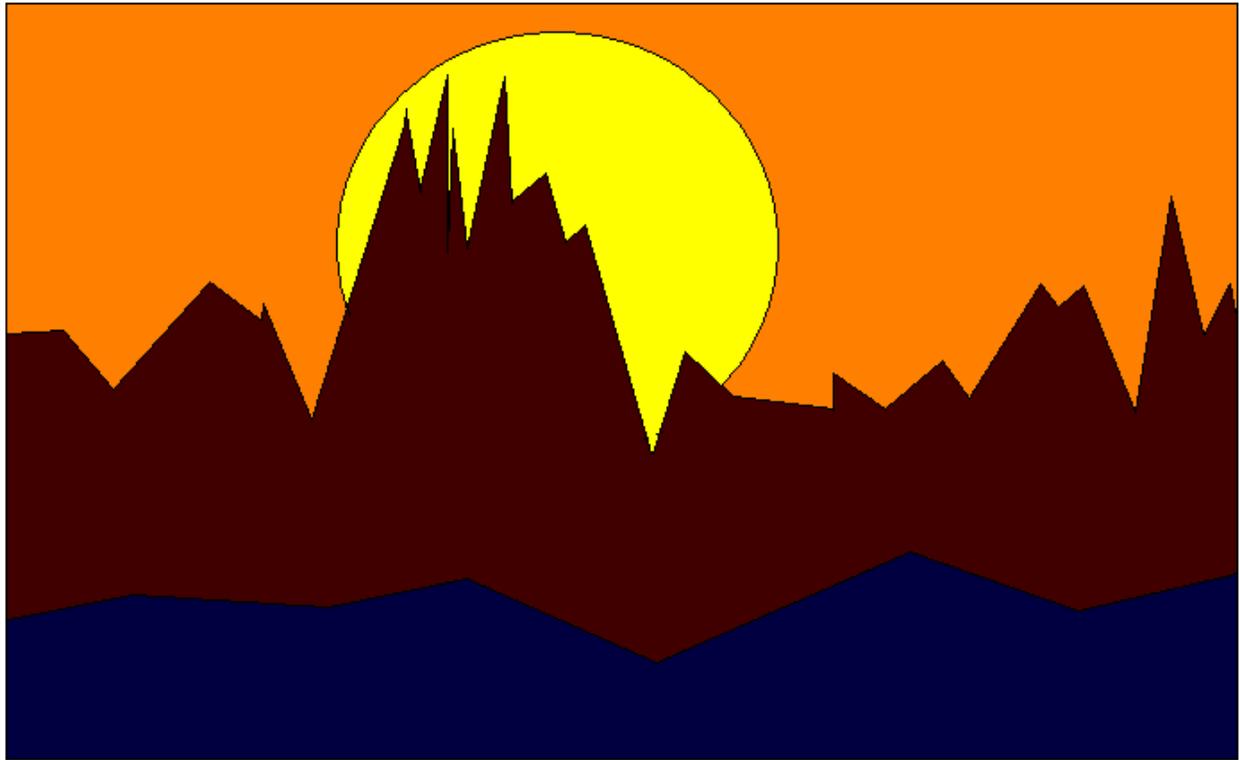


Stars and planets do the two step



A principle of everyday science is helping detect planets of faraway stars, says **S.Ananthanarayanan**. But will this help find a planet like earth orbiting a star like our own sun?

The star nearest to the earth is Proxima Centauri, a whole 4.2 light years away and too dim to be seen by the naked eye. Its neighbour, Alpha Centauri, is one of the brightest in the sky, but still just a dot in a telescope. Even if these stars had planets in orbit, there is little question of the planets being visible from the earth.

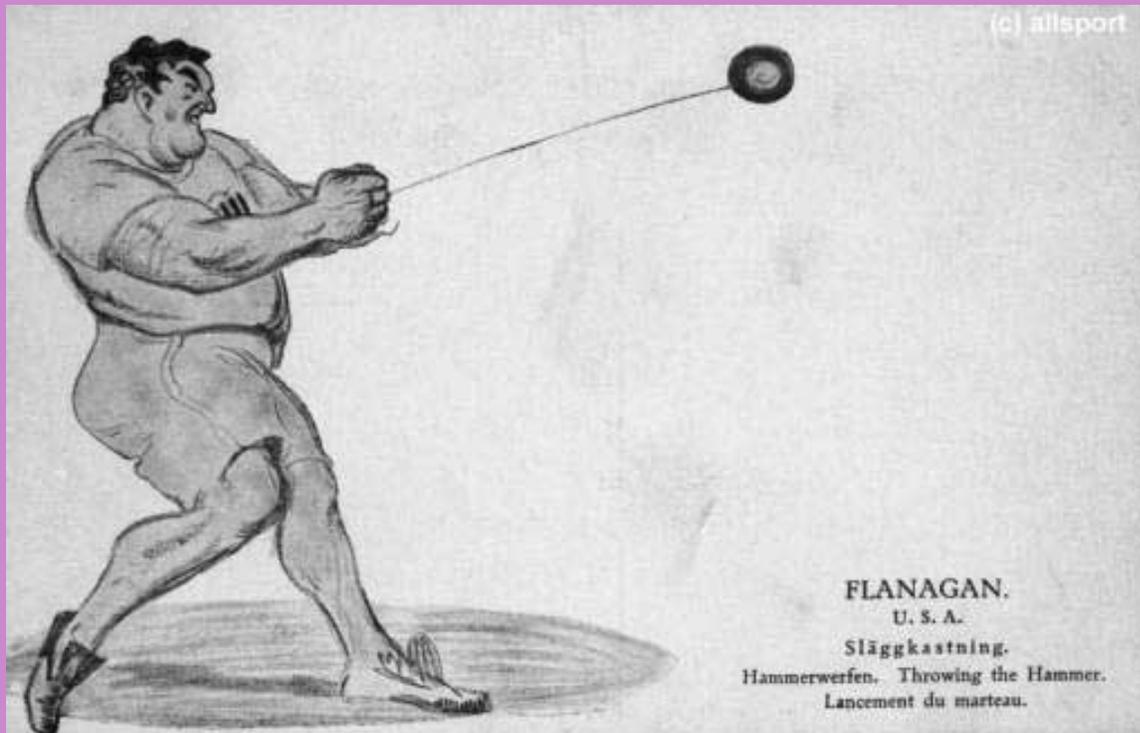


And as we go further, to explore stellar systems millions of times more distant, the possibility of spotting planets completely vanishes.

The star-planet system

But there is a roundabout way by which we could still detect a planet around a distant and barely visible star. This is by measuring the 'wobble' of the star as the planet goes around it!

A star steering a planet around is like an athlete throwing the hammer. The weight going round and round has momentum now one way and now the other. As the athlete and the hammer are a combined system, the athlete has to move too, to balance the motion of the hammer.



In the same way, the motion of a heavy enough planet around a star would cause the star to move in a smaller circle too!

The Doppler effect

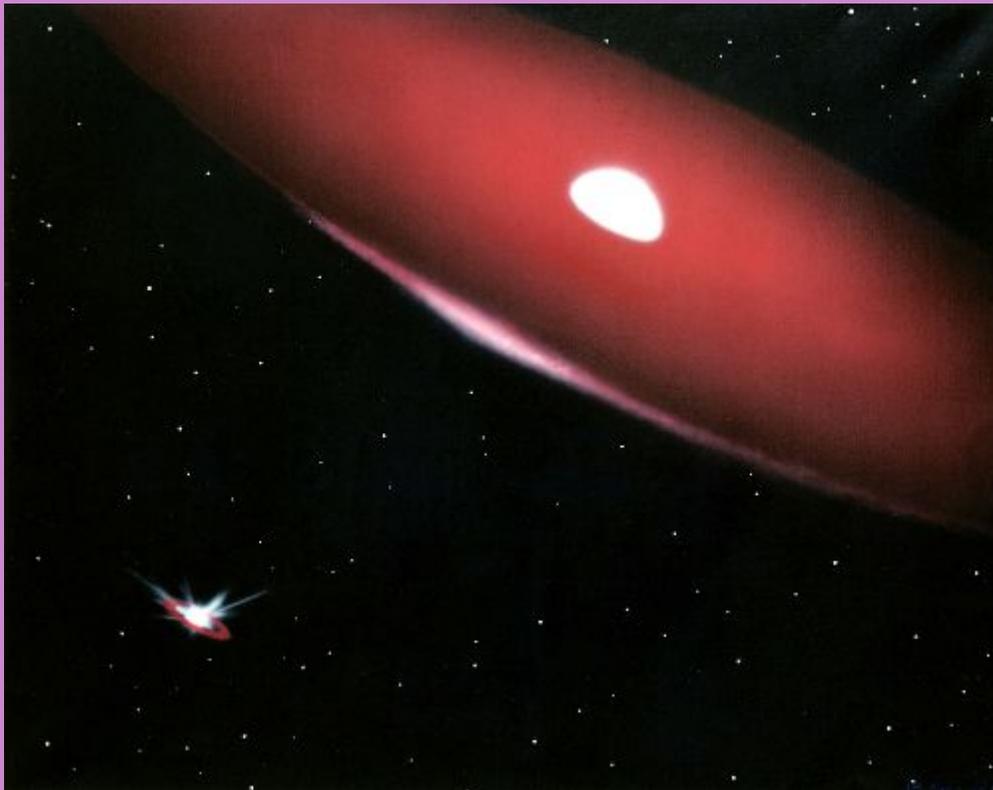
This minute wobble of a barely visible dot in the sky can scarcely be accurately measured from the earth. The device that scientists use is the effect of the motion on the colour of light the star emits.

Most of us would have noticed that the whistle of a train is shrill as the train approaches, but gets deeper as the train begins to recede. This is because the motion of the train coming towards us 'pushes' the sound waves closer together, which makes the sound shriller. And while receding, the motion away from us 'stretches' the sound waves, which makes the sound 'deeper' in tone!

The same thing happens with the light of stars hurtling towards us or rushing away. The light changes colour, towards the violet side of the spectrum while the star is approaching us and towards the red side while the star is receding.

Doppler and starlight

In a star-planet system, the motion is at tremendous speeds, which perceptibly affect the colour of light emitted. Measurement of the colour of starlight, which can be done even if the light is faint, then reveals how fast the star moves forward, and backward, and, by extension, even sideways.



No earth-like systems yet

Painstaking sky watching has led, so far, to finding some 15 such planet-star pairs, which are somewhat like our solar system. The planets are around the size of Saturn or Jupiter and much closer to the mother stars than the earth to the sun.

But this method could still not help detect a system like our own, if there is one, because a small planet like the earth would cause too small a 'wobble'!
