

DEEP HST IMAGING OF A GALAXY CLUSTER AT  $z=2.40$ 

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We present a 67-orbit HST/WFPC2 exposure on the weak radio galaxy 53W002 at  $z=2.390$  and its surrounding cluster. Color Plate 1 shows 12 orbits in  $I_{F814W}$  &  $V_{F606W}$ , and 24 in  $B_{F450W}$ . Potential cluster members were identified through 15 orbits in  $F410M$ , optimized for narrow-band searches for compact  $Ly\alpha$  objects at  $z \simeq 2.4$  (P96), and confirmed through spectroscopy (W91, P96); 16 candidates were found with significant narrow-band emission in  $F410M$ : 4 out of 5 had a confirming MMT spectroscopic redshift at  $z \simeq 2.40$  (P96). All are located within  $60''$  from 53W002, or  $\sim 0.24 h_{100}^{-1}$  Mpc ( $q_0=0.5$ ) at  $z \simeq 2.4$ , the physical scale of a group or small galaxy cluster. One object contains a weak (variable) AGN, another is a merger with two companions. Their underlying young stellar population is very compact, with  $r_{h.l.} \simeq 0.2''$  ( $\simeq 0.8 h_{100}^{-1}$  kpc), and considerably fainter than the  $L^*$ -value at  $z \simeq 2.4$ , implying sub-galactic sized objects. These results may explain why ground-based  $Ly\alpha$  searches for PG's have been largely unsuccessful. The narrow-line galaxy 53W002 was imaged in the  $PC$  at  $\sim 0.07''$  FWHM (WK95, see also W94). Its AGN component is  $\leq 20 \pm 4\%$  of the total continuum, surrounded by an extended  $r^{1/4}$ -envelope with  $r_{h.l.} \simeq 1.1''$  (4.3 kpc), and has an SED of  $\sim 0.3$  Gyr in the center to  $\sim 0.5$ – $1.0$  Gyr at  $\sim 4$  kpc. A *one-sided* cloud is seen  $\sim 1.8$  kpc West,  $\sim 0.3$  mag bluer than the SED, aligned with the radio source and its  $Ly-\alpha$  cloud, presumably weak scattered AGN light, and/or jet-induced star-formation.

**References**

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**Plate 1.** True color image of our 48-orbit Cycle 4-5 HST/WFPC2 exposure in *both*  $B_{F450W}$  (16 hours; blue gun),  $V_{F606W}$  (5.7 hours; green), and  $I_{F814W}$  (5.7 hours; red).  $V$  was rotated by  $-6.721^\circ$  to match the  $B$ - and  $I$ -exposures, resulting in slanted borders. North is  $39.7^\circ$  counterclockwise from vertical. This WFPC2 image is  $64 \times 64''$ , has  $0.07''$  resolution (FWHM) and a  $3\text{-}\sigma$  point source sensitivity of  $R \cong 29.3$  mag. Objects labelled A, B, C, etc., are candidate cluster galaxies at  $z \cong 2.40$  with significant excess in the WFPC2  $Ly\alpha$  filter (Pascarella *et al.* 1996). Object 53W002 (not visible here) plus object A, B, and E are spectroscopically confirmed at  $z \cong 2.40$ .