

Name

Course

Tutor

Date

Planet Nine

Planet nine is hypothetical planet astronomers believe to be located at the Kuiper belt found within the outer boundary of the earth's solar system. The planet challenges the contemporary knowledge of the existence of eight planets. Researchers Mike Brown and Konstantin Batygin unveiled the evidence of its existence by using mathematical modeling and computer simulations to ascertain its possible existence. I have always had the passion for space science, and when NASA Goddard Space Flight Center launched the citizen science project Backyard Worlds: Planet 9, to allow citizens help with the search for planet nine, I gained immense interest. I found it particularly interesting that planet nine may have been detected and exist in the current data collected by NASA's Wild Field Infrared Survey Explorer (WISE) telescope and that ordinary people with interest in astronomy had the opportunity to be part of what could be a significant discovery in space exploration.

The speculation about Planet 9 began at the onset of the 20th century when Astronomer Percival Lowell developed a theory about the existence of a ninth planet beyond Neptune in our solar system. He proposed that particular disturbances in the orbit of planets Uranus and Neptune could be a result of a massive planet, code-named Planet X orbiting further out in the solar system. In 2003 Sedna, an object about three times far from the sun than Neptune was discovered in overly peculiar orbit. The strange orbit of Sedna gave more credibility to the possibility of the

existence of a ninth planet. Researchers have used the models of the orbit of Sedna and the brown dwarfs to estimate the mass of Planet nine at about ten times the mass of planet Earth.

WISE telescope mission launched in December of 2009 scanned and mapped the sky more than seven times in infrared rays for near-Earth Objects (NEOs) taking pictures of seven hundred and fifty million objects that include distant stars, galaxies, and asteroid. Using the data from the WISE space mission, astronomers discovered the coolest category of star-like bodies known as brown dwarfs. They do have the requisite mass needed to sustain nuclear fusion, for this reason, brown dwarfs lack the energy to support their luminosity hence fades away with time. Contrary to the known eight planets that shine very bright at observable wavelengths, they are primarily observable through a WISE infrared telescope. Scientist believe planet nine exhibit similar features and should also be apparent on infrared, hence identifying and classifying brown dwarfs is a step closer to discovering the planet.

At Backyard world: planet nine, citizens assist a team of NASA scientists in the search for actual objects at the boundary of the solar system by distinguishing real stellar objects (brown dwarfs) from photographic artifacts in the large volume of data gathered from Wide-field Infrared Survey Explorer Mission. The human eyes scan through the data much faster is more trust word than computer-generated algorithms. The infrared images are presented as a flick book. Backyard Worlds uses a similar technique by astronomer Clyde Tombaugh in the discovery of Pluto but alternatively, electronically serving up flipbooks of WISE images taken at different times of exploration. As the flipbooks play, the objects are occurring in the field move or their appearance change making it easy for volunteers to mark potential objects for further examination.

I was able to take part in the search for planet nine in the Backyard world project after creating an account with Zooniverse.org. My primary objective upon opening the flipbook was to identify dipoles. Dipoles are bright high motion infrared objects on the flipbook that appears like black spots and moves from one side to another. Once identified a possible dipole I marked its location on the flipbook using a marking tool button provided. While many dipoles might appear unique for a first-time citizen scientist like me, there were higher chances that the particular object was already known, marked and classified.

To verify whether the objects had identified were known or unknown, I clicked on the information button provided for just below the flipbook that leads to SIMBAD. It is an astronomical database containing information of all the known objects that had previously been identified. It enabled me to verify the significance of the infrared objects had identified, if the objects were already listed in the SIMBAD, I went ahead to identify others that were unknown. My significant breakthroughs came about when I spotted unknown moving objects. To mark the precise coordinates of my find on the flipbook, I clicked on the IRSA finding chart link and using the lock by click button locked the exact coordinates. I could then copy paste the coordinates and fill in the "You think you've got one" online form of reporting new findings and submit for further analysis by the NASA team of professionals. The feeling of being part of a historical journey towards what could be a significant scientific discovery was both genuinely fulfilling and rewarding.

Scientists have so far identified six known celestial objects in the Kuiper belt that have elliptical orbits pointing in a similar direction and are all inclined 30 degrees below the orbital plane of the solar system. This discovery may not sound like much, but researchers have calculated that the probability of six Kuiper Belt Objects unsystematically moving in a tight

cluster as such is one in a thousand. The existence of eccentric Kuiper Belt Objects that are orbiting in the opposite direction of everything else in our solar system could only be explained by planet nine's orbital influence (Cox et al., 38). Planet nine's existence also best describe the misalignment of the orbital plane of the solar system with the sun's equator by approximately six degrees. Analytical models incorporating Planet nine developed by NASA scientists reveal that the planet would naturally affect the orbits of other orbits in the solar system.

Despite the significant progress made by Backyard Words: Planet Nine citizen science project, Planet Nine is still elusive. However, continued funding of the project and the commitment of citizen scientist together with a competent team of NASA astrophysicists shades a clear path for a breakthrough shortly. The advances in technology also assist in processing and analysis of the collected data making it easier for scientists to examine deep space images more reliably. The discovery of Planet nine will mark a significant milestone in the space exploration and expand our Knowledge our knowledge of the solar system. It will also set the stage for possibilities of other unknown planets in the solar system and foster the participation of ordinary citizens in the study and understanding of our vast solar system.

Works Cited

Cox, Joe, et al. "Defining and measuring success in online citizen science: A case study of Zooniverse projects." *Computing in Science & Engineering* 17.4 (2015): 28-41.

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