High-resolution spectroscopic follow-up of known exoplanet-hosts and candidates: star-planet connection

Edita Stonkute (Institute of Theoretical Physics and Astronomy, Vilnius University, Lithuania)
Grazina Tautvaisiene, Sarunas Mikolaitis, Renata Minkeviciute, Arnas Drazdauskas

Exoplanets – planets outside the Solar system are common in our Galaxy, however a question how they form remains. Following recent studies of different aspects of the planetary formation process one thing is clear - the better we know the host star the more precise characterization can be made of planets orbiting it. For example, the chemical composition of the host star is a reflection of the elements in the protoplanetary disc, which is made of the same material that was used in planet formation. It has been shown that there is a higher chance to detect a planet around a more metal rich star, as a higher overall metallicity provides more of the building blocks required for planets formation. Recent studies also show, that certain elemental ratios (Mg/Si, C/O) could be indicative of possible planet composition. As the number of discovered and confirmed planets increases, we find that a lot of those host stars do not have accurate spectroscopic parameters or elemental abundance determinations. We started the high-resolution spectroscopic follow-up of known exoplanet-hosts and candidates using the Europlanet Telescope Network facility – VUES high-resolution spectrograph at the Moletai Astronomical Observatory in Lithuania with a 1.65-m telescope. Recently, we published our results for all 848 bright ($V < 8$ mag) stars that are cooler than F5 spectral class in the area of 12 deg around the northern TESS continuous viewing zone with uniformly determined main atmospheric parameters (Teff, log g, microturbulence velocity and metallicity), ages, orbital parameters, velocity components, and precise abundances of up to 24 chemical species (including Li, C/O and Mg/Si ratios). The recent analysis of 25 planet-hosting stars from our sample drove us to the following conclusions: the dwarf stars hosting high-mass planets are more metal rich than those with low-mass planets. We find slightly negative C/O and Mg/Si slopes toward the stars with high-mass planets. We continue our high-resolution spectroscopic follow-up of known exoplanet-hosts and candidates and hope that our results together with available archival data will provide constraints for the planet formation models. In this talk, we will present our latest results on the star-planet connection from our analysis of planet-hosts.