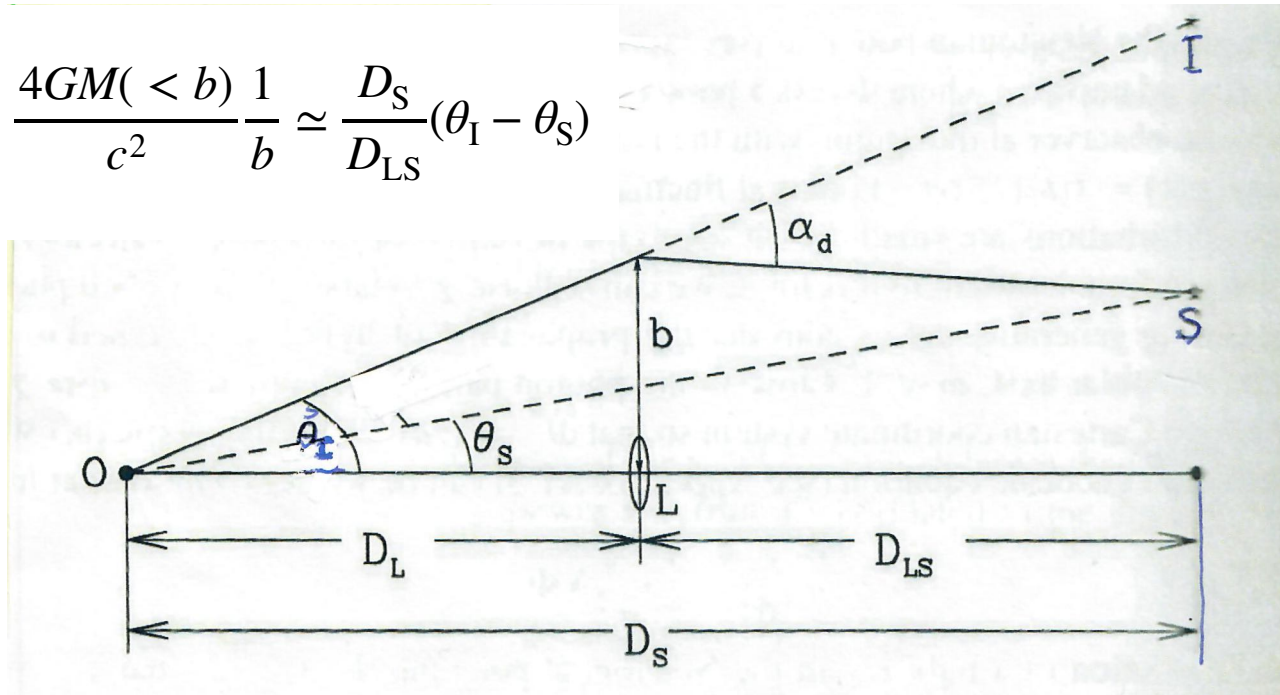


Lens Geometry

$$\alpha_d \simeq \frac{4GM(< b)}{c^2} \frac{1}{b} \simeq \frac{D_S}{D_{LS}} (\theta_I - \theta_S)$$



The "Cosmic Horseshoe" : $z=2.38$



Quadruply-lensed QSO



Lensing by foreground Elliptical galaxies:

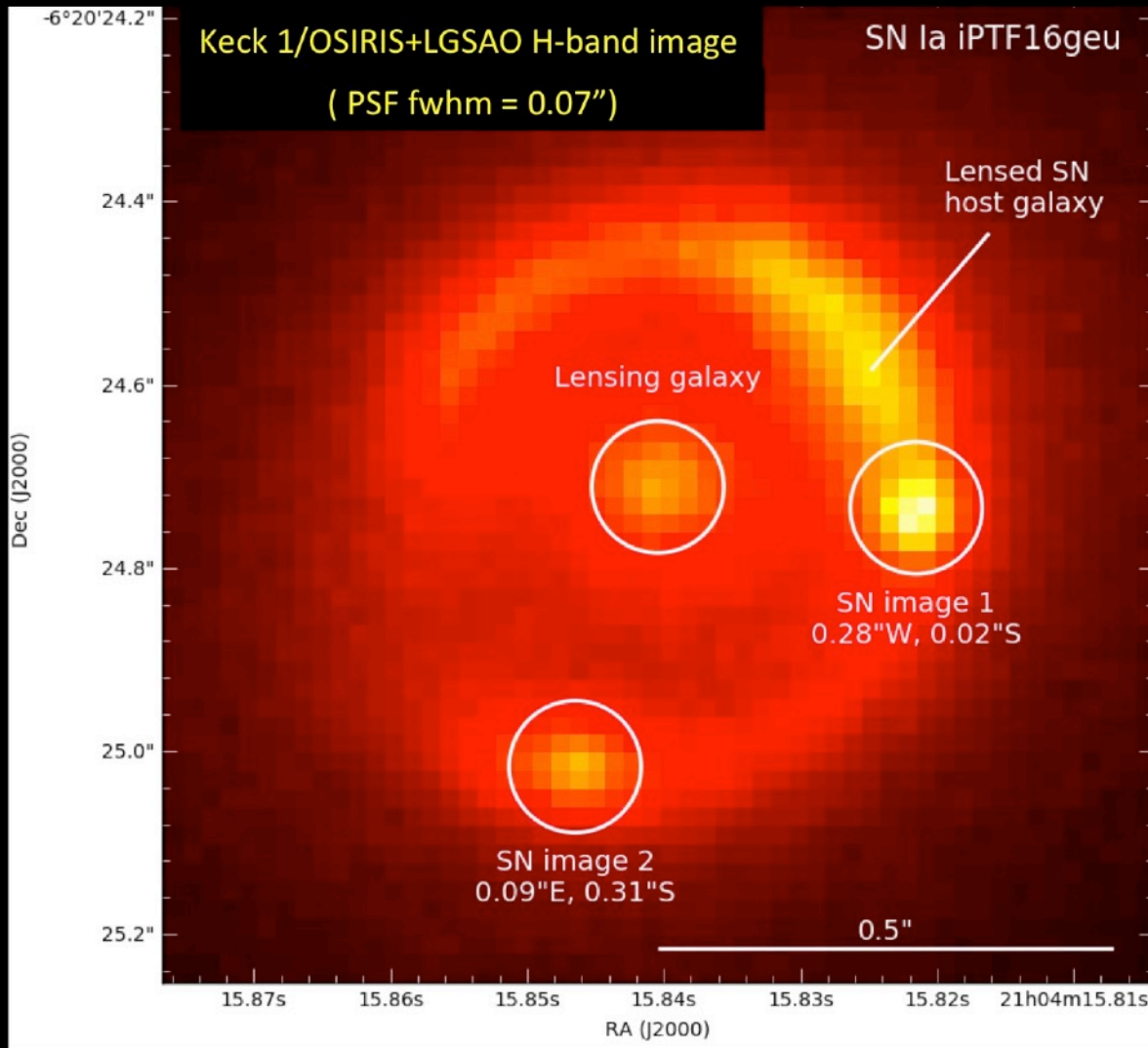


Lensing by foreground galaxy clusters



iPTF-16-geu: Lensed SN Ia

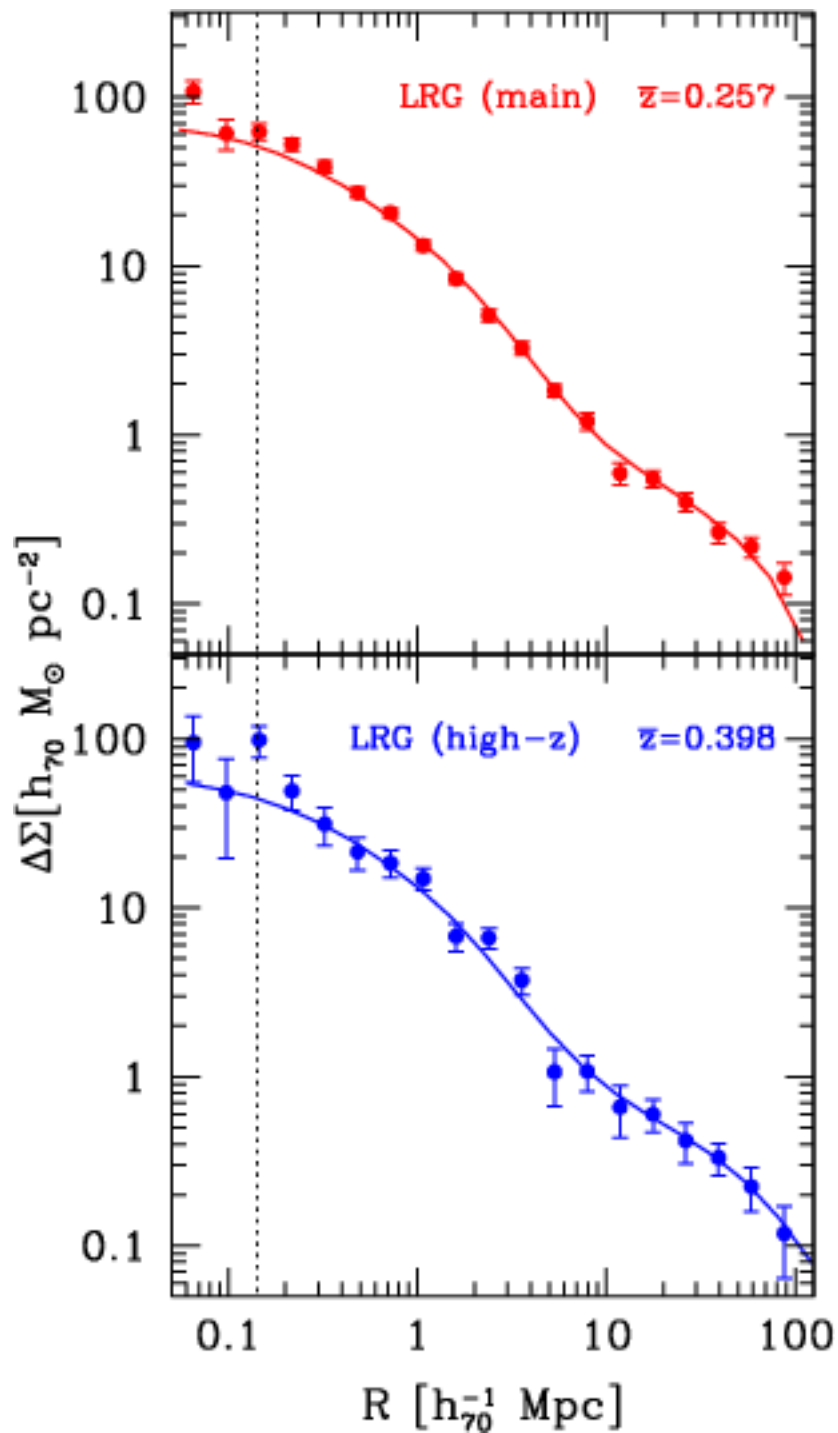
Goobar+2017, Science



$$z_L = 0.216$$

$$z_{SN} = 0.409$$

D. Law, C. Steidel + iPTF coll. 13 Oct 2016 UT



Weak lensing mass profiles around
“Luminous Red Galaxies” in the SDSS
LRG survey

Relative surface mass density vs.
projected distance.