A PAthway towards the Characterization of Habitable Earths: the APACHE project

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APACHE is a project to undertake a long-term northern-hemisphere photometric survey to search for **transiting low-mass planets** orbiting a well-defined sample of **M dwarf stars** in the solar neighborhood.
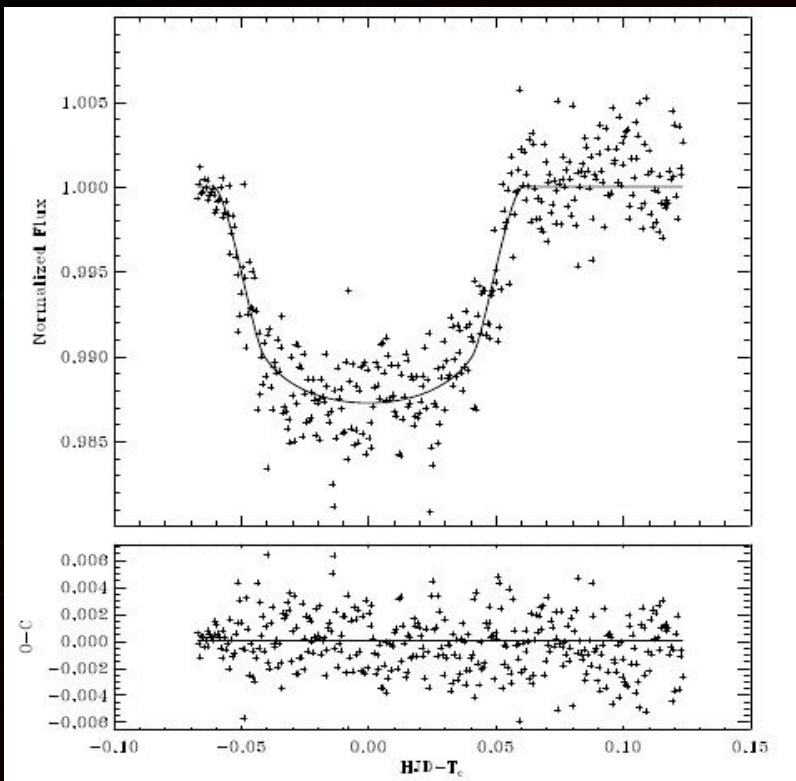
The main goals are:

The discovery and characterization of rocky planets in the *habitable zone* or, alternatively, constraining their occurrence rate;

The possibility to undertake in-depth characterization of the microvariabilty properties of a statistically significant sample of M dwarf stars

APACHE will monitor photometrically ~3500 nearby (d<40 pc) M dwarfs using an array of robotic telescopes at the **Astronomical Observatory of the Autonomous Region of the Aosta Valley** (OAVdA)
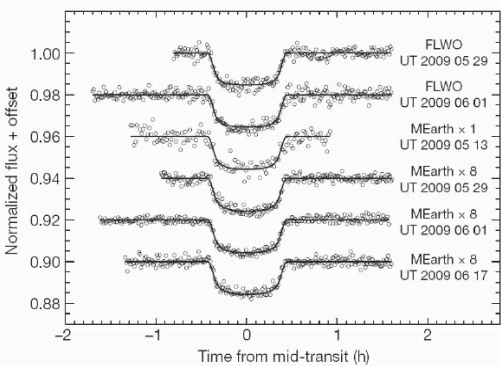
Transit of Wasp-3b (07/28/2009)

Crossing fingers!

GJ 1214b: the first super-Earth discoverd by the MEarth Observatory

Mass = 6.55 M_{Earth}
Radius = 2.68 R_{Earth}
Period = 1.58 days

How it started: a feasibility study, ended in August 2009 and aimed at characterizing the site using the available instrumentation (two 25 cm and a 40 cm telescopes), demonstrated that the OAVDA is a suitable location where the APACHE survey can be carried out.
Full details on the site testing study can be found in Damasso et al. 2010 (PASP accepted, arXiv:1007.0252)

What we have now: a pilot study, started in December 2009 and aimed at photometrically monitoring ~40 M Dwarfs with accurate parallaxes (d < 25 pc) determined in the course of the Torino Observatory Parallax Program, using full-time the 40 cm and 25 cm telescopes. The goal is a preliminary characterization of the intrinsic variability in relationship with the spectral type (M0-M8).

The way forward: the APACHE survey. This implies the construction of a robust hardware/software infrastructure to manage the telescopes and to perform real-time photometry for real-time alerts. This could guarantee the best phase-coverage during a 3/4-year hunting period.