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The ancestor philosophers' dream of thousand of new world is finally realised: more than 1800 extrasolar planets have been discovered in the neighborhood of our Sun. Most of them are very different from those we used to know in our Solar System. Others orbit their parent star inside the belt known as Habitable Zone (HZ) where a rocky planet with the right clime could have the availability of liquid water on its surface. Those planets, in HZ or not, will be the object of observation that will be performed by new instrumentation space- and ground-based.

Space missions, as JWST and the very recently proposed ARIEL (ESA M-Class Mission), or ground based instruments, like SPHERE@VLT, GPI@GEMINI and EPICS@ELT, have been proposed and built to measure the atmospheric transmission, reflection and emission spectra over a wide wavelength range.

Exoplanets are unique objects in astronomy because they have local counterparts—the Solar System planets—available for comparative planetology studies but also really interesting outsider case like Super Earths. In our own system, proto-planets evolution was flanked by an active prebiotic chemistry that brought to the emergency of life on the Earth. The search for life signature requires as first step the knowledge of planet atmospheres, main objective of future exoplanetary space explorations. Indeed, the quest for the determination of their chemical composition is of much larger value than suggested by the specific case. It opens out to the more general speculation on what such detection might tell us about the presence of life on those planets. As, for now, we have only one example of life in the universe, we are bound to study terrestrial organisms to assess possibilities of life on other planets and guide our search for possible extinct or extant life on other planetary bodies.

The planet atmosphere characteristics and possible biosignatures will be inferred by studying such composite spectrum in order to identify the emission/absorption lines/bands from atmospheric molecules such as water (H_2O), carbon monoxide (CO), methane (CH_4), ammonia (NH_3) etc. In particular, it is important to know in detail the optical characteristics of gases in the typical physical conditions of the planetary atmospheres and how those characteristics could be affected by radiation driven photochemical and biochemical reaction. Insights in this direction can be achieved from laboratory studies of simulated planetary atmosphere of different pressure and temperature conditions under the effects of radiation sources, used as proxies of different bands of the stellar emission. A number of Italian Astronomical Observatories and Astrophysical institutes (OAPD, OAPA, IAPS) together with the INFN, the Biology Departments of the second University of Rome and the Biology Department of the University of Padova, the LUXOR laboratory of the CNR-IFN and the Department of Engineering of Information of the Padova University gave life to a collaboration in order to share their experience in performing laboratory experiments on several items concerning extrasolar planet Atmospheres. In this paper we describe the scientific case, the net of institutes and their main activities that go under the name of "Atmosphere in a Test Tube".