Observation of Consequences of the Coriolis force

Secondary School Klatovy
http://wyp.fyzika.net/
Klatovy, 10th May 2005

Coriolis force works on moving objects in rotating systems (like for example on our Earth) and causes a yawing of their moving direction. It's incredible wherever it is possible to meet this force. Next to the yawing of a vibration plane of the parasitic currents, it is also for example an asymmetrical spinning of north-south rails, where the trains move still in an identical direction with very high speed (for example road Brno – Ceska Trebova).

But we fixed on an experiment, which was realized in Toronto or Hamburg. It's a free fall of an object from a large height – the Coriolis force holds good on it as well. In the age of the Ancient Greece the people thought that if we threw down an object from a large height, the Earth should turn under it- it means that the object should land more western. As they didn't observe it, they gathered from it that the Earth didn't rotate. But the real consequence of the Earth rotation is a shift to the east! This is firmed up with an equation for computation of the Coriolis force:

$$\vec{F}_c = 2m\vec{v} \times \vec{\omega},$$

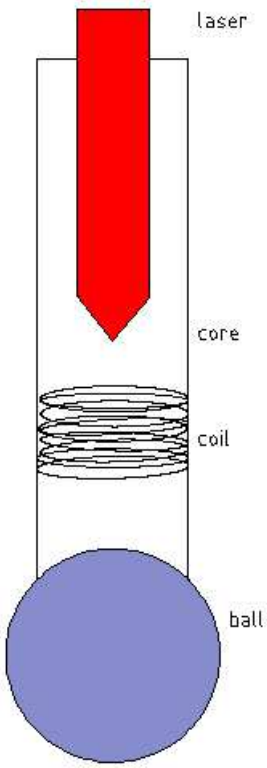
where $\vec{v}$ is a speed of the object (which grows in this case, because it's a free fall), m is its weight and $\vec{\omega}$ is a angular speed of the Earth. So the intensity of Coriolis force probably depends on the terrestrial latitude of the observer (and this way came to being a superstition about the contrary direction of the whirlpool yawing on the northern and southern hemisphere, but it's rather an superstition).

The throwing ball is moving to the east direction in consequence of the effect of the Coriolis force to the distance x:

$$x = \frac{2}{3}\omega\sqrt{\frac{2h^3}{g}}\cos\varphi$$

that – at the height of the Black Tower – makes a diversion about 0.8 cm. It is mesurable, too, and our tendency is to measure it.

The mechanism intended for it is very simple. It contains metal core of an electromagnet which holds an iron ball. We'll switch off this magnet in the right time and the ball will fall down. Next to this, there's also a laser which serves for ranging the point down on the land.



This action proceeds within the World Year of Physics 2005.
http://www.physics2005.org/