

# Star Wobble

**Overview:** How do astronomers find planets around distant stars? If you look at a star through binoculars or a telescope, you'll quickly notice how bright the star is, and how difficult it is to see anything other than the star, especially a small planet that doesn't generate any light of its own! Astronomers look for a shift, or wobble, of the star as it gets gravitationally "yanked" around by the orbiting planets. By measuring this wobble, astronomers can estimate the size and distance of larger orbiting objects.

**What to Learn:** Doppler spectroscopy is one way astronomers find planets around distant stars. If you recall the lesson where we created our own solar system in a computer simulation, you remember how the star could be influenced by a smaller planet enough to have a tiny orbit of its own. This tiny orbit is what astronomers are trying to detect with this method.

## Materials

- Several bouncy balls of different sizes and weights, soft enough to stab with a toothpick
- Toothpicks

## Experiment

1. Does your ball have a number written on it? If so, that's the weight, and you can skip measuring the weight with a scale.
2. If not, weigh each one and make a note in the data table.
3. Take the heaviest ball and spin it on the table. Can you get it to spin in place? That's like a Sun without any planets around it.
4. Insert a toothpick into the ball. Now insert the end of the toothpick into the smallest weight ball. Now spin the original ball. What happened?
5. Complete the data table.

## Star Wobble Data Table

Weight of Ball #1	Weight of Ball #2	How Much Did it Wobble? <i>(Use a scale of 1 to 5, with 5 being the most wobble)</i>

### Reading

Nearly half of the extrasolar (outside our solar system) planets discovered were found by using this method of detection. It's very hard to detect planets from Earth because planets are so dim, and the light they do emit tends to be infrared radiation. Our Sun outshines all the planets in our solar system by one billion times.

This method uses the idea that an orbiting planet exerts a gravitational force on the Sun that yanks the Sun around in a tiny orbit. When this is viewed from a distance, the star appears to wobble. Not only that, this small orbit also affects the color of the light we receive from the star. This method requires that scientists make very precise measurements of its position in the sky.

### Exercises

1. For homework tonight, find out how many extrasolar planets scientists have detected so far.
2. Also for homework, find out the names (they will probably be a string of numbers and letters together) of the 3 most recent extrasolar planet discoveries.

### **Answers to Exercises: Star Wobble**

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