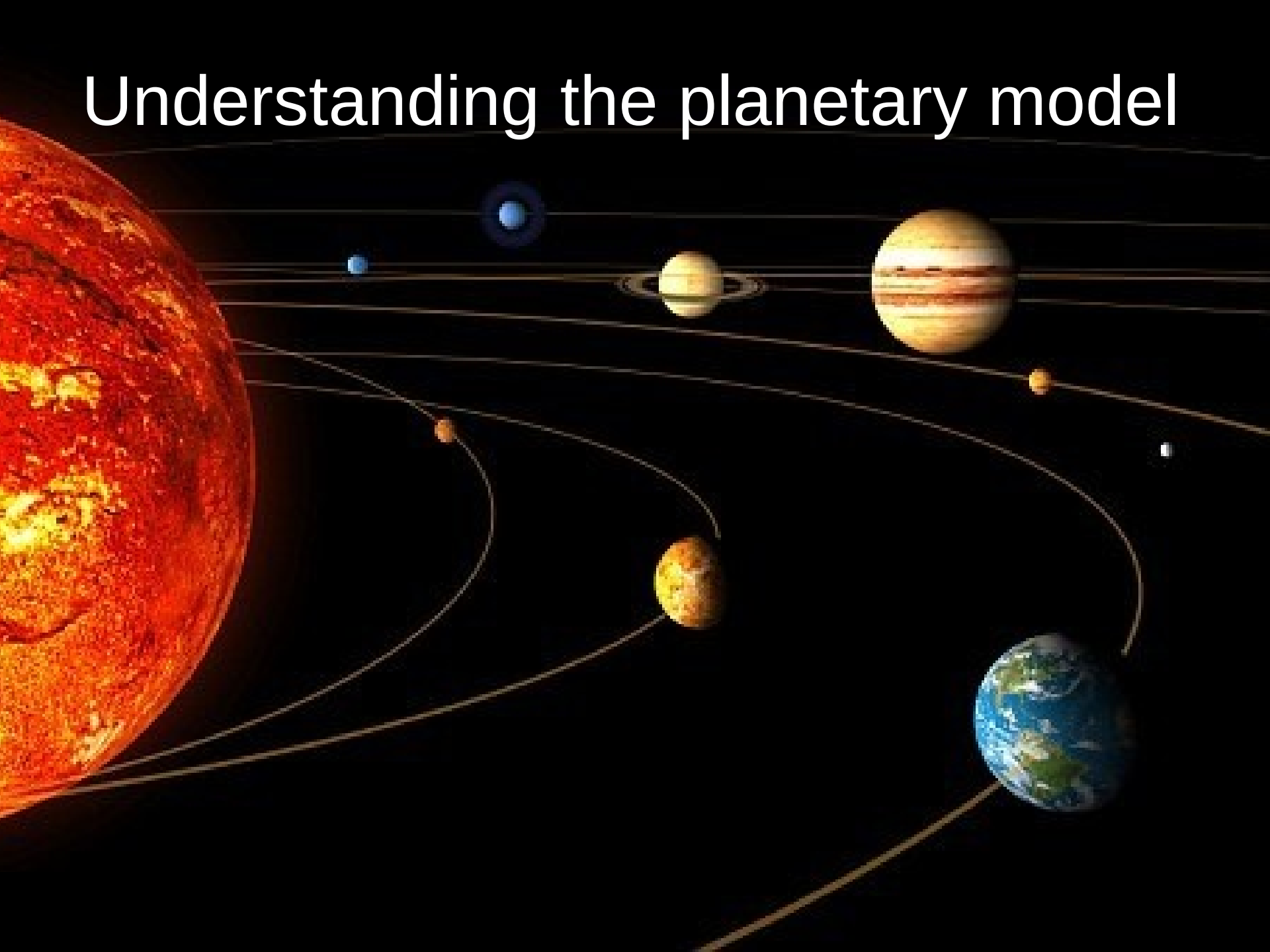
Understanding the planetary model



Understanding the planetary model

We can understand the planetary model of Bohr by first reviewing the forces that hold our solar system together. Let's consider the balance of forces that keeps the earth in its orbit. We will ignore subtle points such as the fact that the orbit is actually slightly elliptical. We will pretend that it is perfectly circular. The gravitational force pulling the earth into the sun is given by

$$F_{attract} = G\frac{m_{earth}m_{sun}}{R^2}$$

This force should be offset by the centripedal force given by

$$F_{centripedal} = m_{earth}\omega^2 R$$

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Given the following,

$$G = 6.674 \times 10^{-11} \ \frac{Nm^2}{kg^2}$$

$$m_{earth} = 5.97 \times 10^{24} \ kg$$

$$m_{sun} = 1.98 \times 10^{30} \ kg$$

$$R = 1.5 \times 10^{11} \ m$$

Calculate both the attractive force and the centripedal force of the earth.

$$F_{attract} = G\frac{m_{earth}m_{sun}}{R^2} \ and \ F_{centripedal} = m_{earth}\omega^2 R$$