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This document reports the translation into English of my interview with astronomer Dr. Giovanni Picogna on the discovery of Trappist-1 and on searches for exoplanets, published by the Italian science outreach magazine Galileo. The original version is in Italian (see the link to publication below). The hyperlinks in the translation are the same as in the original version.

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Why is everyone crazy about exoplanets?

Two months have passed already since the announcement of the discovery of the Trappist-1 planetary system, but those seven faraway exoplanets keep stimulating our imagination, making us feel a little less alone in the cosmos. They represent a major scientific result, the destination of a journey started in the nineties with the discovery of the first extrasolar planet. But astronomers are not lazy and are getting ready for their next moves. We discuss this with Giovanni Picogna, researcher at the Ludwig Maximilian University in Munich (Germany), who has been working for many years on searches for extrasolar planets.

Dr. Picogna, what shall we expect from the "planet hunters" in the next future?
There are many promising projects aiming to discover new exoplanets and better study those which we already know. Some are ongoing, such as the ground-based observations carried out with the ALMA radio interferometer in the Chilean Andes, or with the Harps North instrument, installed at the Galileo National Telescope, the Italian observatory on the Canary islands. Since 2013 we also have the ESA Gaia satellite. 2018 will be a very important year, as the James Webb Telescope, which is considered to be the successor to the Hubble Space Telescope, and the satellites TESS of NASA and CHEOPS of ESA, should be launched into orbit. We already have something on the 2024 agenda, namely the space-based observatory PLATO, also from ESA. As you can see, in the next years we will have a lot of fun.

But how do you actually search for exoplanets?
There are many possible approaches. The most common are the transit and radial velocity methods. The transit method is based on the observation of a periodic dimming of the light we receive from a given star. This is due to an exoplanet passing between us and the star while orbiting the star itself. During the transit, the planet blocks a fraction of the light coming from the star, which becomes less bright. This is the method that enabled the discovery of the planets in Trappist-1. On the other hand, the radial velocity method enables the discovery of a planet through its gravitational effect on the motion of the central star. There is also the possibility to discover a planet by observing it directly, a method that is mainly effective for planets located far from their star, as these are less "hidden" by the light of the star. Another method is based on a particular phenomenon known as gravitational lensing. In this case, we discover the exoplanet because its gravitational field deflects the trajectory of the light from faraway stars. Finally, there is the astrometric method as well, that is based on the motion of the central star around the barycenter of the planetary system, from which we can deduce the presence of planets. Although no planet has been discovered this way yet, this method is regarded as very promising for the future.

For the moment we have managed to discover Trappist-1. Why was this discovery so important?
The importance of Trappist-1 is closely related to the search for life outside the Solar system. All planets have the same size as Earth and three of them are in the so-called habitable zone, which means at the right distance from the star to support liquid water on the surface. Since we know that life on Earth started in liquid water, something similar could happen with Trappist-1. Moreover, the central star is a so-called red dwarf. Red dwarfs are the most common star type in our galaxy, and the fact that they could be surrounded by a planetary system increases our confidence on the possibility to discover new Earth-like planets.

The media have given a lot of visibility to Trappist-1. But was it a very uncommon discovery, or do we actually know of other planetary systems?
Currently, we know of approximately 3500 extrasolar planets and a few hundred planetary systems, all of them in our galaxy. We then have approximately 4000 celestial bodies which could be planets and for which we need observational evidence. We believe that the most common planets in our galaxy are the so-called "super Earths", bodies with a mass up to ten times that of the Earth, even though, ironically, we do not have one in our Solar system!