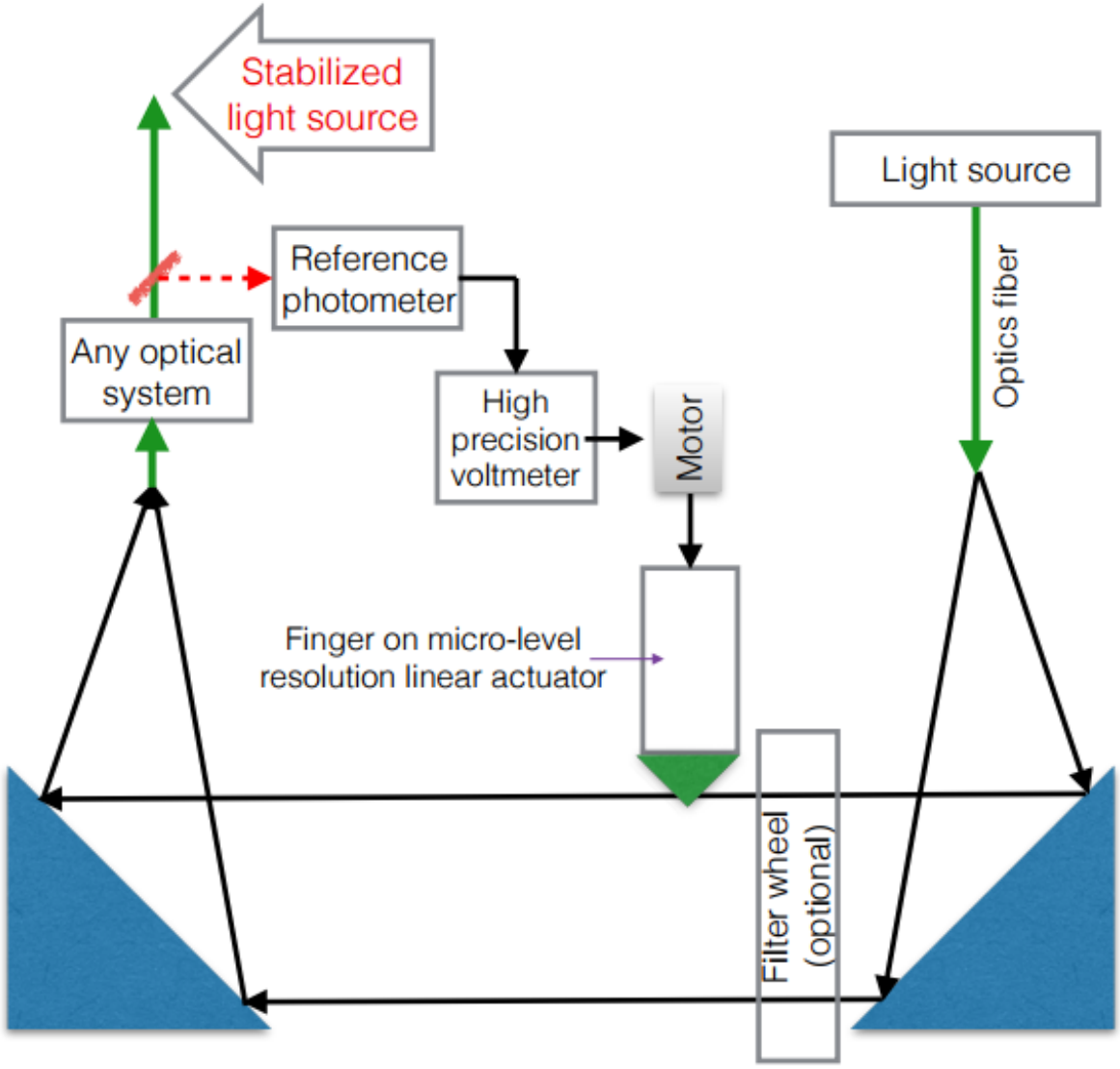
The most stable source of light in the world

September 30 2015



In order to be able to detect planets comparable to Earth, the CHEOPS satellite, which will be sent into orbit at the end of 2017, must be able to measure the luminosity of a star with inimitable accuracy. In order to test CHEOPS detectors researchers need a stable source of light. However there was no instrument capable of producing a light source with sufficient stability to be used as a reference… until today. A team from the University of Geneva (UNIGE), Switzerland, has just filed for a European patent.

Designed by Swiss researchers and built by the University of Berne, the CHEOPS satellite's mission will be to study exoplanets that have already been identified and which are located close to our solar system. Thanks to high-precision photometry, the satellite will detect the passage (transit) of a planet in front of its star, by measuring the latter's diminishing luminosity at that precise moment. Scientists will thus be able to deduce the diameter of the exoplanet under observation.

In order to detect planets similar to planet Earth, the satellite must therefore be able to measure the luminosity of a star with exceptional stability (0.002%). CHEOP's sensors must be tested using a source of light whose stability is ten times superior than that demanded by the satellite itself. Since no existing light source could guarantee this level of stability, UNIGE engineers and technicians and the PlanetS national research center designed a brand-new instrument, which produces the most stable light source in the world. Unlike other procedures, which stabilize light at its source, the system developed in Geneva modifies the intensity of a beam of light. By activating a "mobile finger", which more or less obscures the beam of light, the intensity and finally the stability of the light can be modulated.

"We have presented our instrument to the American leaders of the TESS mission, a satellite researching exoplanets, and they were so enthusiastic that they ordered one from us," said François Wildi, engineer in

UNIGE's Department of Astronomy, and member of PlanetS.

Having proved themselves in the laboratory setting, thanks to the stable light source, the CHEOPS detectors will then be tested – using the same source, in space conditions, in a University of Berne simulation tank whose temperature variations reflect those that the satellite will encounter in space.

Provided by University of Geneva