The Art of Astronomy

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1.0 Abstract

2.0 The Universe

What is Astronomy? It is the study of the stars and planets. It is a source of interest to young and old amateur astronomers and scientists. Many people enjoy the science of Astronomy without thinking about it. It is fortunate that we have individuals who dedicate their life to the study of how the bodies of the Universe interact, and consequently, inter-react because of the "randomness" of the irregular bodies floating around in space affected by the gravitational effects of nearby objects.

2.1 The Milky Way Galaxy

2.2 The Solar System

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The Solar System itself holds many mysteries that Astronomers continuously are discovering. The number of moons on the outer planets seems to increase at a yearly rate, even though its not dynamic body creation but technological advances in imaging software by terrestrially and sky-based telescopes.

3.0 Chemistry of the Universe

An interesting aspect of the Universe is how the atoms of elements combine to form the nebulae, galaxies, stars, and other sky objects.

3.1 Quasars and Pulsar

Quasars give off more

3.2 Nebulae

3.3 Stars

3.4 Planets

4.0 Physics of our Universe

4.1 Computer Simulation

There has been much research into the implementation of simulation software for mimicking the behavior of our Universe on a Computer. Why is this important? Besides amateurs, students, and kids who are impressed with the power and "coolness" factor involved with simulation of heavenly bodies, scientists are dependent on this type of software.

An interesting simulation and example of computer simulation is the nbody problem. This attempts to mirror the gravitational effects of the objects in the Universe on other bodies in the Universe. Equations that are used in this are Newton's Force equation:

$$F = \frac{M_1 * M_2 * G}{r^2}$$

4.2 Motion of the Stars from Earth

How do programs simulate the behavior of the stars from the Earth? As you know, the stars in the sky appear to move in a circle around a fixed point in the sky. Non-technical individuals know this point as the North Star. Interested parties know it by another name, *Polaris*. It is the end the tail of the constellation Ursa Minor, aka "the small bear" or as the beginning of the handle in "the Little Dipper".

With this fact in mind, we need a mathematical formula for the rotation of the sky. At first thought, a simple rotation formula should work:

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Newx = x* cos(angle_to_rotate) –
x * sin(angle_to_rotate)
Newy = y * cos(angle_to_rotate)
+ x * sin(angle_to_rotate)
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These values are derived from polar coordinate equations for x and y which are:

$$x = r * \cos(q)$$
$$y = r * \sin(q)$$

3.0 Other Formulas

The ratio of the observed change in wavelength of light emitted by a moving object to the rest wavelength of the emitted light.. This ratio is related to the velocity of the object. In general, with v = velocity of the object, c is the speed of light, lambda is the rest wavelength, and delta-lambda is the observed change in the wavelength, z is given by

$$z = (d - l)/l = \frac{\sqrt{1+v/c}}{\sqrt{1-v/c}} - 1$$

z = (delta-lambda)/lamda = (sqrt(1+v/c) / sqrt(1-v/c)) - 1.

3.0 Appendix A-Source Code

4.0 References