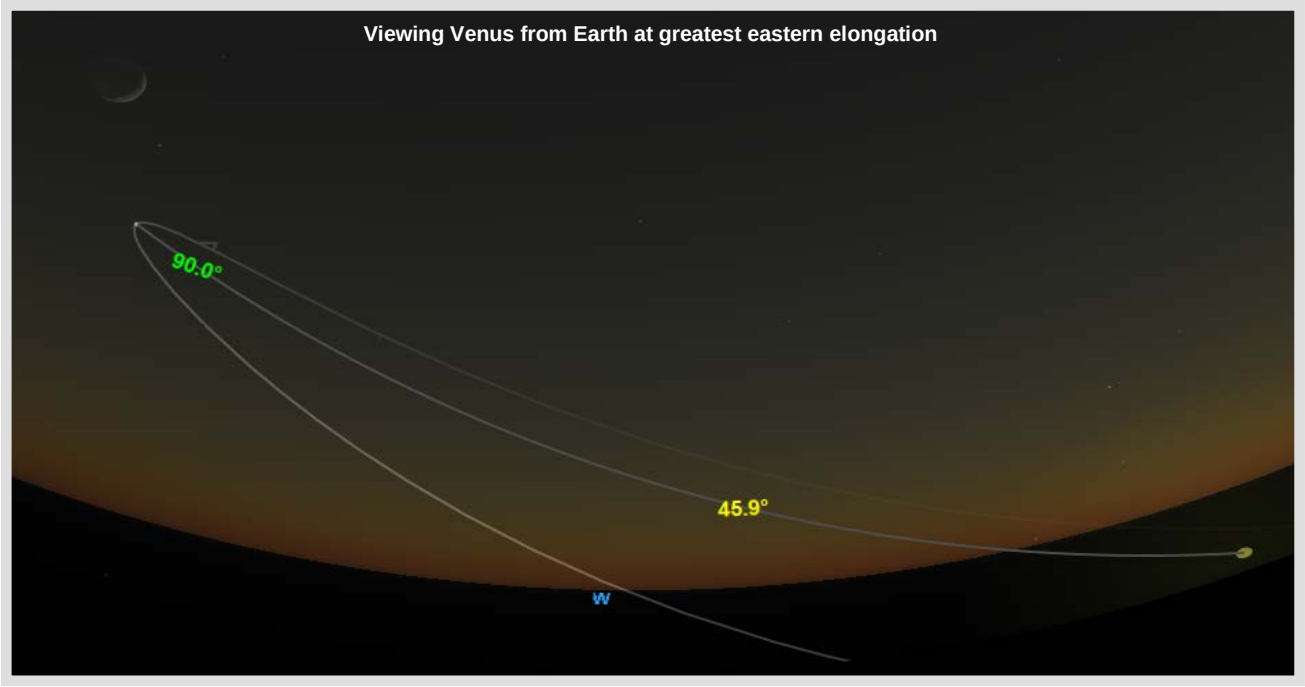
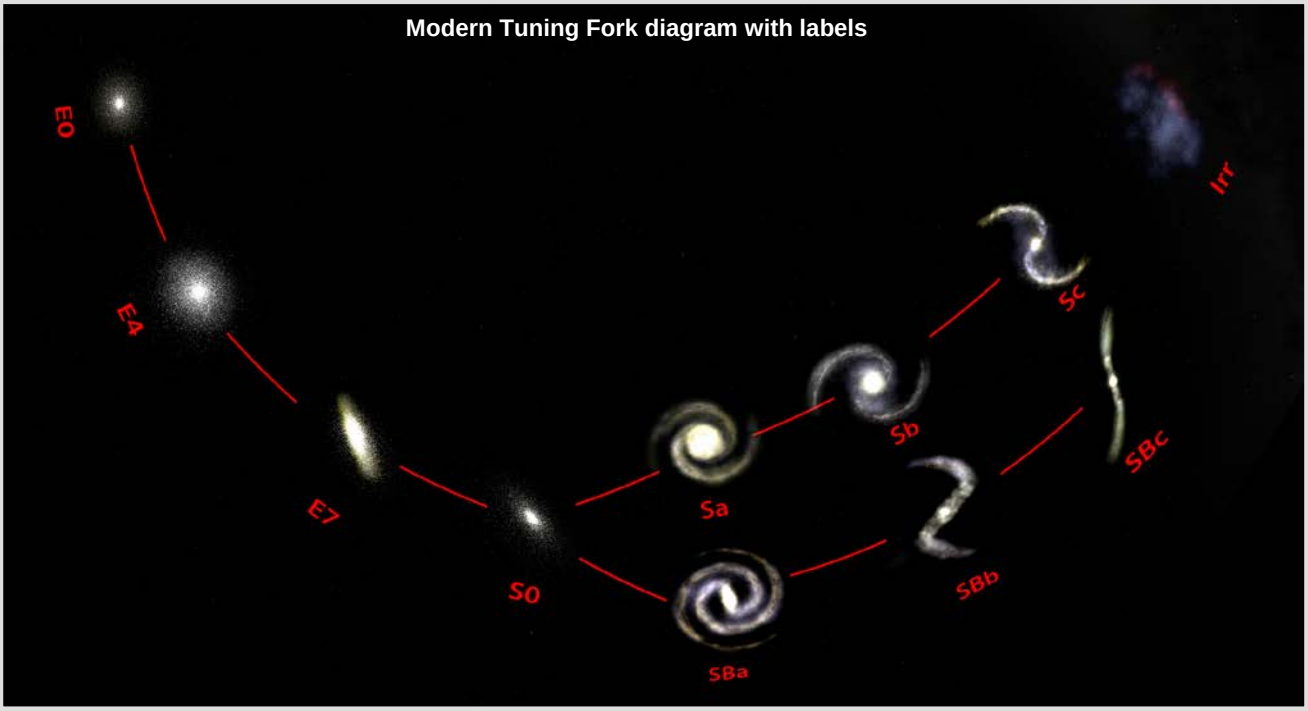
Minilessons

Copernican Method



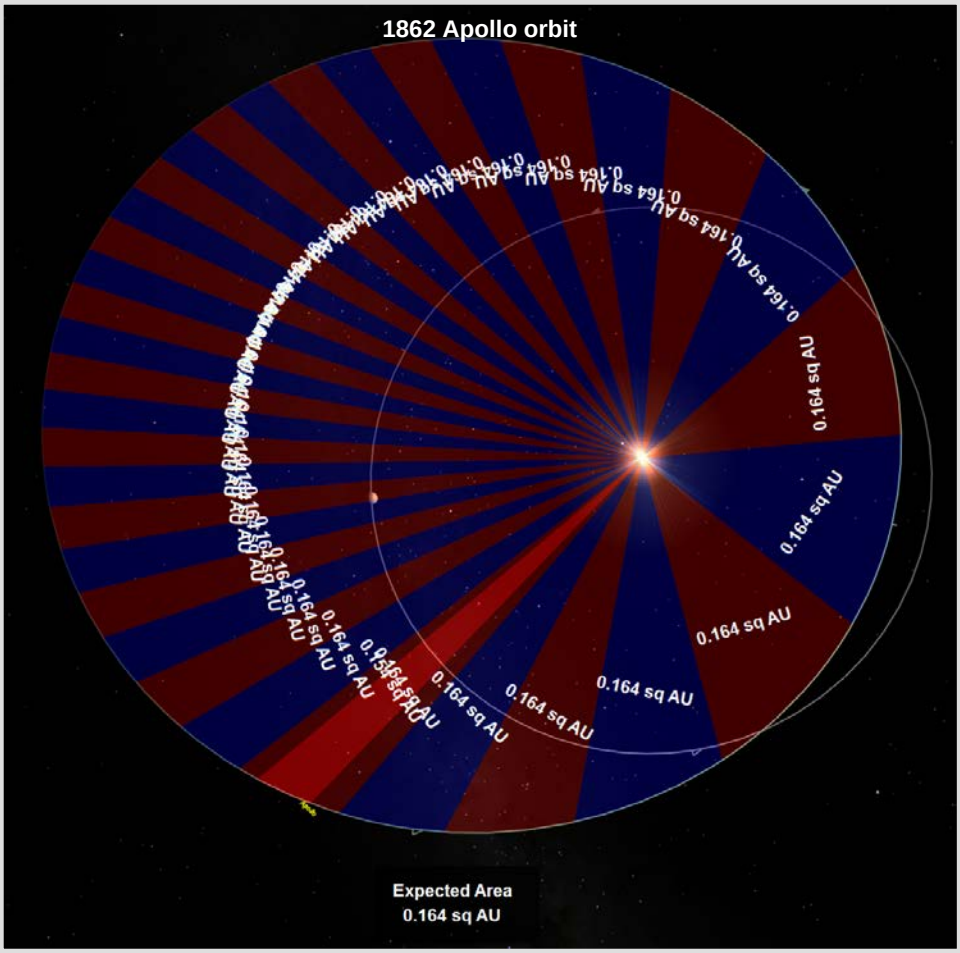
Nearly everyone knows that Copernicus was the first to set up a scale model of the heliocentric system, but how exactly did he arrive at the incredibly accurate values for the distances of the known planets from the Sun? This minilesson goes into the details of exactly how he accomplished this amazing feat, first from a curtate orbit view so that your audience will understand the principles behind the geometry of the system, and then from the actual view from the surface of the Earth. New features have been implemented into ***Starry Night*** in order to make these geometrical measurements feasible and visible! Considering the approximations that Copernicus had to make (circular orbits and constant orbital speeds) it's incredible how close to modern values he achieved!

Hubble Tuning Fork



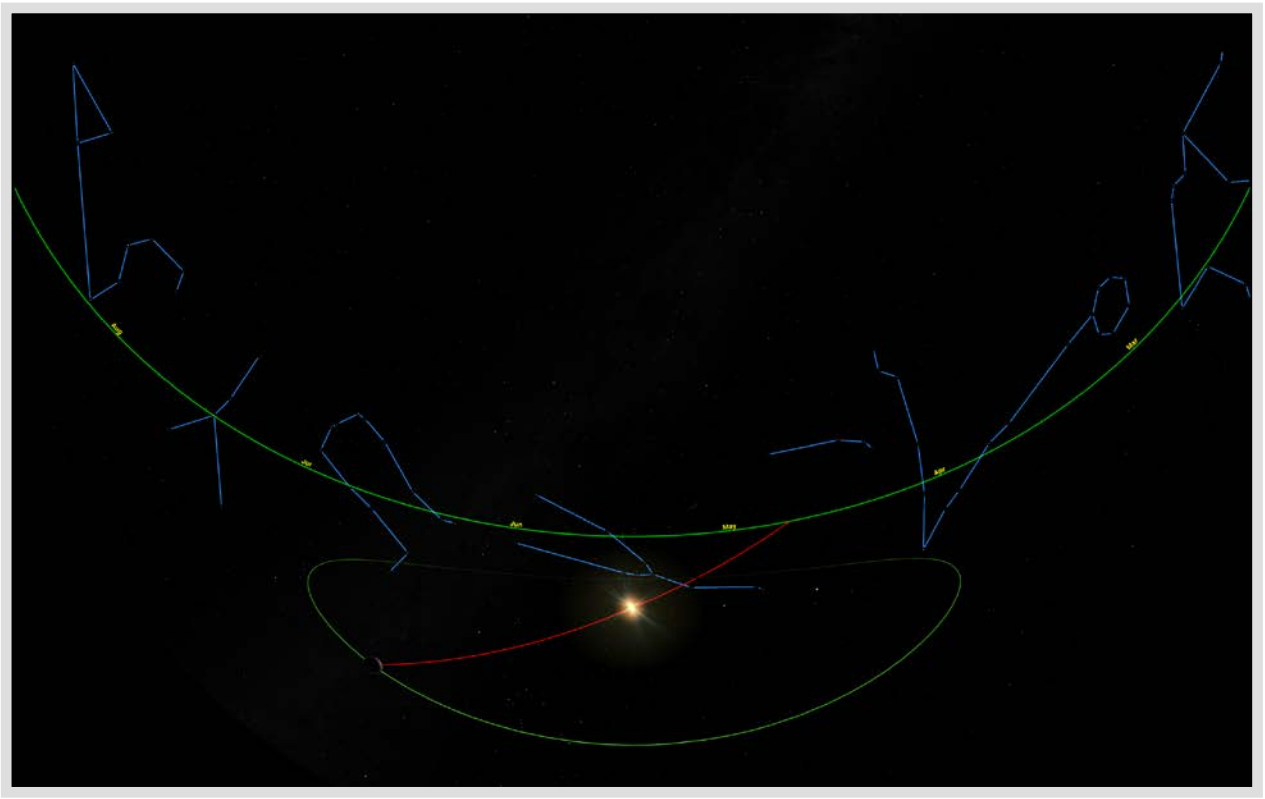
Edwin Hubble first classified galaxies into the now familiar tuning fork diagram in 1926, but a drawing of this scheme first appeared in his popular book ***The Realm of the Nebulae*** in 1936. He believed that this diagram was revealing an evolutionary path, *i.e.*, that galaxies began as ellipticals and eventually changed into spirals. We now know that galaxies stay pretty much the way they're born, much of their shapes dependent upon their initial angular momentum. This minilesson gives a 21st century "twist" to the Hubble Tuning Fork diagram by allowing the planetarium operator to initiate three-dimensional motion to each and every individual galaxy in the diagram, either via **ATM-4** or ***SciTouch***. Irregular galaxies have been added to complete the picture. This minilesson is especially useful in showing the planar nature of spiral galaxies as opposed to elliptical galaxies.

Kepler's 2nd Law



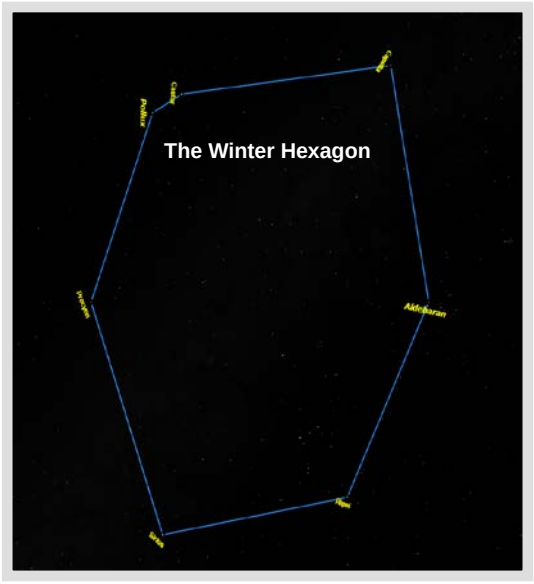
Kepler's three laws of planetary motion are taught in nearly every astronomy class. For the first time a new feature in ***Starry Night*** allows the planetarium instructor to clearly animate Kepler's 2nd Law of Areas for any object in the program except for artificial space probes. This includes planets, moons, comets, asteroids and even exoplanets! There are many options available to the instructor such as segment size, colors, etc. The analytical area is displayed as well as the numerically iterated value for each area segment to demonstrate that indeed Kepler's 2nd Law holds true!

Sun Along the Ecliptic



One of concepts that my students struggle with is the idea of the Sun traveling along the ecliptic because of the Earth's revolution. This may seem straightforward, but only to those who already understand it! ***Starry Night*** has a new feature which allows the **line of sight** from the Earth to the Sun to be drawn. This line of sight continues through the Sun and ends at infinity, *i.e.,* where the circle of the ecliptic resides. This minilesson drives home the idea that the reason that the Sun appears to move along the ecliptic is simply because of our moving platform called Earth. This is illustrated both from an orbital view and then from a view directly behind the night side of the Earth as it revolves around the Sun.

Winter Hexagon



This minilesson lets the instructor to point out, segment by segment, the great asterism called The Winter Hexagon. This new asterism allows your students to better acquaint themselves with the most prominent bright stars in the winter sky.