SPHEREx

Telescope $d = 20\text{ cm} = 0.20\text{ m}$

wavelengths $0.75 - 5.0\ \mu m$

→ resolution diff

$\lambda = 0.75\mu$ $\quad \theta_c = 1.22 \frac{0.75\mu}{0.20m} = 4.58 \times 10^{-6}$ rad

$= 0.94''$

$\lambda = 5.0\ \mu m$ $\quad \theta_c = 3.05 \times 10^{-5}$ rad

$= 6''.29$

(Note that SPHEREx's camera uses pixels 6" on a side)

MW Disk diam $w \approx 40$ kpc

$z = 1$ $\quad D_A = 1675$ Mpc $\rightarrow \theta_{MW} = \frac{40 \times 10^3}{1675 \times 10^6}$

$= 2.4 \times 10^{-5}$ rad

$= 4''.9$

$z = 3$ $\quad D_A = 1620$ Mpc $\rightarrow$ $4''.9$

$z = 8$ $\quad 1016$ $\rightarrow$ $3''.0$

At $z \geq 1$, even a big galaxy would appear as a small blob, at best. The light would nearly all fall within a single pixel.

Note that the apparent angular size does NOT decrease linearly with redshift; in fact, it doesn't shrink much at all, due to the curvature of space.