RIA-AstroMadrid **5.**
Multiplicity of M dwarfs with IAC80

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With the help of CARMENCITA, the CARMENES Cool dwarf Information and daTa Archive, we investigate the membership in double, triple or higher-order multiplicity systems of 54 pairs with at least one M dwarf in the solar neighbourhood observable from Calar Alto. We measure angular separations and parallactic angles form low-resolution images taken with TCP and CAMELOT at the IAC80 telescope at the Observatorio del Teide (Fig. 1), and compared them with those from the Washington Double Star Catalogue and other bibliographic sources in order to analyze their evolution over time (Fig. 2). We perform our own astrometric analysis with public astrometric catalogues and photographic plate digitisations for nine controversial pairs. We confirm the physical binding of 52 pairs for which we provide projected physical separations (Fig 3.), individual masses, reduced orbital periods and binding energies (Fig. 4). Studying M dwarfs in multiple systems provides information on a wealth of topics, e.g. from dynamical masses, through distance and metallicity, to the formation and evolution of weakly bound systems.

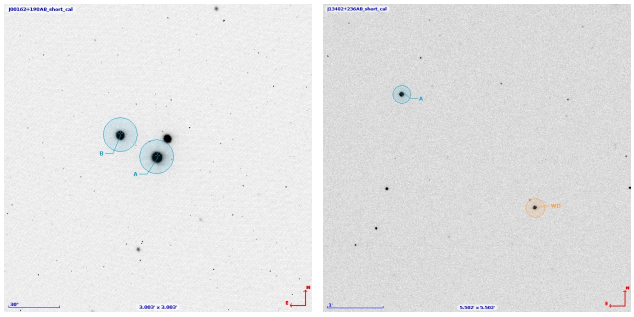

Fig. 1. *R*-band images of two of our pairs observed with TCP (left) and CAMELOT (right). The secondary in the right panel (orange circle) is a white dwarf.

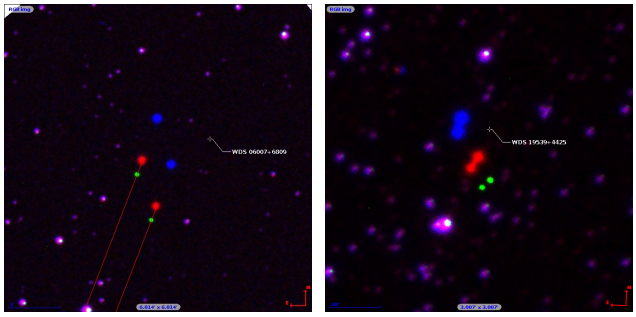

Fig. 2. False-color composite images of two of our (high) common proper-motion pairs (blue: POSS-I ~1950, red: POSS-II ~1990, green: IAC80 ~2012). The right panel shows a clear relative movement, which is useful to track orbital variations of V1581 Cyg Aab and B.

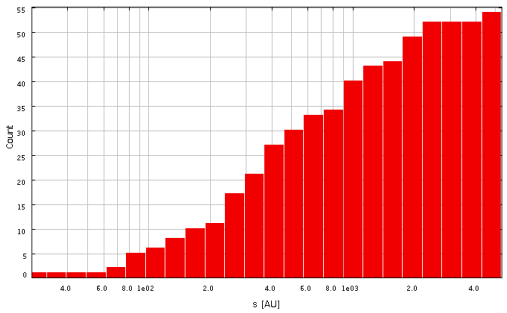

Fig. 3. Cumulative projected physical separations in logarithmic scale, *s*, in the range from 30 to 5000 AU.

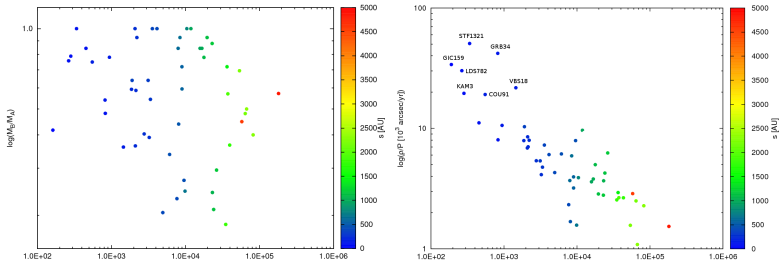

Fig. 4. **Left:** Mass ratio M_B/M_A vs. period *P*. **Rigth:** ρ/P vs. P in logarithmic scale. The seven pairs over the gap at log(ρ/P) = 1.1, identified with the WDS discovery code, show rapid orbital variations and will be further studied in detail. In both panels, colour bar indicates projected physical separations.

Results • Updated projected physical separations and position angles of 52 confirmed physical pairs, which provide information about its absolute and relative motions • Basic astrophysical parameters for these 52 pairs: spectral types, heliocentric distances, individual masses, periods and binding energies • Five wide pairs weakly bound: 1 in a triple system, 2 with white dwarfs companions • Nine pairs with reduced orbital periods less than 1000 yr • Seven pairs with rapidly changing orbital variations for further study

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