

A space-based laser-frequency comb for absolute cross-calibration of EPRV spectrographs
Francesco Pepe
University of Geneva

The accuracy of state-of-the-art EPRV spectrographs depends on the access to extremely precise and stable wavelength calibration sources. There are several available calibration sources (e.g., emission lamps, laser frequency combs, reference cavities) that can be used to calibrate an astronomical spectrograph. However, the calibration as it is currently performed is always 'local' with the following consequences:

- 1) Wavelength calibration of most of astronomical spectrographs is 'precise'. While for some of the exoplanet study aspects wavelength calibration in relative terms is sufficient, other investigations, such as the detection of Earth analogues requires a long-term repeatability that can only be assured by 'accuracy', i.e., if the spectrograph is calibrated in absolute terms.
- 2) The vast majority of astronomical spectrographs lacks a common wavelength reference. This signifies that the data taken by one spectrograph cannot directly be compared nor directly combined with data taken by another spectrograph. This impedes possibilities for performing long-term measurements simultaneously by several spectrographs in order to increase the measurement sensitivity, time sampling or time span.
- 3) The usual scheme for spectrograph calibration requires that somewhere along the optical path from the telescope to the spectrograph a light from the calibrator is injected to calibrate the latter. Consequently, only a part of the optical path. Any error introduced in the path before the injection of the calibrator (atmosphere and telescope front-end) is not monitored, which may lead to additional unwanted effects in the scientific data that cannot be identified nor corrected for.

In this talk I will present the vANCESTOR concept that will address the above-mentioned issues with the wavelength calibration of astronomical spectrographs by embarking an optical frequency comb on-board a satellite equipped with an actively pointing telescope and precision orbitography. This calibration satellite shall be available and serve EPRV spectrographs in *all* major observatories around the world.