• What is CARMENES? It stands for Calar Alto high Resolution search for M dwarfs with Exo-earths with a Near-infrared Echelle Spectrograph. It is a next-generation instrument to be designed, built, integrated and operated by a consortium of nine German and Spanish institutes and universities (see above). CARMENES is expected to share the prime focus of the Calar Alto 3.5 m telescope after 2013 with the extreme multiplexing spectrograph XMS. Our main objective is finding habitable exoplanets around M dwarfs, but we also aim at investigating the activity of M dwarfs, searching for exoplanets around GK giants and using asteroseismology to refine parameters of exoplanet host stars.

• The instrument as a whole. CARMENES will be fiber-fed from a front-end in the telescope prime focus. The three cross-dispersed echelle spectrograph channels (NIR, VIS, MOS; see below) will be thermally and mechanically stabilized in the Coudé room of the 3.5 m telescope. We will cover from 500 to 1800 nm with a radial velocity accuracy goal of 3 m/s.

• The near-infrared (NIR) channel. Thanks to an optical design with a mosaic of two 2k x 2k NIR detectors and an R2.9 echelle grating, we will cover from 950 (Y band) to 1800 nm (H band) with a spectral resolution R = 85000 in 31 echelle orders. The cross-disperser will be two S-NPH prisms. Most of the opto-mechanical components of the NIR channel will be located inside a vacuum tank at T = −30ºC. The channel will need an image slicer and an image scrambler. [left: 3D NIR optical conceptual design]

• The visible (VIS) channel. The relatively simple design of the VIS channel, which will cover from 500 to 900 nm with R = 60000 in 42 echelle orders, will be based on the FEROS one. The simulatenous observations of the NIR and VIS channels will allow us to discriminate between activity-induced and planet-induced radial-velocity variations. [left: VIS spot diagram]

• The multiobject (MOS) visible channel. With practically no extra telescope time, we will make use of the ~0.8deg² field of the 3.5 m telescope to acquire the spectra of 12-14 bright stars, mostly G and K giants, during the M dwarf observations. [left: MOS optical conceptual diagram]

• The front-end. This subsystem will be mounted in the telescope primary focus at the output of the K3 corrector. It will contain the mask exchanger for XMS and the fibre positioners for the CARMENES NIR, VIS and MOS channels. Our primary channels (NIR and VIS) require two fibers each: one for the object and one for a ThAr lamp or sky. [left: front-end layout]

• The remaining subsystems. The extensive documentation prepared for the Conceptual Design Review contains a wealth of technical information on additional subsystems and items, such as instrument electronics and software, data analysis and reduction, auxiliar opto-mechanical systems, detectors and dewars, wavelength calibration strategy, cryogenics... [left: NIR system configuration]

• Our URL. www.ucm.es/info/Astrof/carmenes