

# Optical redshift and richness estimates for galaxy clusters selected with the Sunyaev-Zel'dovich effect from 2008 South Pole Telescope observations

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We present redshifts and optical richness properties of 21 galaxy clusters uniformly selected by their Sunyaev-Zel'dovich (SZ) signature. These clusters, plus an additional, unconfirmed candidate, were detected in a 178 deg<sup>2</sup> area surveyed by the South Pole Telescope (SPT) in 2008. Using griz imaging from the Blanco Cosmology Survey and from pointed Magellan telescope observations, as well as spectroscopy using Magellan facilities, we confirm the existence of clustered red-sequence

galaxies, report red-sequence photometric redshifts, present spectroscopic redshifts for a subsample, and derive R 200 radii and M200 masses from optical richness. The clusters span redshifts from 0.15 to greater than 1, with a median redshift of 0.74; three clusters are estimated to be at  $z > 1$ . Redshifts inferred from mean red-sequence colors exhibit 2% rms scatter in  $\Delta z/(1+z)$  with respect to the spectroscopic subsample for  $z > 1$ . We show that the M200 cluster masses derived from optical richness correla