LECTURE 2

In Lecture 2, we treat **our Sun** as a star seen though space telescopes, telescopes dedicated to the **search of extrasolar planets** and **precision galactic astronomy.**

Our Sun has been and is being observed by dedicated space telescopes, aimed at understanding its surface and corona physics, by looking at them at various wavelengths. NASA's ACE has filmed splendid images of energy release from the Sun's surface, while ESA/NASA's SOHO has looked at the global Sun under many points of view (including helioseismology), gathering spectacular evidences for Coronal Mass Ejections. It has also proven to be an excellent comet hunter, with more then 1000 comets discovered as they swing around (or fall into) the Sun. The future (2017?) ESA SOLAR ORBITER mission will go inside Mercury's orbit for a truly close-up view of our Sun.

Studying **our immediate galactic neighbourhood** will be the topic of
- CNES's (with ESA support) COROT mission, dedicated to precise photometry af bright stars in the optical and to be launched later this year. This will allow both for precise measurement of astroseismology and other stellar properties, but also for the search of extrasolar planets.
- NASA's KEPLER will have similar aims, and a somewhat better sensitivity, a few years later.
- Much later, ESA is thinking (with NASA) to apply long-distance optical interferometry to a cluster of three space telecopes, the DARWIN mission. It will aim for extremely accurate imaging and spectroscopy (in the optical) of possible planetary companions of nearby stars, going down to terrestrial masses. Obviously, spectroscopy of any atmosphere discovered around such planets could be decisive in the **search for extraterrestrial life**.

Astrometry in our galactic environment has been a European success with the HIPPARCOS ESA mission of more then a decade ago. ESA is now planning to launch in 2011 GAIA, an advanced space telescope dedicated to microarcsecond positioning of stars to magnitudes so faint (20^{th}?) as to collect data for a **billion stars** and thus construct a complete 3-D view of our Galaxy, its structure, its stellar population content and much more, including tens of thousands of extrasolar planets.
(in all, 8 space optical telescopes will be reviewed)