Astronomy Talk 11th October 2022

Exoplanet Atmospheres

Annabella Meech, who is studying for a DPhil at Oxford University, and who was a frequent visitor to BNSS in the past, with her parents, as she lived locally. The talk was given by Zoom, and there were 49 attending.

The first exoplanet was found in 1992 round a pulsar, which was a surprise. The first round a sun-like star was discovered in 1995. Annabella talked about the different detection methods and their strengths and weaknesses: transit, doppler and microlensing. So far more than 5,000 planets have been discovered.

Their atmosphere is basically the only thing we can detect, apart from mass and diameter: if we're looking for life, we assume it needs an atmosphere. The atmosphere can be analysed from the changes in the star's spectrum as the planet transits. We can also get information from the reflection spectrum when it's behind the star. This is particularly useful if the planet is tidally locked and has a hot side facing the star all the time.

To get hi-res spectra needs us to account for the Earth's atmosphere and the interstellar medium. Machine learning tools are very helpful in enabling us to get to the true signal.

What have we seen? Ultra-hot Jupiters are relatively easy, some with "iron rain." Other usefully hot planets can be described as "lava worlds," e.g., 55 Cancri e.

In conclusion we're getting better and better at getting good planetary spectra from ever more normal planets, but there's a long way to go.

There were many questions of different sorts; the audience was clearly highly engaged by the talk.