Ever wonder what a black hole looks like? Kind of a weird question considering that the gravity of black holes is so strong that once light gets too close, it gets trapped and can never reach our eyes to be processed into an actual image of a black hole. However, an international collaboration, known as the Event Horizon Telescope (EHT), may have found a way to give us some type of visualization of a black hole! Actually, they will be trying to make observations of the event horizon of a black hole, which is the boundary past which light can no longer escape the gravitational pull of a black hole (Figure 2). Using an “array” of telescopes across the globe in a technique called Very Long Baseline Interferometry (VLBI), the EHT is essentially using the planet Earth as a single giant telescope. VLBI is a technique that uses multiple telescopes, thousands of miles apart, in order to make observations (Figure 1). Signals from outer space reach each telescope individually and are recorded. Later, the data from all of the involved telescopes are brought together and combined to form a larger, more wholistic dataset. There is usually some sort of atomic clock involved in the process to properly account for time differences and ensure that data are combined as seamlessly as possible. Though, one big problem that comes with using this technique is that observations can only be made when the chosen telescopes can operate at the same time. Thus, a lot of planning has to go into any observations, and the EHT can only observe about once a year. This logistical complication can be frustrating, but the promise of new scientific material from this project makes it a very small price to pay. Another issue is that even though the EHT is using the largest telescope on the planet (Earth itself) in its scientific endeavors, since there telescopes do not completely dot the face of the globe, some information is lost in each observation. However, this setback is dealt with using various algorithms to fill in the blanks with the most likely data (eventhorizontelescope.org). The EHT organization

Figure 1: Submillimeter Array Telescope by the light of the full moon observing 3C279, April 10, HST.
One of many telescopes that The Event Horizon Telescope incorporates.
Image Credit: Jonathan Weiss, eventhorizontelescope.org

Figure 2: Sagittarius A* Selfies...?
has really covered their bases in making their project as effective and efficient as possible. The primary targets for the EHT are Sagittarius A* (SgrA*), the supermassive black hole (SMBH) at the center of the Milky Way, and Messier 87 (M87), a SMBH located in the Virgo Galaxy, about 54 million light-years away (Garner, 2017). The EHT organization received its first dataset last summer and is still currently processing the data. They also just recently made another observation this past April. The hope is that with these observations, scientists will be able to better study gravity, relativity, black hole accretion, as well as actual the black holes and their event horizons, just to name a few things.

While no images have yet been released from the EHT, the day will soon be upon us. They already have one full dataset of observational information, and have just made another observation. The predicted release was supposed to be late 2017, but things rarely go exactly according to plan in real science. As of now, there is no predicted release; but, even so, they are making great progress, and when they finally do release those first resolved images of the black hole event horizons, it will certainly be a day to remember!

References

Figure 2: Artist’s rendition of a spinning supermassive black hole, explaining various parts of the black hole, including the event horizon.

Image Credit: ESO, ESA/Hubble, M. Kornmesser/N. Bartmann, eventhorizontelescope.org