

Early-type stars in the core of the young open cluster Westerlund 2

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The properties of the early-type stars in the core of the Westerlund 2 cluster are examined in order to establish a link between the cluster and the very massive Wolf-Rayet binary WR20a as well as the H II complex RCW49. Photometric monitoring as well as spectroscopic observations of Westerlund 2 are used to search for light variability and to establish the spectral types of the early-type stars in the cluster core. The first light curves of the eclipsing binary WR20a in B and V filters are analysed and a distance of 8 kpc is inferred. Three additional eclipsing binaries, which are probable late O or early B-type cluster members, are discovered, but none of the known early O-type stars in the cluster displays significant photometric variability above 1% at the 1- σ level. The twelve brightest O-type stars are found to have spectral types between O3 and O6.5, significantly earlier than previously thought. The distance of the early-type stars in Westerlund 2 is established to be in excellent agreement with the distance of WR20a, indicating that WR20a actually belongs to the cluster. Our best estimate of the cluster distance thus amounts to 8.0 ± 1.4 kpc. Despite the earlier spectral types, the currently known population of early-type stars in Westerlund 2 does not provide enough ionizing photons to account for the radio emission of the RCW49 complex. This suggests that there might still exist a number of embedded early O-stars in RCW49.

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