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From primordial composition of stars to the present-day composition of their rocky exoplanets

Stellar atmospheres offer the only observational window into the remnants of planet-forming disk composition, given that disks, with lifetimes typically lasting only a few million years, have long dissipated around most discovered planet-hosting stars. When modeling the interiors of rocky planets an one-to-one relation between the composition of the planet and the host stars is typically assumed. However, Adibekyan et al (2021) showed that while there is a relation between the composition of rocky planets and their host stars, the relation is not one-to-one. The study by Adibekyan et al. (2021) has two potential limitations: i) The interiors of the planets were modeled assuming they are made only of core and mantle, i.e., no volatiles, and ii) the present-day stellar abundances were used as a proxy for the primordial protoplanetary disk composition. Some astrophysical processes, such as atomic diffusion, can influence the stellar composition as the star evolves. Thus, the present-day stellar abundances can be measurably different from their primordial composition.

Over the last two years, we worked on the EXO-Terra project, which aimed at a comprehensive analysis of the star-planet compositional link by overcoming the two aforementioned limitations. Additionally, we increased the sample by about 50%. I propose an oral contribution to present the final results of the EXO-Terra project.

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