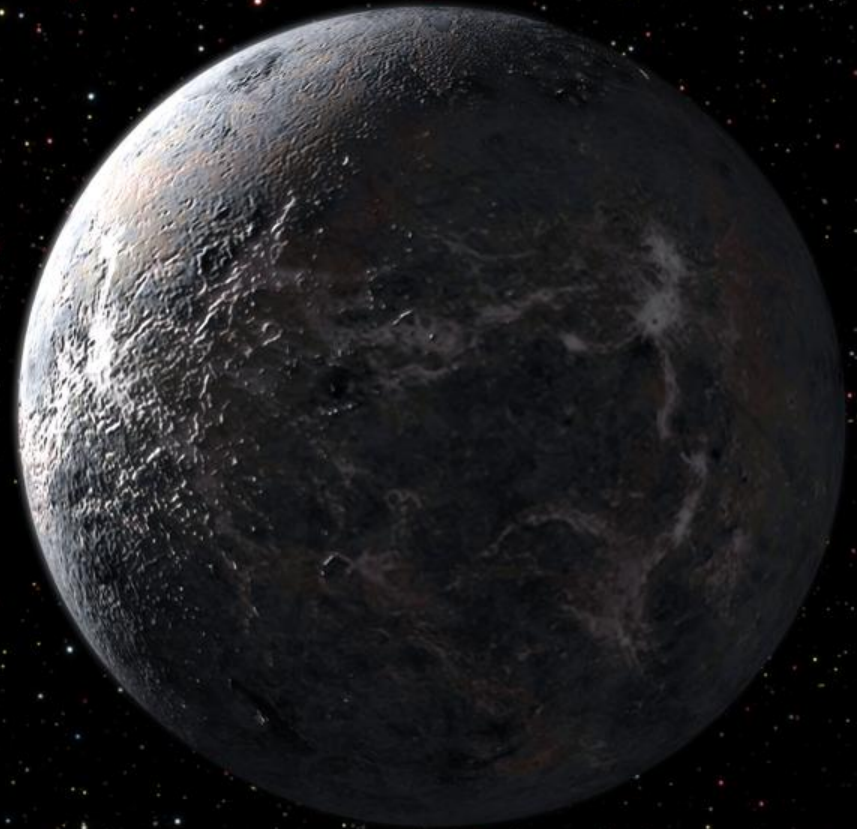


Finding extrasolar terrestrial planets using chemical composition analysis of their host stars

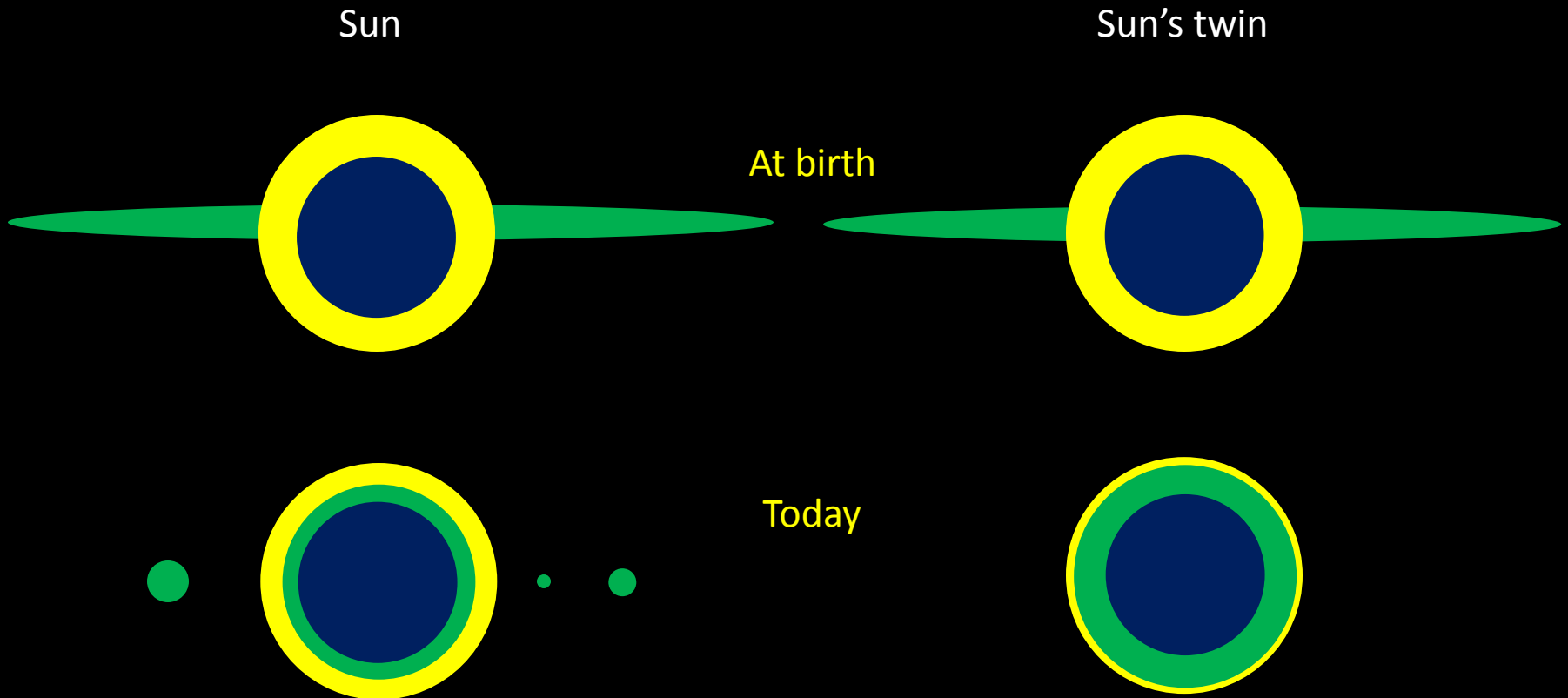
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Sagan Fellowship project

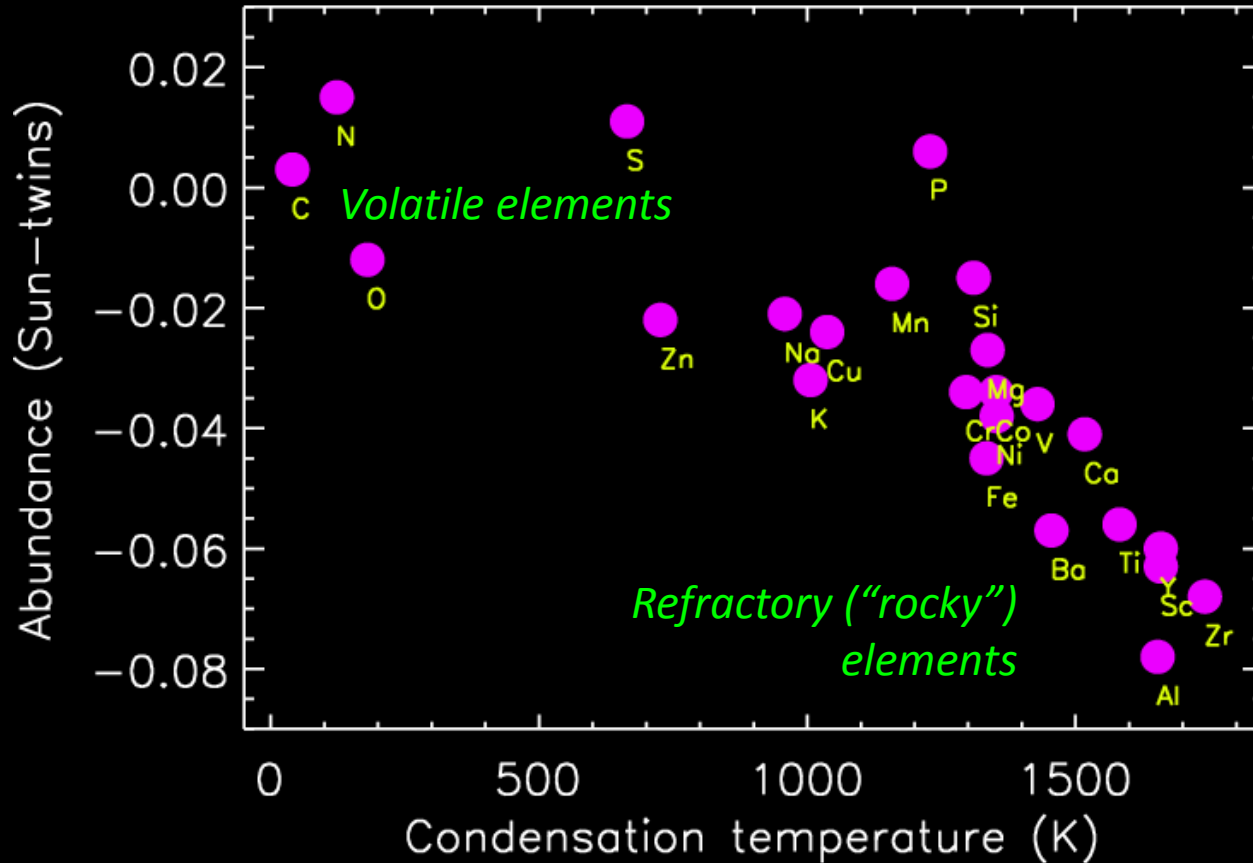


A signature of terrestrial planet formation?



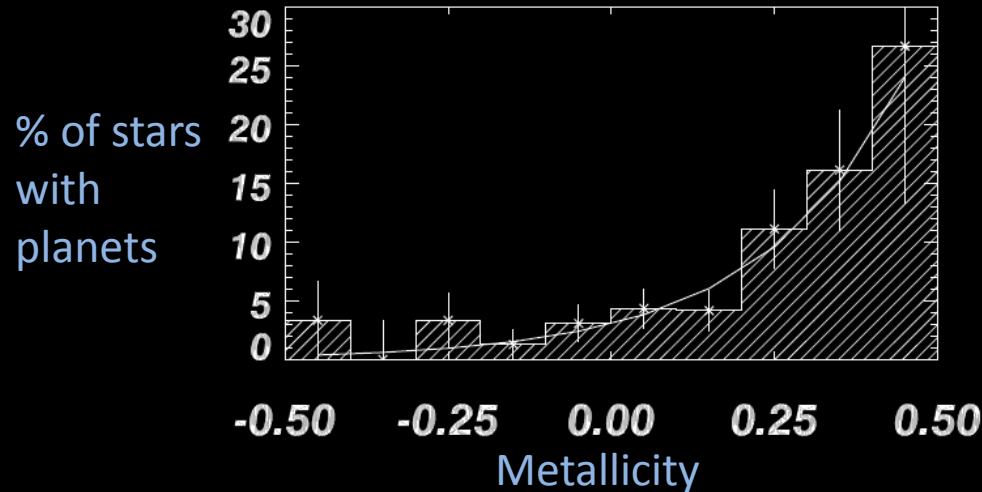
Terrestrial planets formed around the Sun (left side of figure), which therefore ended up with a deficiency of rocky elements (green in the figure) on its surface. If a solar twin star did not form terrestrial planets (right side of figure), today it should show an excess of rocky elements relative to the Sun.

We observe a small deficiency of rocky elements in the Sun relative to its twins!



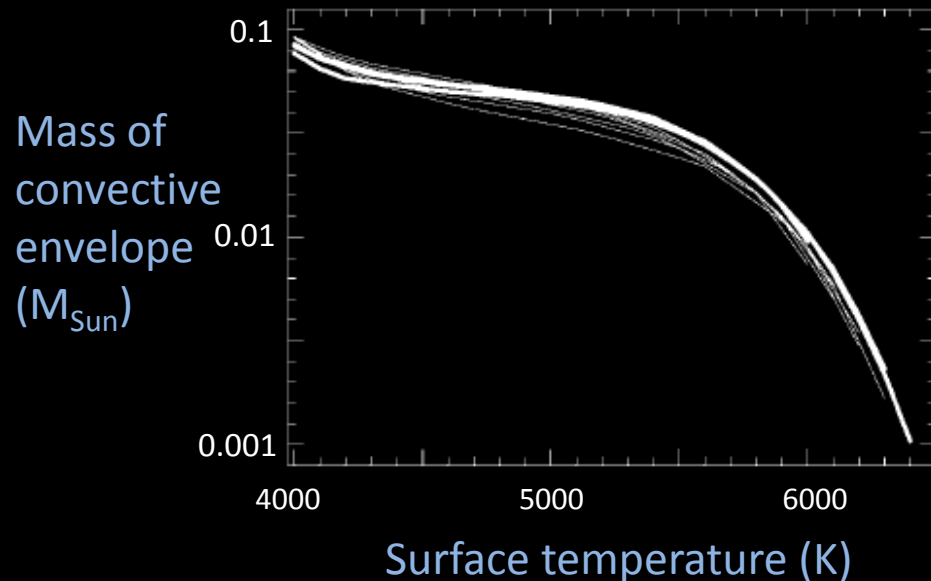
However, since this is an indirect indicator of the presence of terrestrial planets, we need additional evidence showing that these results are *really* related to the formation of Earth-like planets.

Testing the hypothesis



The number of stars which host planets increases with the overall content of metals in the host star.

→ *Is the proposed planet signature more frequent in stars of high metallicity?*



The mass of the convective envelope on which the observable chemical signatures are imprinted is smaller in stars with warmer surface temperatures.

→ *Is the proposed planet signature more evident in warmer stars?*

The ultimate test

NASA's *Kepler* mission will find extrasolar planets with masses and orbits similar to Earth.

→ *Do these Kepler planet host stars exhibit the proposed signature in their chemical composition?*



To answer these questions, large telescopes can be used to obtain *spectra* of stars, from which we can derive, very precisely, their chemical composition.

