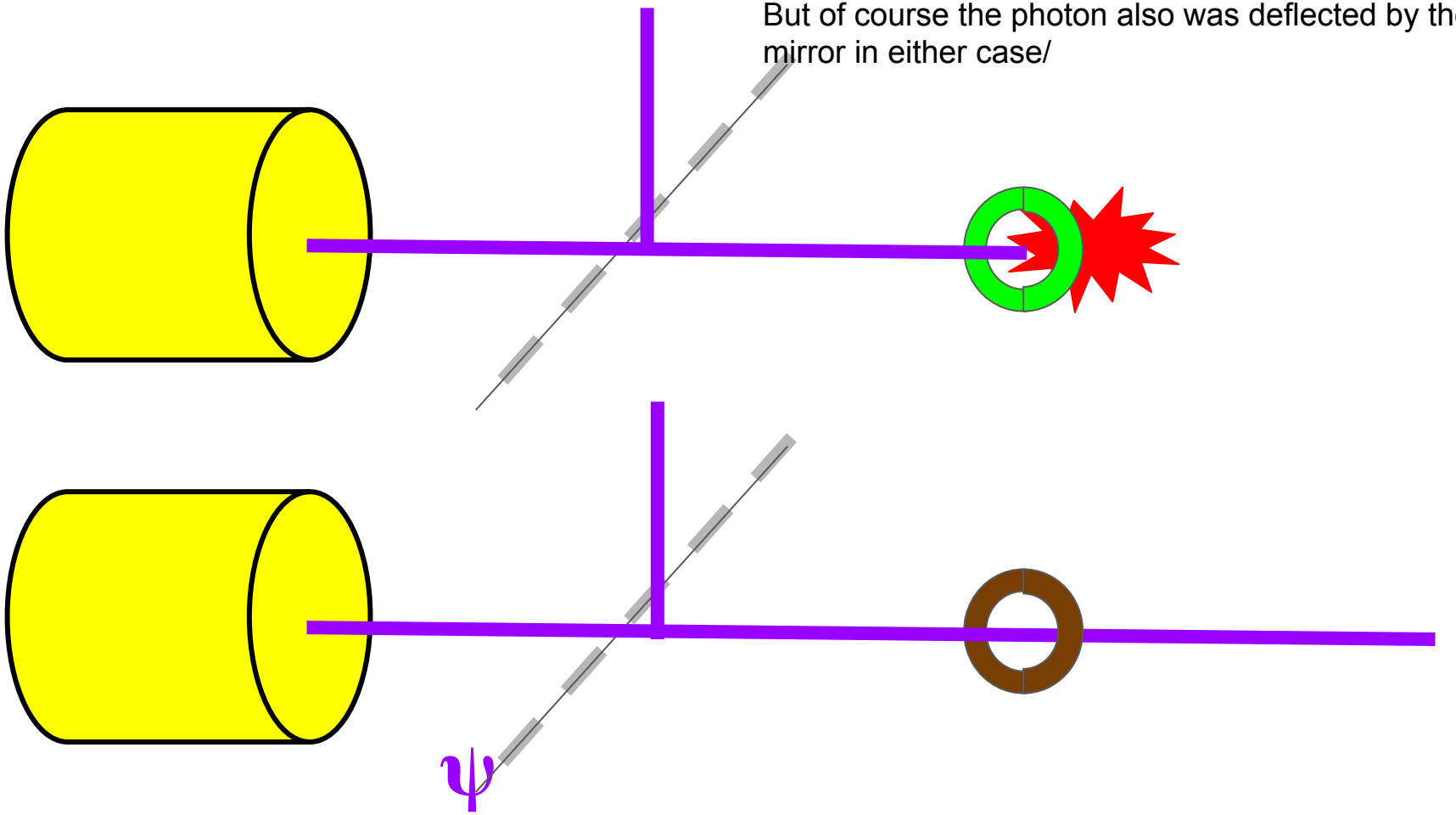

1/2
There is a 50-50 chance the photon will be reflected or pass through the mirror
Photon emitter
1/2
Path of a single photon
Half silvered mirror

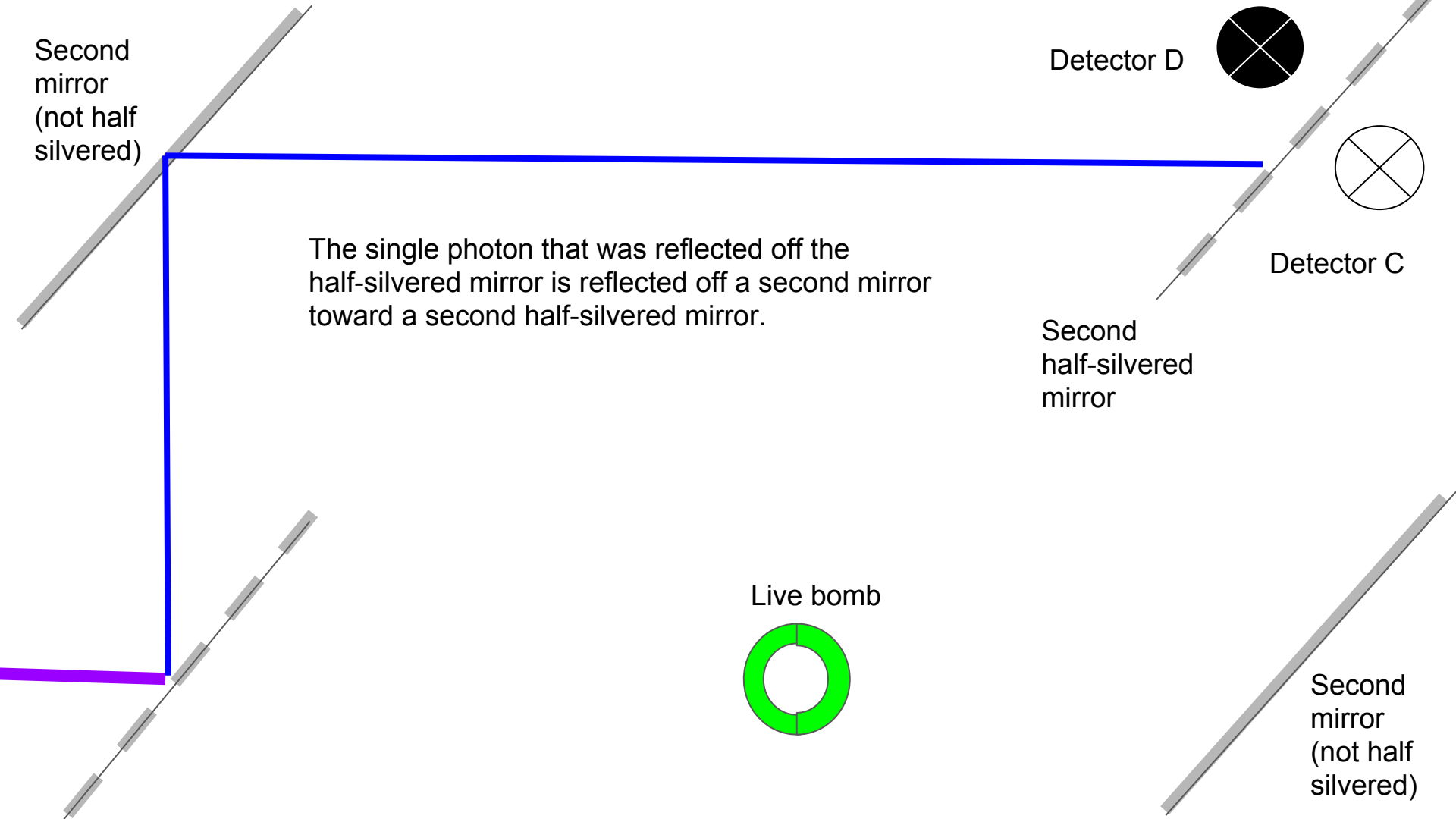


In reality, the photon does both. When it reaches the mirror, it enters a quantum superposition and remains so until observed.

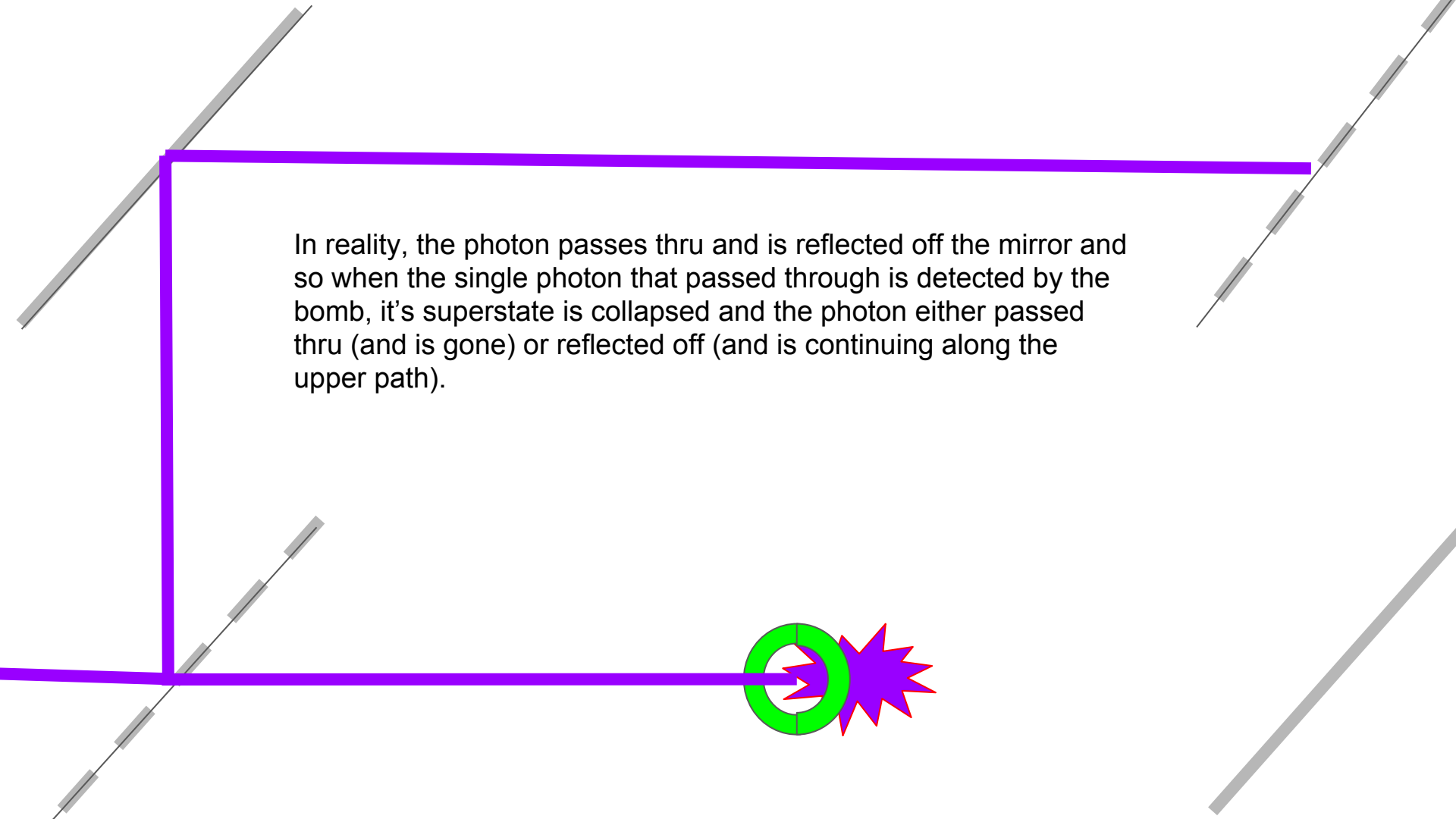

Good bomb
The photon that passed thru the mirror is detected by the bomb and explodes
Dud
The photon that passed thru the mirror passes thru the dud detector and continues on its path
ψ

But of course the photon also was deflected by the mirror in either case/

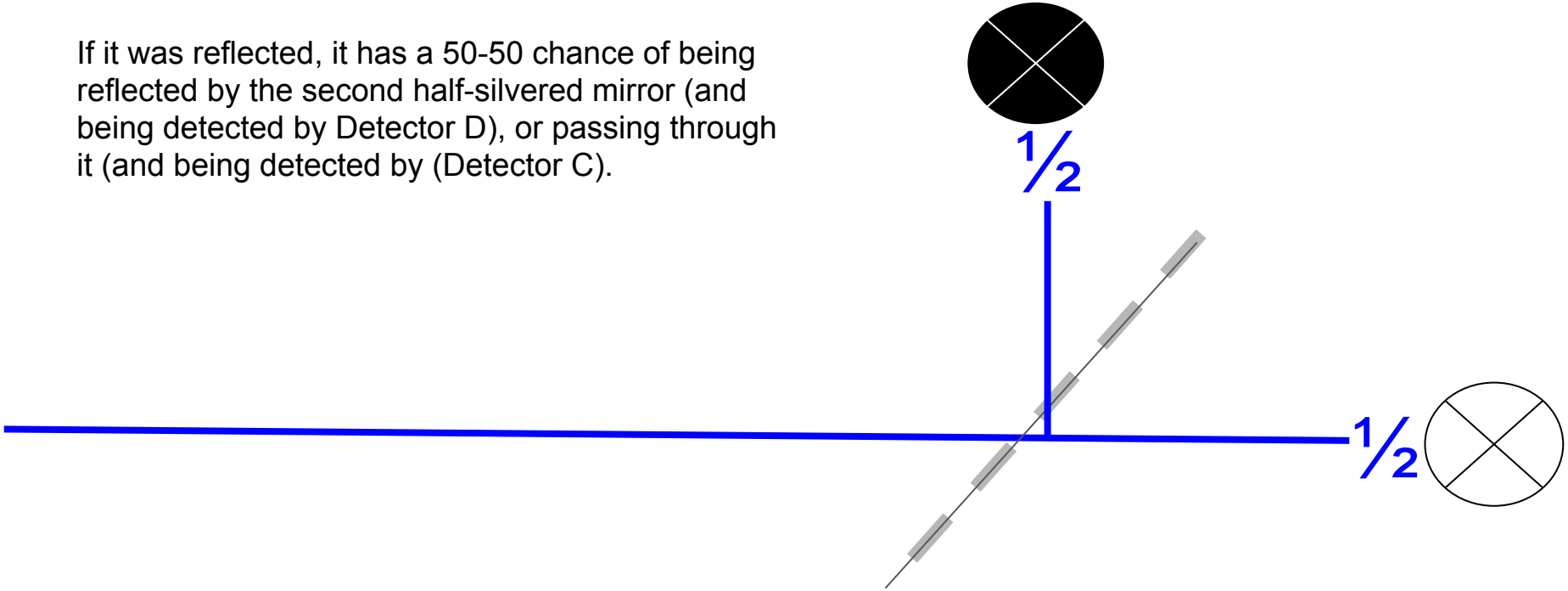



Second mirror (not half silvered)
Detector D
Detector C
The single photon that was reflected off the half-silvered mirror is reflected off a second mirror toward a second half-silvered mirror.
Second half-silvered mirror
Live bomb
Second mirror (not half silvered)

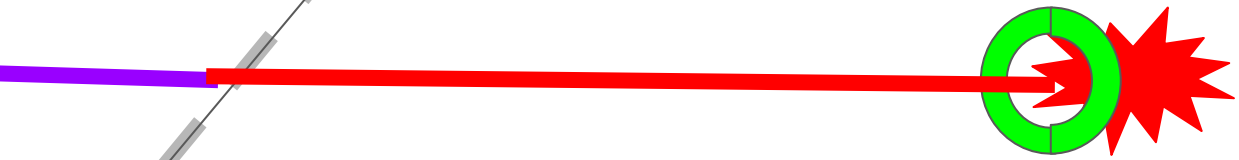
In reality, the photon passes thru and is reflected off the mirror and so when the single photon that passed through is detected by the bomb, it's superstate is collapsed and the photon either passed thru (and is gone) or reflected off (and is continuing along the upper path).

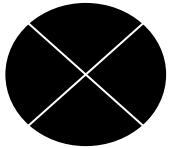


If it was reflected, it has a 50-50 chance of being reflected by the second half-silvered mirror (and being detected by Detector D), or passing through it (and being detected by (Detector C).



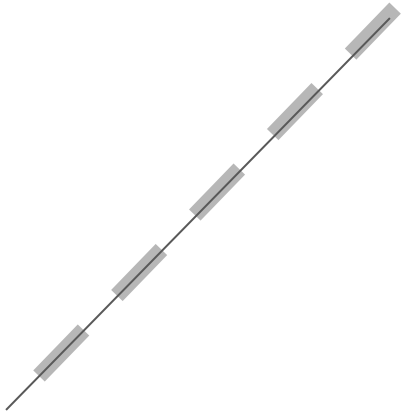
If it passed thru the mirror, it is absorbed by the live bomb.



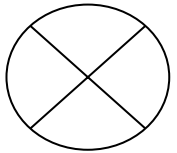


0

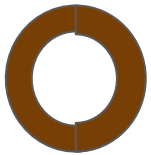
It will not be detected by either D or C,
but it will explode, so that’s that...



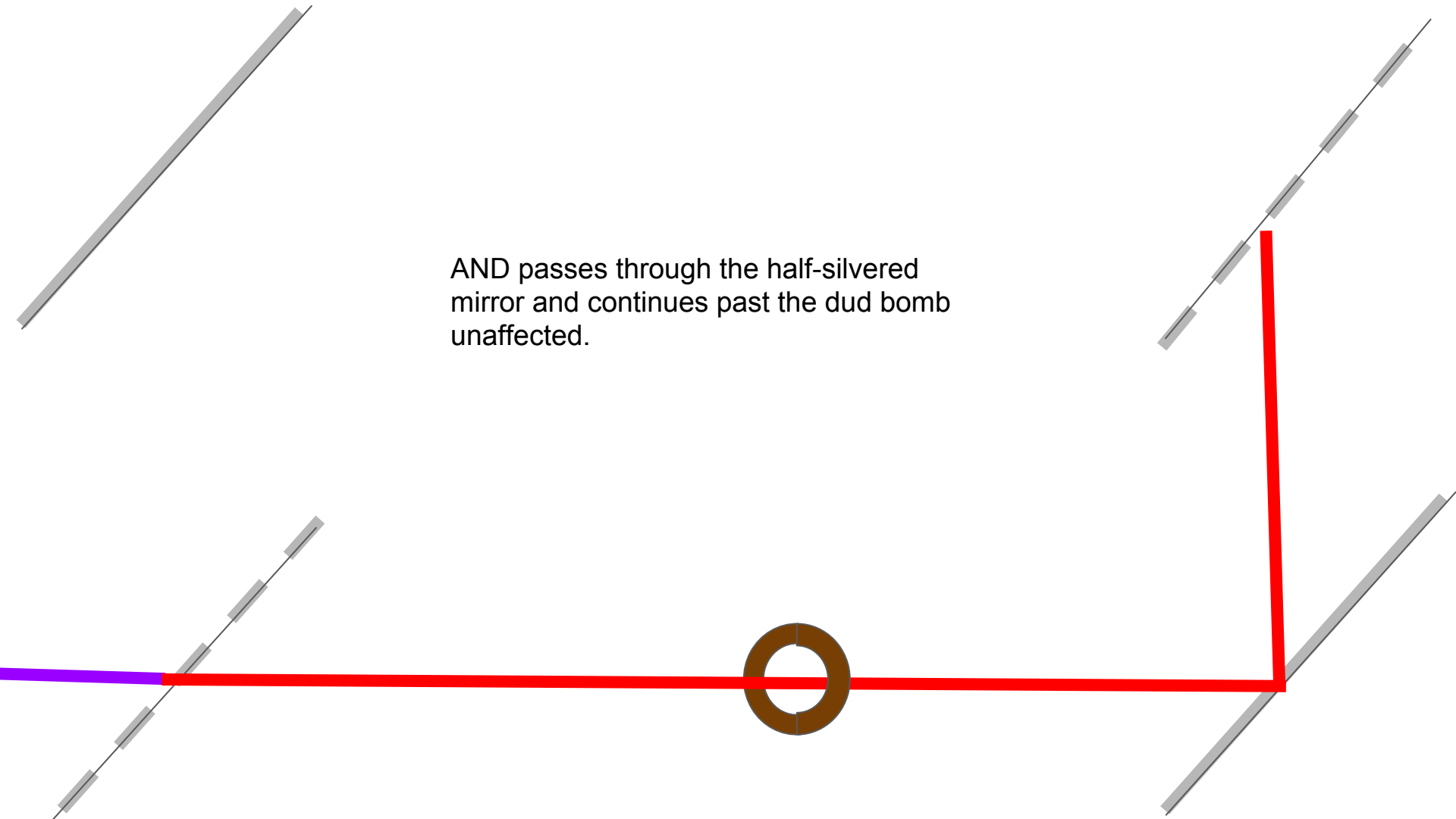
0

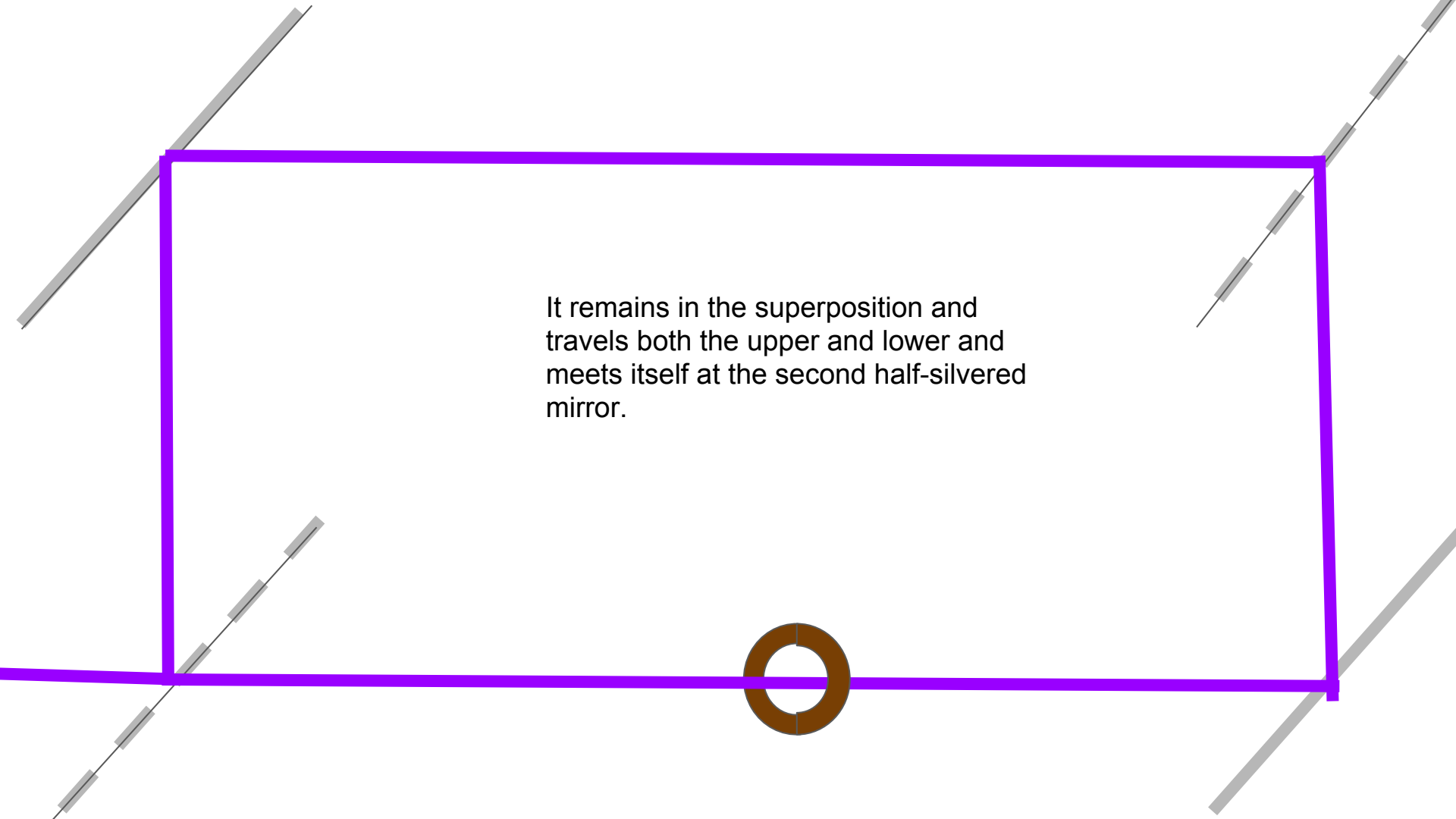


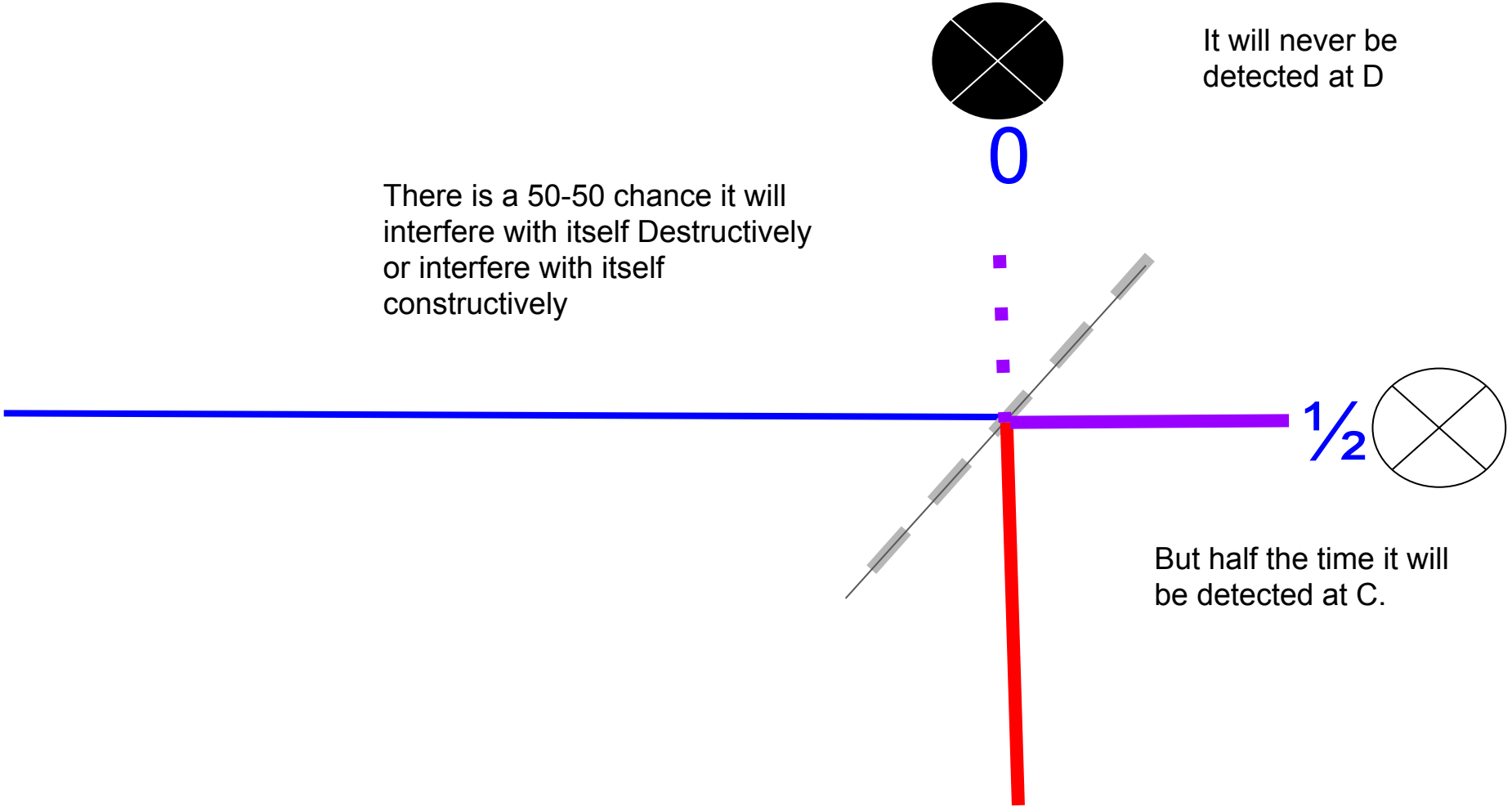
But if it’s a dud, The photon is reflected and travels on the upper path...



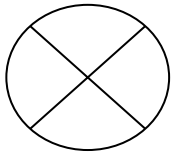
AND passes through the half-silvered mirror and continues past the dud bomb unaffected.




It remains in the superposition and travels both the upper and lower and meets itself at the second half-silvered mirror.

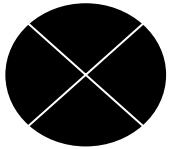

It will never be detected at D
0
There is a 50-50 chance it will interfere with itself Destructively or interfere with itself constructively
½
But half the time it will be detected at C.

If the photon is detected at:



Detector C

Bomb is a dud or live and unexploded. (25%) retest it.



Detector D

The bomb is live and unexploded. (25%) success.

No detection

The bomb is exploded. (50%) (ahem)

If you get a detection at C or no detection, you repeat the test until it explodes or you get a detection at D. Eventually, you will be left with bombs that only give C or no detection no matter how many times you test them. These are almost certainly the duds.