Chippewa Valley Astronomy Update December 2025

Photo caption: A time-lapse picture of the sky reveals that the stars move in circles around a fixed point due to the rotation of Earth. The stars near the center point of rotation are circumpolar, meaning that they never set. Photo credit: Şahin Sezer Dinçer (@sahinsezerdincer)

What every seven-year-old should know about circumpolar stars

By John A. Peterson and Joseph M. Peterson

Most stars rise in the east and set in the west. But some stars never set. Stars that do not rise and set daily are circumpolar – they circle the poles. At any time during any clear night of the year in Wisconsin, you can see the Big or Little Dipper. But many constellations are seasonal and can only be seen at certain times of the year and night. And there are constellations that you can never see from Wisconsin (like Pavo the Peacock).

Imagine laying on a merry go round and looking straight up. You would see all the clouds spinning around a central point and you would see trees at the edge of your vision, but you would never see the grass. The stars do the same thing for observers at the North Pole: they all move around the point overhead. And none of the stars visible at one pole on Earth is visible at the other, just like if you were laying face down on a merry go round, you would see the ground spin around a central point under the merry go round but never see the clouds.

Next imagine sitting on the edge of the merry go round. You would see the trees pass as you spun, and you would see the grass on the ground near the merry go round and the clouds above the trees as you passed. You would not see the clouds or grass turning around a center point but would see all the objects surrounding the merry go round as it rotates. These objects would all rise and set from your field of view. On the Equator, all stars rise and set every day, rotating around the poles that are on the north and south horizon. Which stars rise and set during daylight or nighttime is determined by where the Earth is in its orbit.

Now imagine leaning back on the merry go round so that you are looking partially towards the sky and partially towards the trees. You will see the trees on the ground move past your field of view, but you will also see some clouds rotating around the top of the merry go round. The farther you lay back the more of the clouds and the less of the ground you will see. This is like us on the Earth, part way between the equator and the North Pole. Some stars never set and some stars rise and set every day. The closer you

get to the North Pole, the more stars will be circumpolar and will not set. You will also see fewer stars from the southern sky because they are also circumpolar – they never set because they never rise.

Here in the Chippewa Valley, only about 15% of the sky is circumpolar around each pole, so 70% of the sky rises and sets every day.

--The Petersons are members of the Chippewa Valley Astronomical Society.

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