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Discovery of [OII] Blobs: A Clue to a Feedback/Star-Formation Quenching Process at High Redshifts

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We have discovered 12 galaxies at $z \sim 1.2$ in SXDS field showing a largely extended (> 30 kpc) [OII] nebula, which we call [OII] blobs (OIIBs). Some of these galaxies are probably experiencing the final phase of star formation with their gas heated and expelled out by AGN/supernova feedback, and quenching star formation whose process is a key to produce passively-evolving ellipticals. One of 12 OIIBs is a giant OIIB with a spatial extent over 75 kpc, which hosts an obscured type-2 AGN. The ongoing outflow process in this object is confirmed by VLT/VIMOS optical spectroscopy with an outflow velocity of 500–600 km/s, suggesting that a major heating source of this giant blob is AGN or associated shock excitation rather than supernova feedback. Other OIIBs do not show clear AGN activity, but our spectroscopy confirms a moderate outflow with a velocity of ~ 200 – 300 km/s, suggesting that the outflow of these OIIBs is driven by star formation. The number density of OIIBs with AGN is $5 \times 10^{-6} \text{ Mpc}^{-3}$ comparable with that of AGN driving outflow at the similar redshift. Meanwhile, the number density of all OIIBs including no AGN hosting galaxies is $6 \times 10^{-5} \text{ Mpc}^{-3}$, indicating that 3% of star-forming galaxies at $z \sim 1$ are quenching star formation through outflows involving spatially extended [OII] emission.