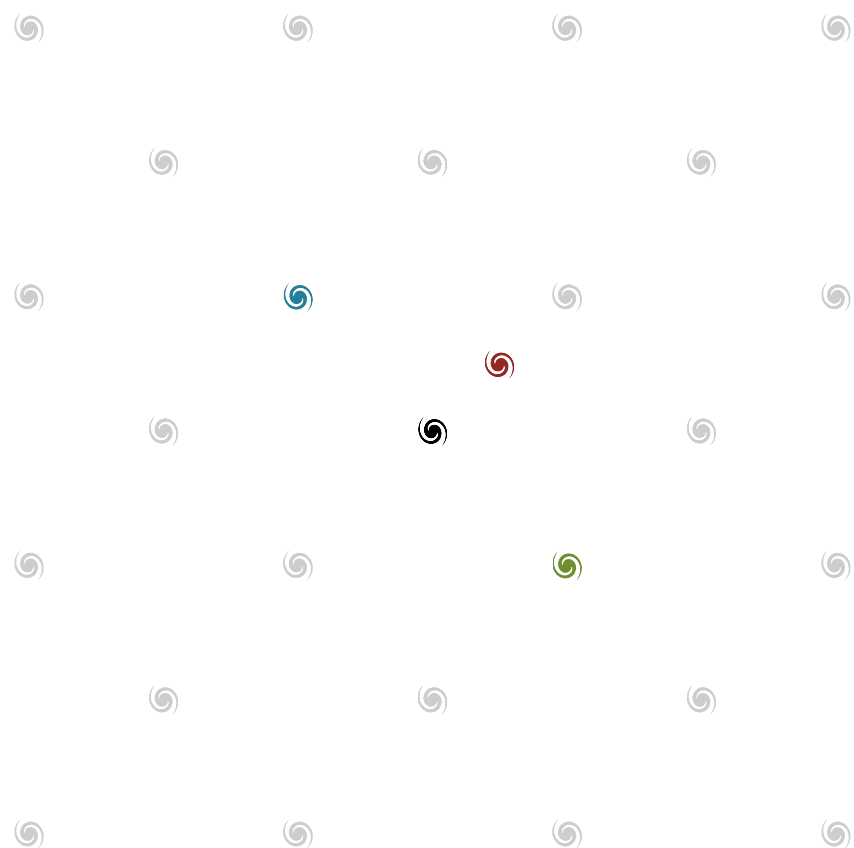
A Novel Interpretation of Quantum Mechanics

By Nick Astraeus

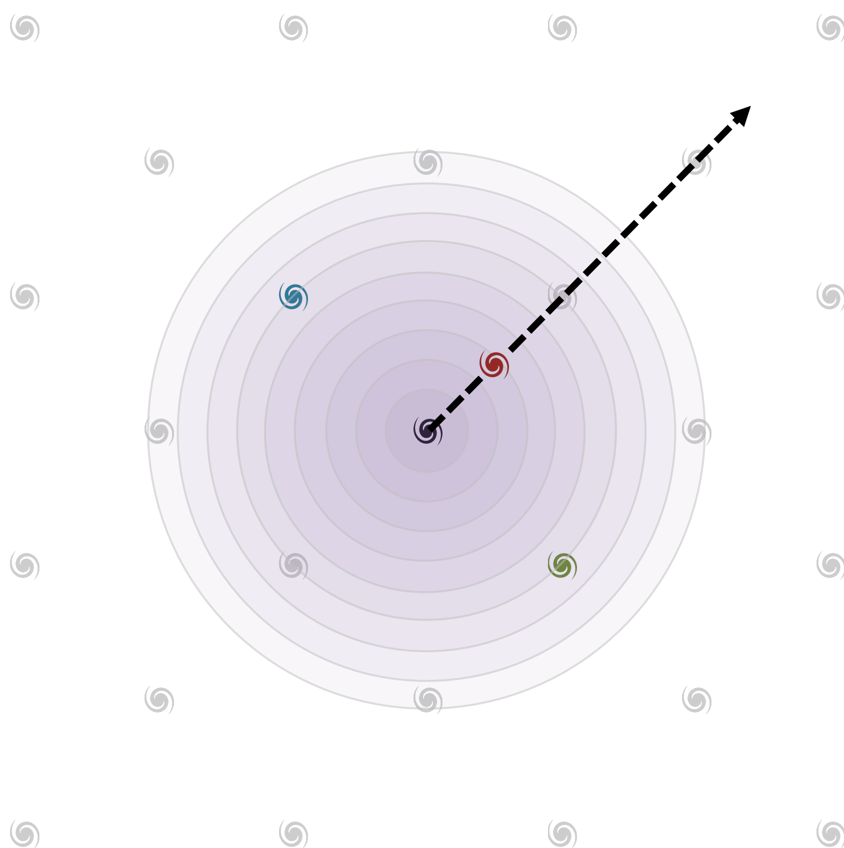
ABSTRACT

In this model, I show how quantum mechanics emerges out of two basic propositions: (1) that the universe expands relative to the observer and (2) that there are multiple observers. The game of fundamental physics is to derive as much as possible from the fewest and simplest propositions. Thus, in the context of this game, it is significant that all of quantum mechanics emerges once we define the observer as a reference frame for the universe. Just as significant is how easy and straightforward it is to demonstrate this seemingly audacious claim. Perhaps above all, it is significant that in the context of this model, quantum mechanics functions naturally on both microscopic and macroscopic levels. This model provides a natural opening, and a fertile framework, for physicists to work on the unification of quantum mechanics and spacetime.

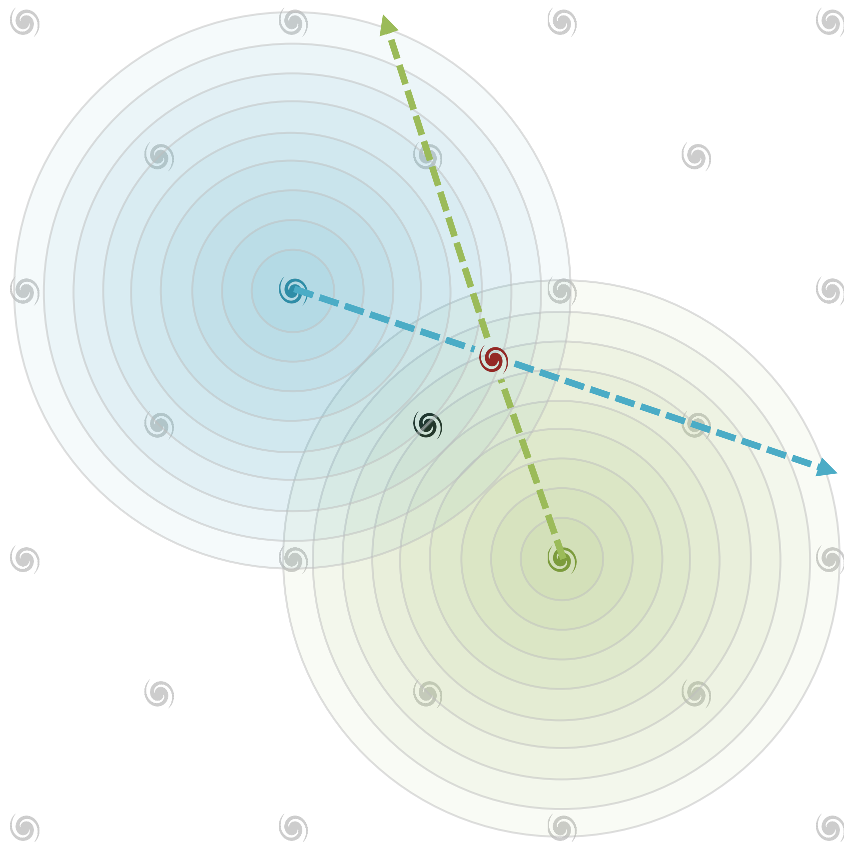
This model portrays a universe that expands relative to the observer.



As the universe expands from the perspective of observers in the black galaxy, the red galaxy recedes along a direct line of sight away from them.

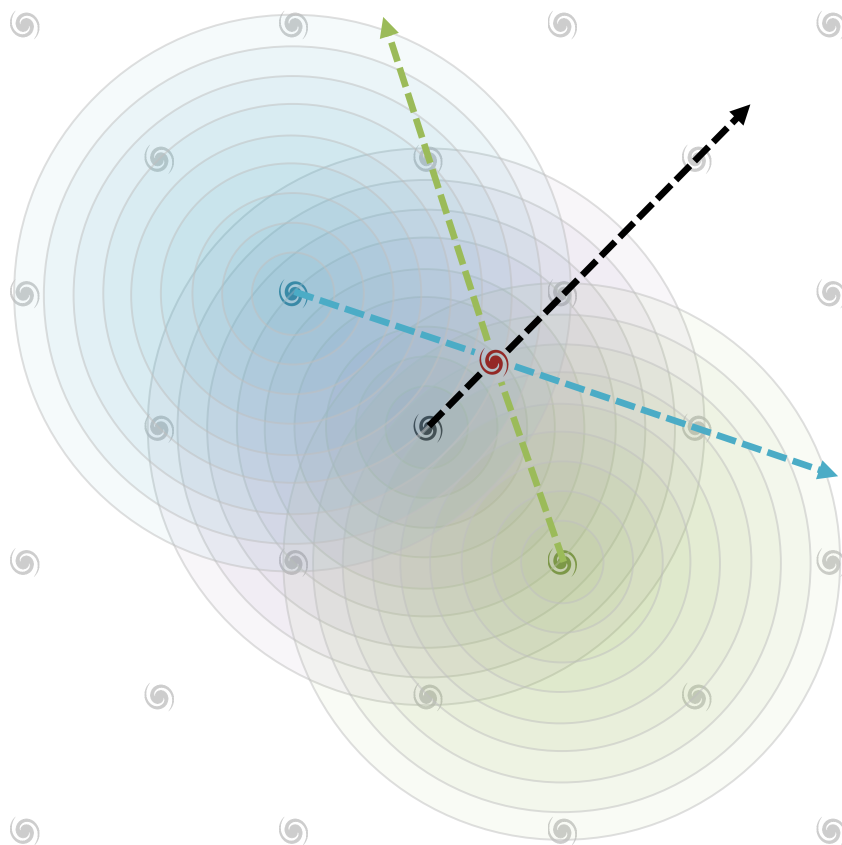


But as the universe expands relative to observers in the blue and green galaxies, the red galaxy recedes at radically different angles. This creates an obvious problem in the shared universe, an incongruity in the location of the red galaxy.

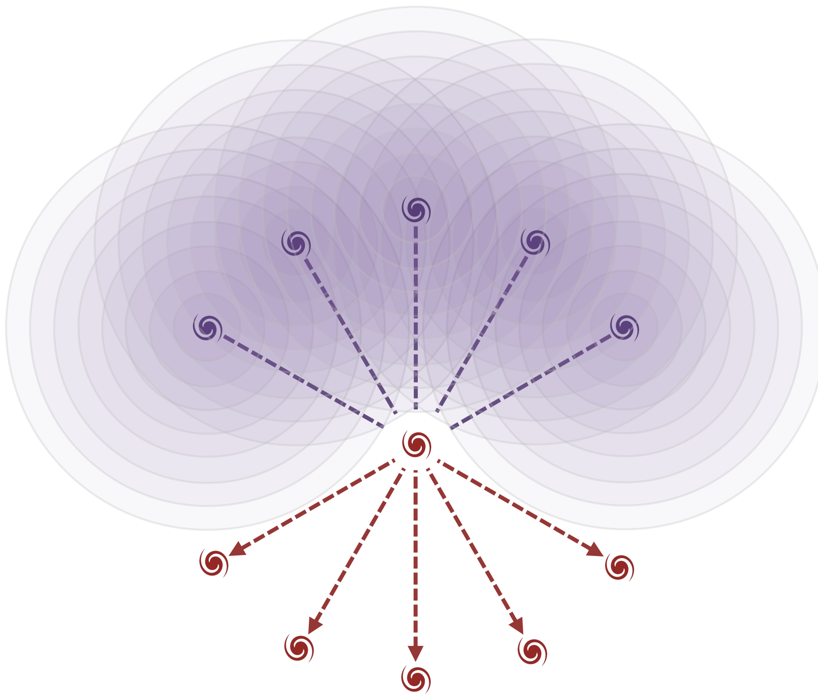


In order to resolve this problem, let's imagine that every observer has their own personal universe. So, for an observer in the black galaxy, the apparent recession of the red galaxy—along a direct line of sight away from them alone—is actually real. But the same thing is true in the blue and green universes. The red galaxy actually does recede at radically different angles, depending on the observer.

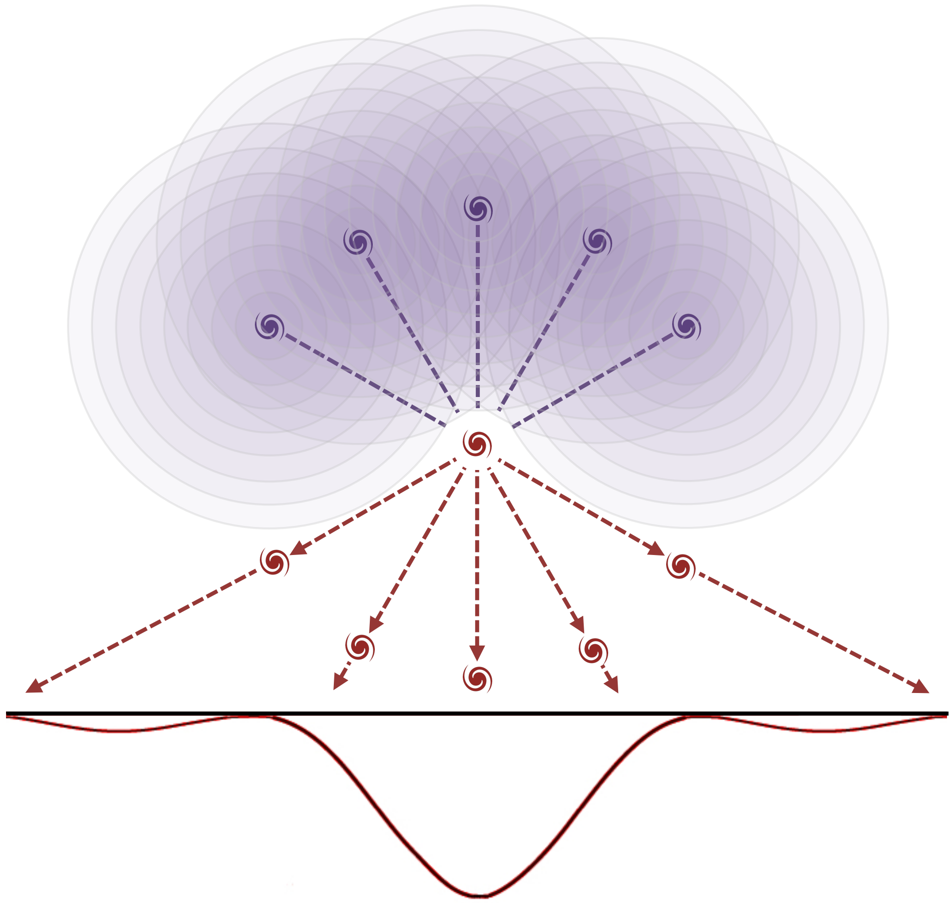
Of course, we are viewing this whole situation from a God's eye point of view. While every observer in this model has their own personal universe, the model itself is a picture of the shared universe.



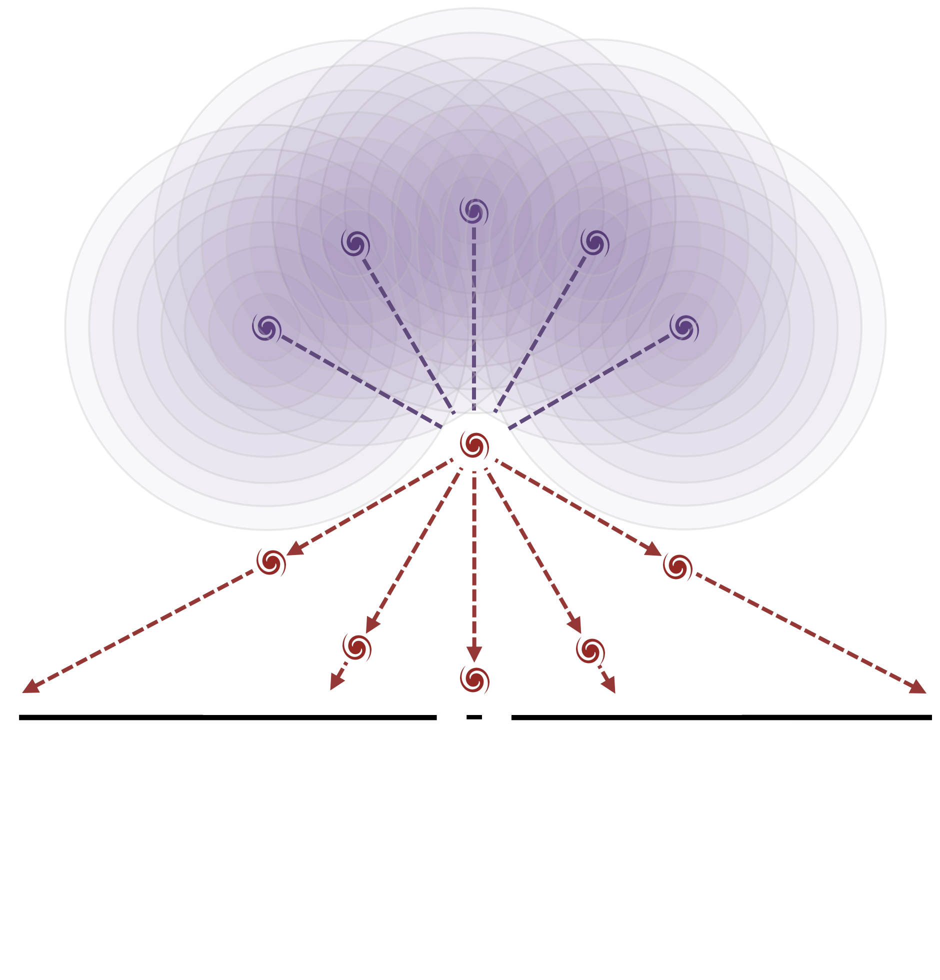
Consider these five purple galaxies, all of which are equal distances away from the red galaxy. As time passes and the universe expands, the red galaxy recedes along a direct line of sight away from each of them. After one unit of time, the red galaxy appears to be in five different locations, depending on the observer.



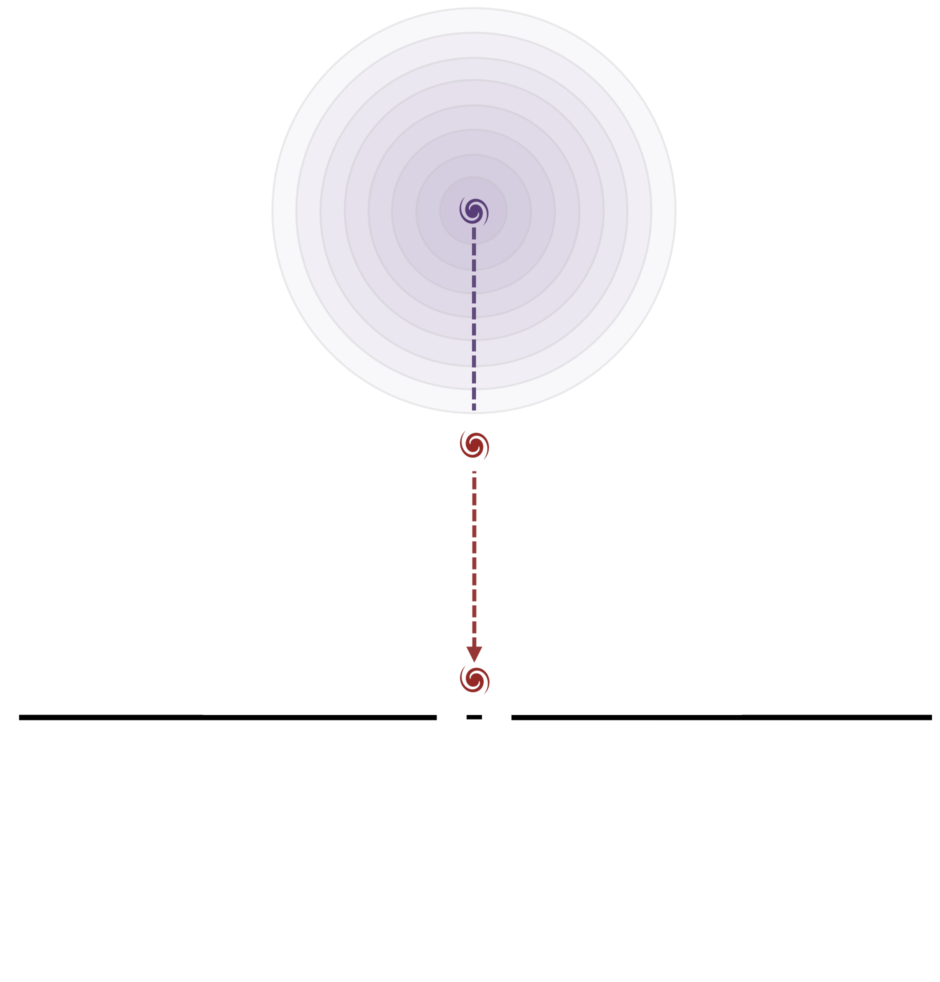
If we could set up a detector in the cosmos and run an experiment from a God's eye point of view, we would see every possible location of the red galaxy hit the detector like a wave.



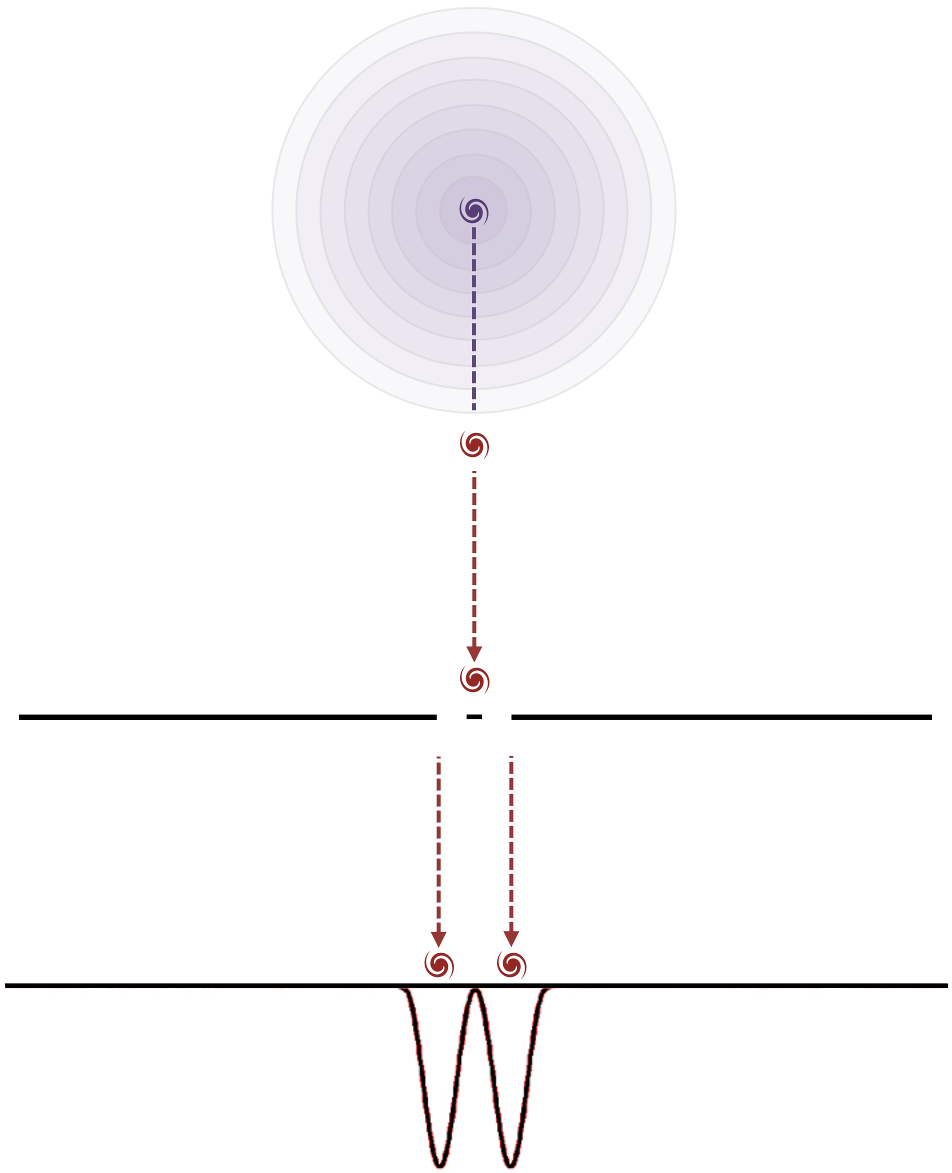
Now let's alter the experiment by placing a barrier with two slits in front of the red galaxy.



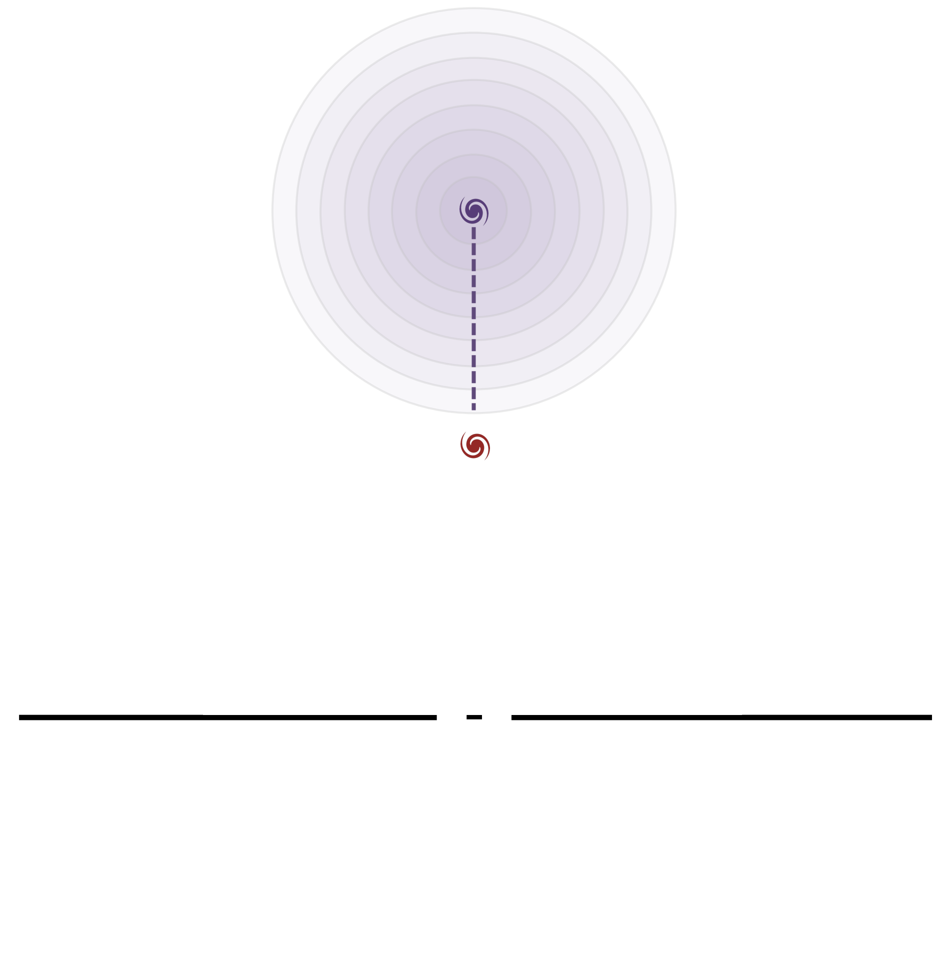
And let's run this experiment from the perspective of the purple galaxy in the middle.



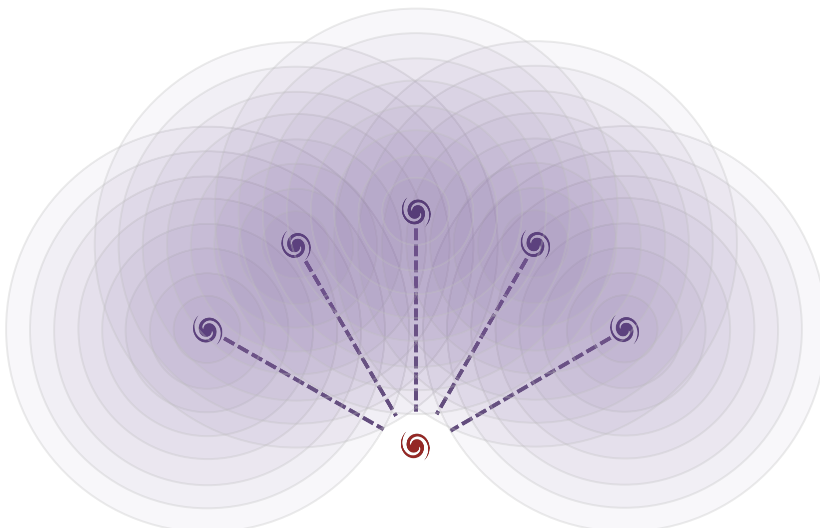
As time passes and the universe expands, observers in the purple galaxy see the red galaxy pass through one of the two slits, which are close to each other, so the red galaxy could easily pass through either one. If we ran the experiment several times, expanding the universe, rewinding the clock, and expanding it again, the red galaxy would pass through each of the two slits at about the same rate, and it would hit the detector like an object, not like a wave.



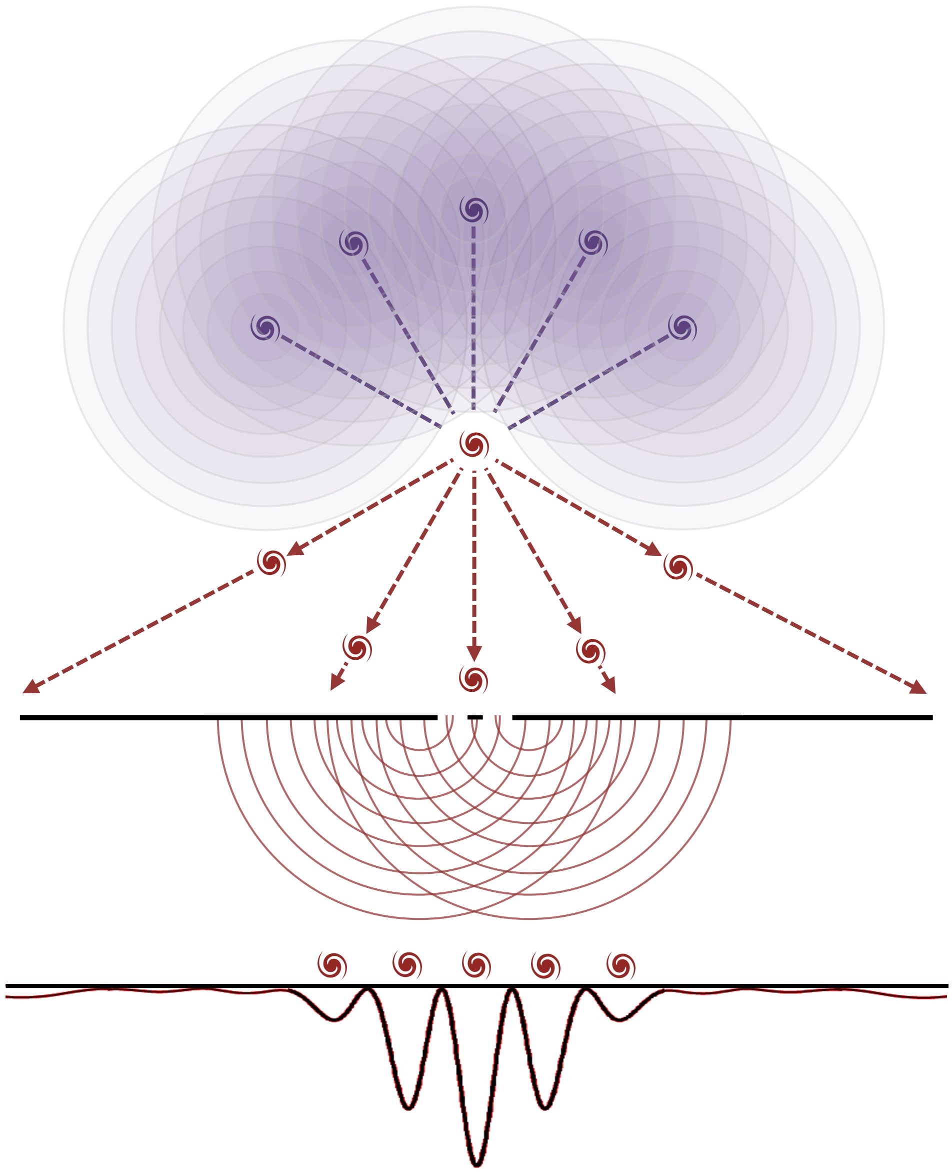
Now let's run the experiment again, only this time let's remove the observer from the experiment. Let's not let anyone see which slit the red galaxy passes through.



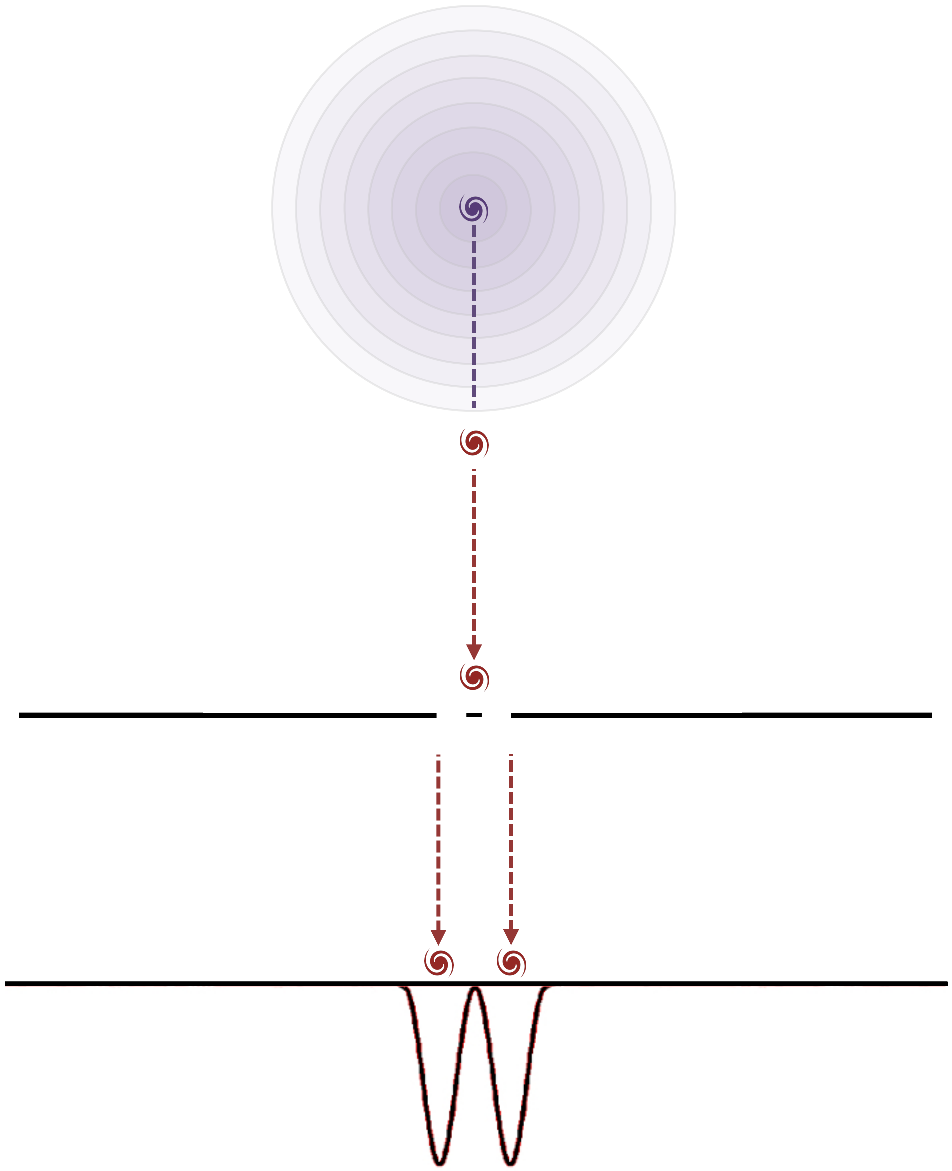
This experiment is now unfolding behind the scenes. Without anyone observing this experiment—without running this experiment from anyone's perspective, without prioritizing anyone's point of view—this experiment is now unfolding from a God's eye point of view, in a realm of possibility, where the perspectives of all observers who might tune into this experiment are accounted for.



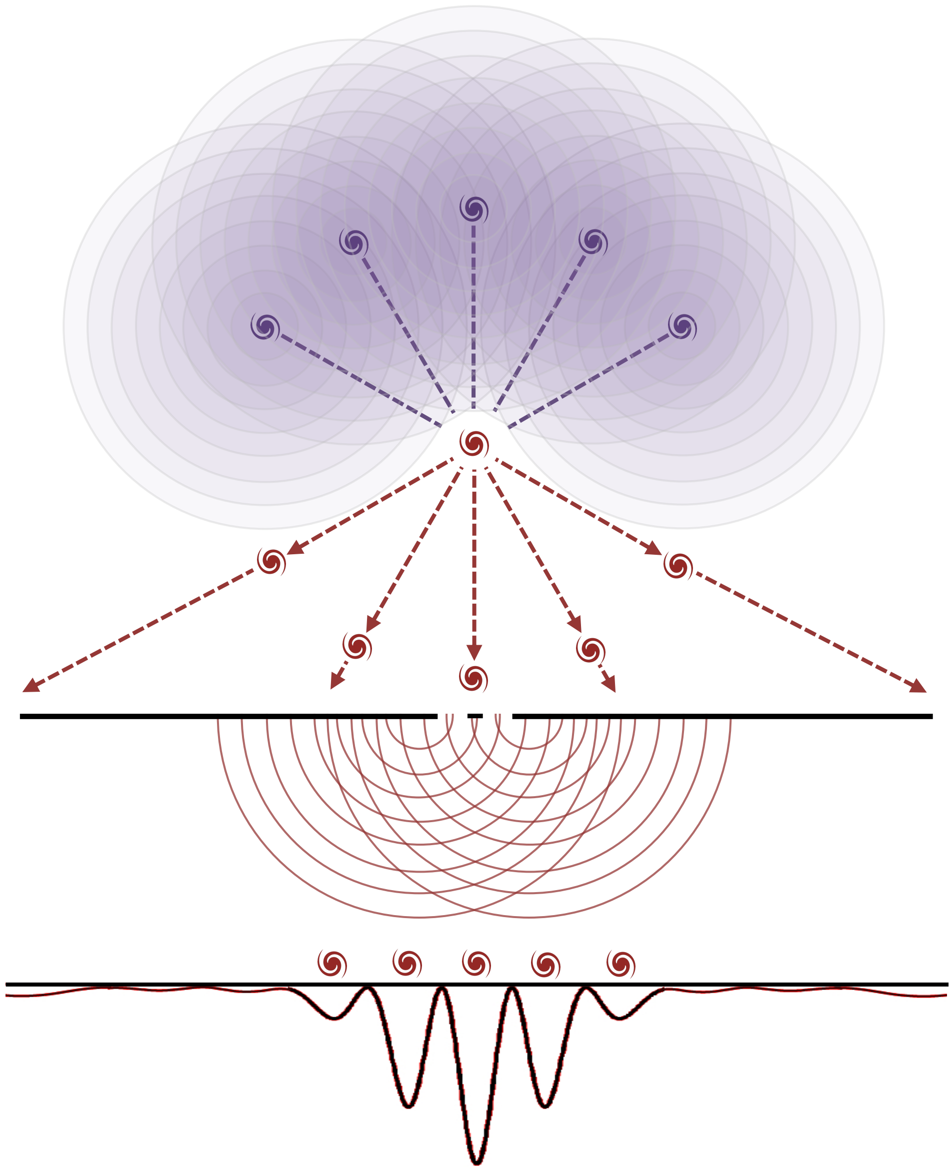
As time passes and the universe expands, the possible locations of the red galaxy hit the barrier like a wave. At which point, the two slits in the barrier divide the red galaxy into two separate waves. The two waves then interact with each other to produce an interference pattern on the detector.



To summarize: In the terms of this model, the collapsed wave function is a personal universe.

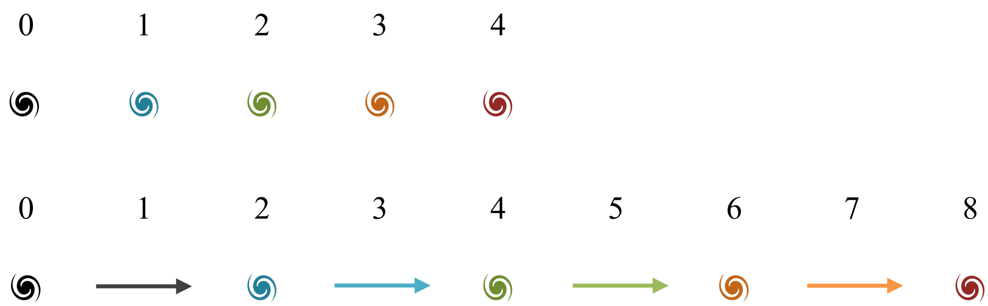


While the wave function itself is the shared universe—the community of personal universes.



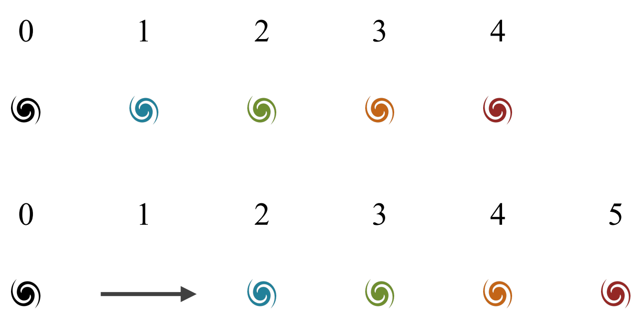
In this way, the double-slit experiment—the classic demonstration of the mystery of quantum mechanics and the wave-particle duality of matter—is explained by this model, by personal universes coexisting in the shared universe.

Now let's consider how this model relates to Hubble's law. Edwin Hubble discovered that galaxies recede away from us with a velocity that is proportional to their distance—more distant galaxies move faster than nearby ones. In this model, Hubble's law is reflected in the shared universe. It is explained by the fact that the universe expands relative to every observer in every galaxy.



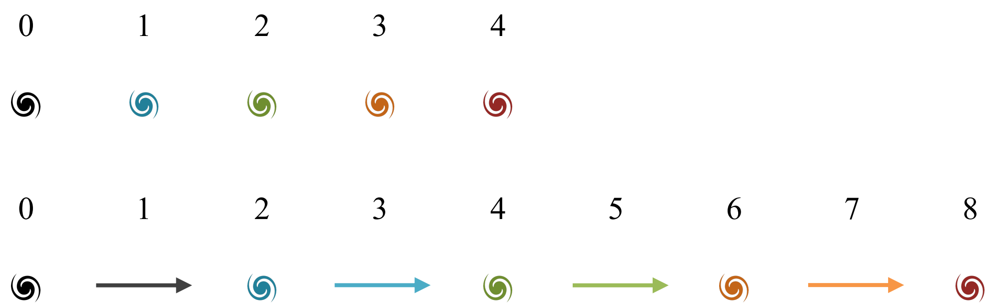
From the perspective of observers in the black galaxy, the blue galaxy receded one unit of distance in one unit of time, while the red galaxy receded four units of distance in one unit of time. There is a compounding effect in the recession of galaxies over large distances, which is produced by the constant expansion of space between each galaxy.

But Hubble's law is not reflected at the level of personal universes, which only expand relative to their one observer.

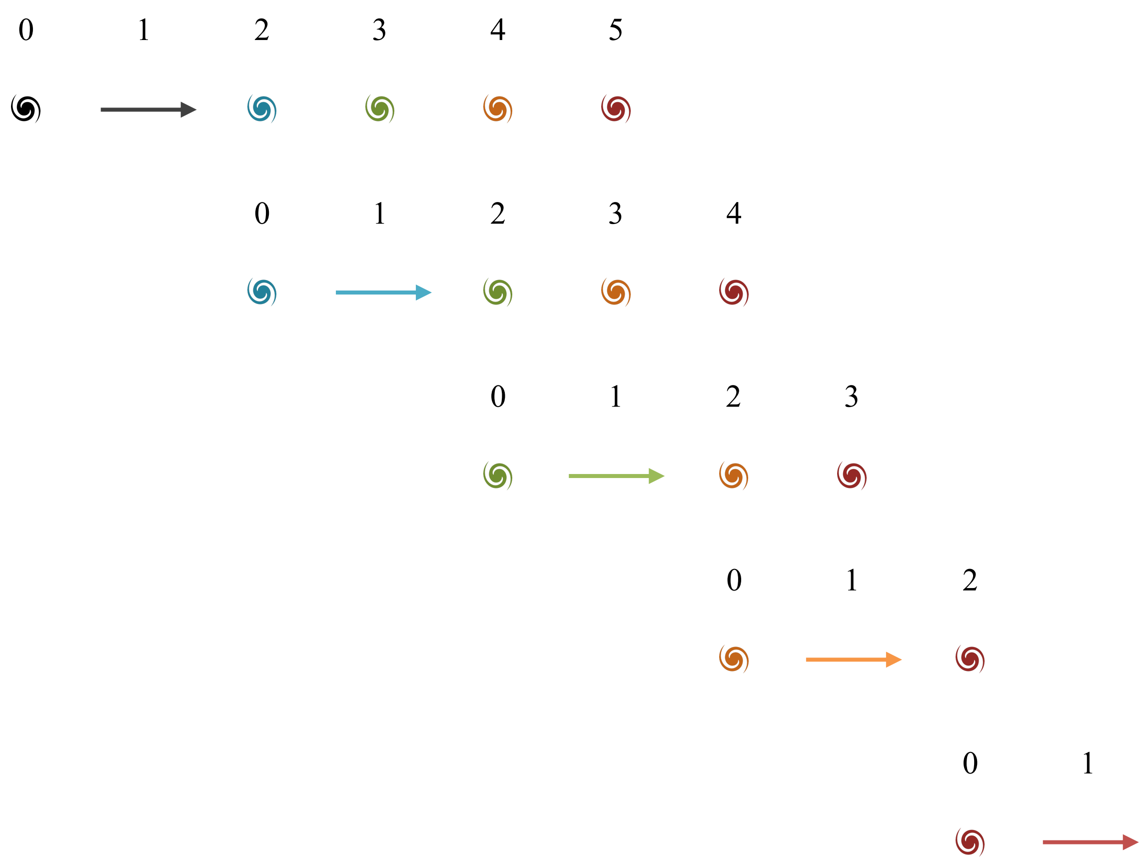


The observer in the black galaxy sees every other galaxy recede one unit of distance in one unit of time. There is no compounding effect in the recession of galaxies over large distances. As previously discussed, this generates a problem in the shared universe, an incongruity in the location of galaxies depending on the observer.

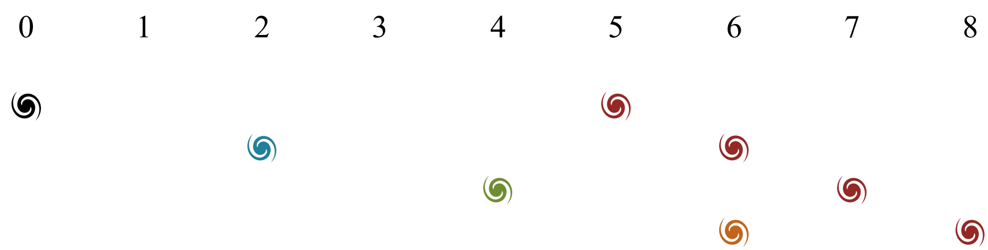
To see how this works again, let’s combine the two perspectives: personal universes coexisting in the shared universe. Again, here are five galaxies, all equal distances away from each other, before and after expansion in the shared universe, obeying Hubble’s law.



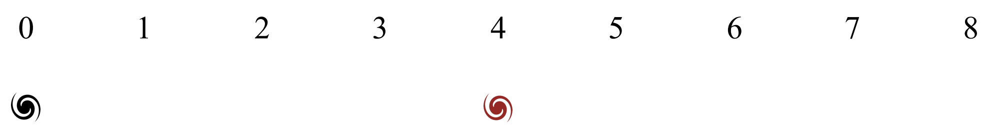
At the same time, observers in these five galaxies each have personal universes that expand relative to them alone.



For the sake of clarity, let's look at what happened to the red galaxy. After one unit of time, the red galaxy exists in four different locations, depending on the observer.

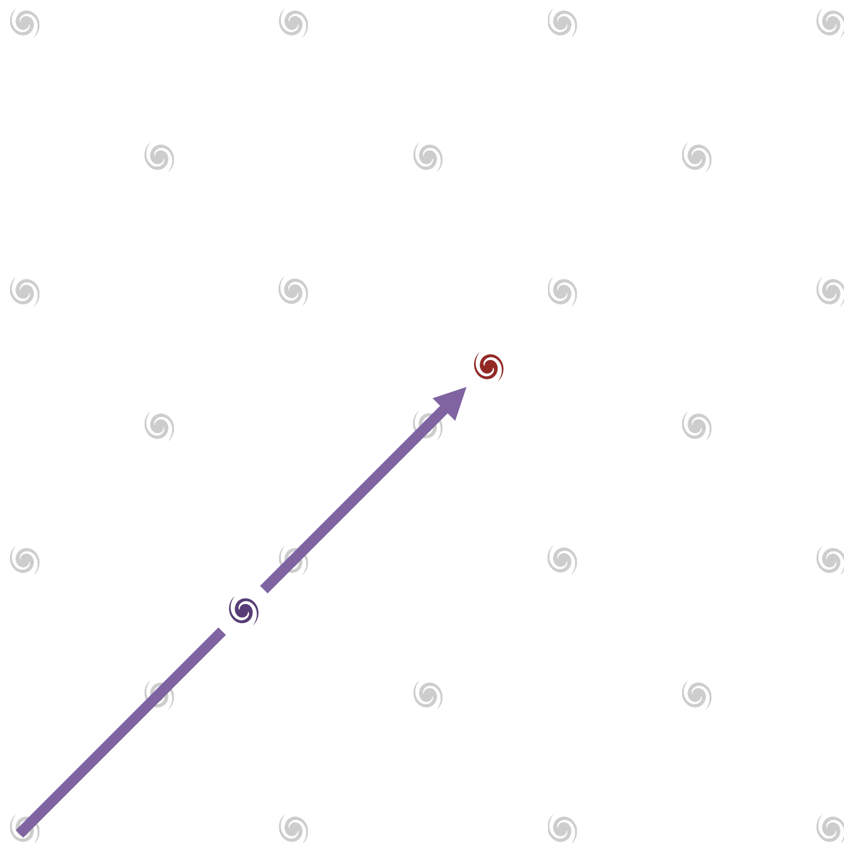


From the perspective of observers in the black galaxy, the red galaxy began four units of distance away.

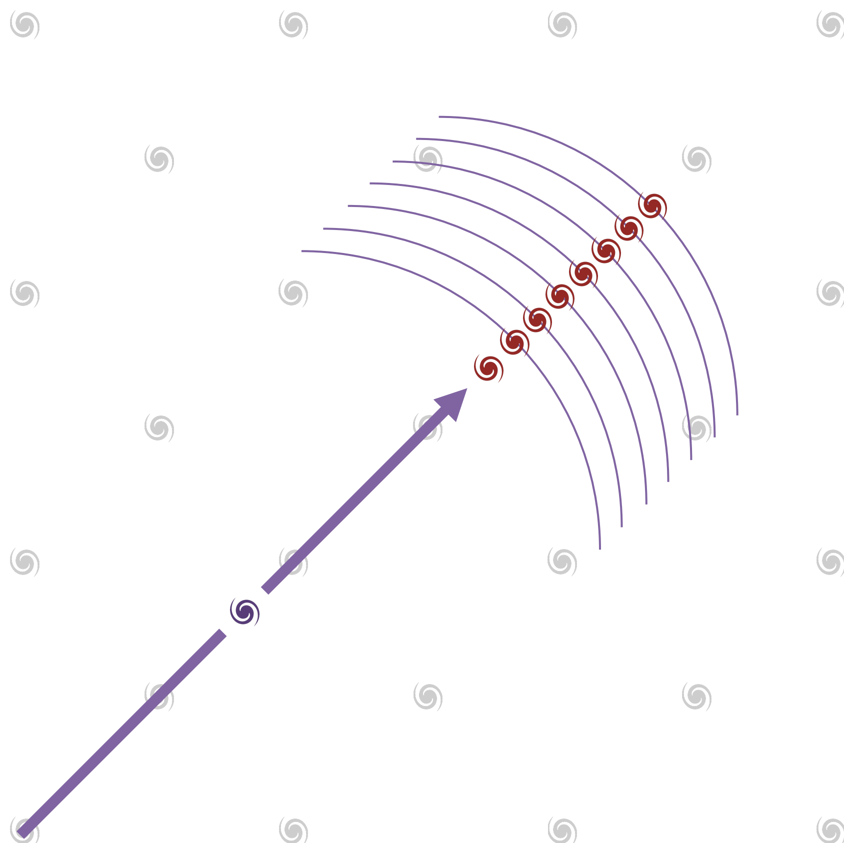


After one unit of time, the red galaxy diffracted into four possible locations. It is either five, six, seven, or eight units of distance away.

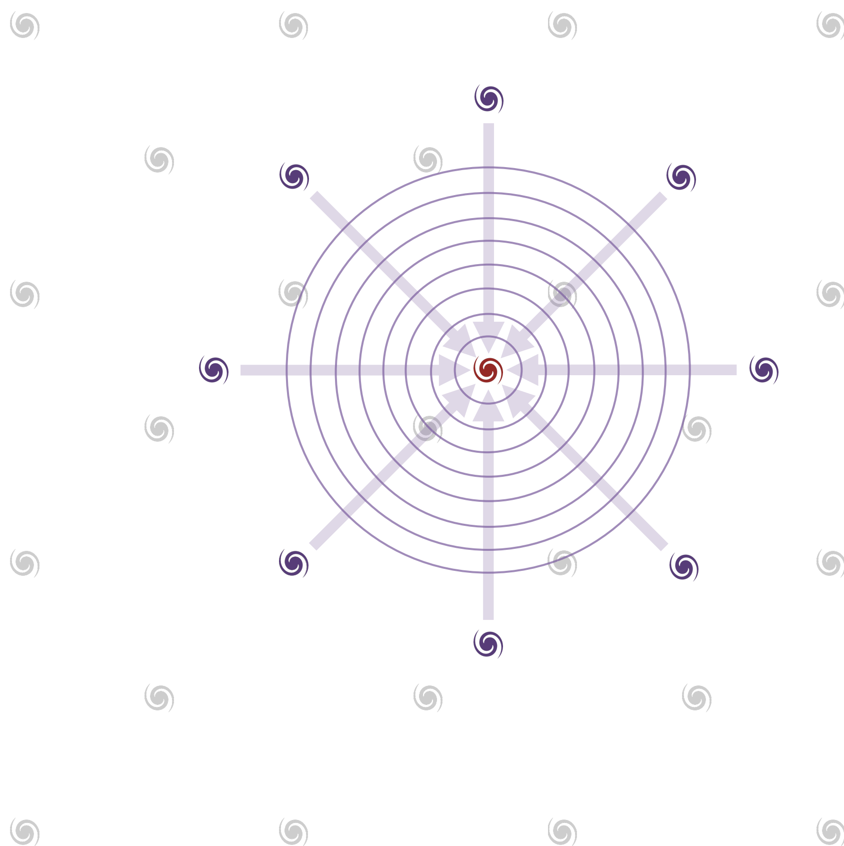
Here's another way to think about it. In this diagram, the purple galaxy represents all observers who exist on the same line of sight relative to the red galaxy.



As the universe expands, all observers who are on this line of sight see the red galaxy recede in the same direction. However, from the perspective of any one observer, the red galaxy has diffracted into many possible locations on this wave line. As a rule, once we determine the momentum of the red galaxy—the line on which it recedes—we necessarily become uncertain about its position. To know the momentum of the red galaxy in our personal universe is to be uncertain of its position in the shared universe.



On the other hand, once we determine the position of the red galaxy, we necessarily become uncertain about its momentum: The red galaxy could be receding along any line of sight in any direction, depending on the observer. To know the position of the red galaxy in our personal universe is to be uncertain of its momentum in the shared universe.



Notice how the uncertainty principle—the foundational tenet of quantum mechanics, which is itself unexplained by quantum mechanics—emerges, in this model, out of two basic propositions: (1) that the universe expands relative to the observer and (2) that there are multiple observers.

Quantum mechanics is true, but it has never made sense; its description of how things behave on a microscopic scale has always lacked a macroscopic explanation. But here is a simple explanation for quantum mechanics: a world where spacetime itself is quantized relative to the observer. The cosmos that we see is merely one side of itself that the universe shows us. The whole external universe is responsive to the present observer.