

CARMENES

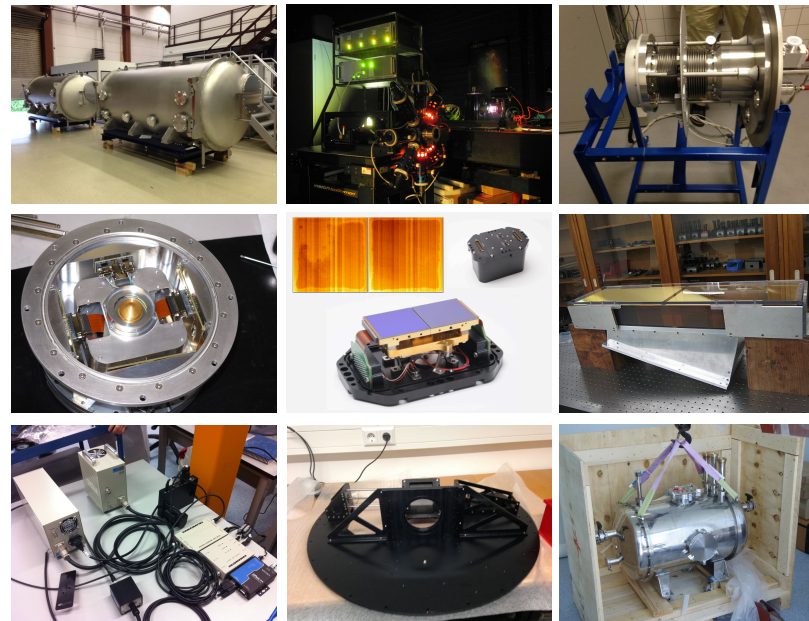
Manufacturing, assembly, integration and verification of the instrument and preparation of the input catalogue



A. Quirrenbach³, J. A. Caballero¹⁰, P. J. Amado², R. Mundt¹, I. Ribas⁴, A. Reiners⁵, M. L. García-Vargas¹², A. Pérez-Calpena¹², W. Seifert³, M. Azzaro¹¹, S. Bercerri², V. J. S. Béjar⁶, S. Dreizler⁵, D. Galadí¹¹, L. Gesa⁴, E. W. Guenther⁷, H.-J. Hagen⁹, H. Mandel³, D. Montes⁸, O. Stahl³ and the CARMENES Consortium^{1,2,3,4,5,6,7,8,9,10,11} (<http://carmenes.caha.es/>)

¹Max-Planck-Institut für Astronomie • ²Instituto de Astrofísica de Andalucía • ³Landessternwarte Königstuhl • ⁴Institut de Ciències de l'Espai • ⁵Institut für Astrophysik Göttingen • ⁶Instituto de Astrofísica de Canarias • ⁷Thüringer Landessternwarte Tautenburg • ⁸Universidad Complutense de Madrid • ⁹Hamburger Sternwarte • ¹⁰Centro de Astrobiología • ¹¹Centro Astronómico Hispano-Alemán – Calar Alto Observatory • ¹²FRACTAL S.L.N.E.

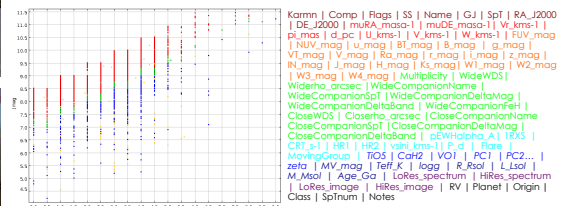
CARMENES is a next-generation radial-velocity instrument under construction for the 3.5 m telescope at the Calar Alto Observatory by a consortium of eleven Spanish and German institutions. It consists of two separate échelle spectrographs, NIR and VIS, covering the wavelength range from 0.55 to 1.70 μm at a spectral resolution of $R \approx 82,000$, fed by fibers from the Cassegrain focus of the telescope. CARMENES passed its final design review in February 2013. We discuss critical design decisions, present the final design, and report on the ongoing MAIV phase of the project. CARMENES will conduct a radial-velocity survey of 300 M dwarfs with a precision sufficient for detecting Earth-like planets in their habitable zones. A database of M stars, dubbed CARMENCITA, has been compiled from which the CARMENES sample will be selected. CARMENCITA contains information on all relevant properties of the potential targets. Dedicated imaging, photometric, and spectroscopic observations are underway to provide crucial data on these stars that is not available in the literature.



Recent pictures of some key CARMENES component. From top left: the two NIR and VIS vacuum tanks, one of the two calibration units (VIS), detector cooling-flow cryostats (VIS), detector heads (NIR), detector (NIR), échelle gratings (VIS), exposure-meter electronics (NIR), Cassegrain-focus front-end mechanics and the nitrogen-gas preparation unit for cooling the NIR channel.

Critical design decisions:

- Mosaic of two 2kx2k Hawaii 2RG detectors with cut-off at 2.5 μm
- Nitrogen-gas preparation unit for keeping the NIR channel at $T = 140.00 \pm 0.07$ K; the VIS channel operates at ambient temperature
- Octagonal fibers for scrambling and shakers for reducing modal noise, especially in the H band
- Daily, master and supermaster Th-Ne (VIS) and U-Ne (NIR) hollow-cathode lamps and two Fabry-Pérot etalons for ultra-stable wavelength calibration
- Project management and system engineering strengthened through a contract with a private company
- Schedule: commissioning of front-end in Calar Alto in Jan 2015, of VIS spectrograph in Fall 2015, of NIR spectrograph in Winter 2015, start of science survey in Jan 2006



CARMENCITA: the CARMENES input catalogue. Our list contains the ~2100 brightest M dwarfs for its spectral type observable from Calar Alto (top left), and dozens of astrophysical parameters for each of them (astrometry, photometry, spectroscopy, multiplicity, activity...; top right). During the 600 clear nights of guaranteed time, we will observe the 300 brightest, least active, latest, single M dwarfs in CARMENCITA. See the CS18 posters by Alonso-Floriano, Cortés-Contreras and Montes for details.

