## Wide-field CCD Photometry of $\omega$ Centauri and Its RR Lyrae Stars

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We present wide-field and high-precision *BV* and *Ca & Stromgren by* photometry of $\omega$ Centauri and its RR Lyrae stars, which represents one of the most extensive photometric surveys to date for this cluster. The member stars of $\omega$ Cen are well discriminated from foreground Galactic field stars from the different distributions in the *hk* [=(*Ca*-*b*)-(*b*-*y*)] vs. *b*-*y* diagram. The color-magnitude diagrams show the presence of several distinct red-giant branches (RGBs) with a red, metal-rich, sequence clearly separated from other bluer metal-poor ones. Comparison with our population models suggests the most metal-rich population is few billion years (~ 4 Gyr) younger than the most metal-poor population (see the poster by Ree et al.). From the comparison of the luminosity functions between metal-poor and metal-rich RGBs, we confirm the predicted location of the red clump, which is associated with the most metal-rich RGB stars and younger than the most metal-poor population, from our synthetic horizontal-branch models. We also present new *BV* photometry and *hk* metallicity measurements of RR Lyrae stars in this cluster, which confirms that the luminosity of RR Lyrae stars depends on evolutionary status as well as metallicity. From the presence of several distinct populations and the internal age-metallicity relation, we suggest $\omega$ Centauri was once part of a more massive system that merged with the Milky Way, as the Sagittarius dwarf galaxy is in the process of doing now.