Cosmology

PFS cosmology observe emission-line galaxies (ELG) from HSC over 1400 deg^2 at $0.6 < z < 2.4$

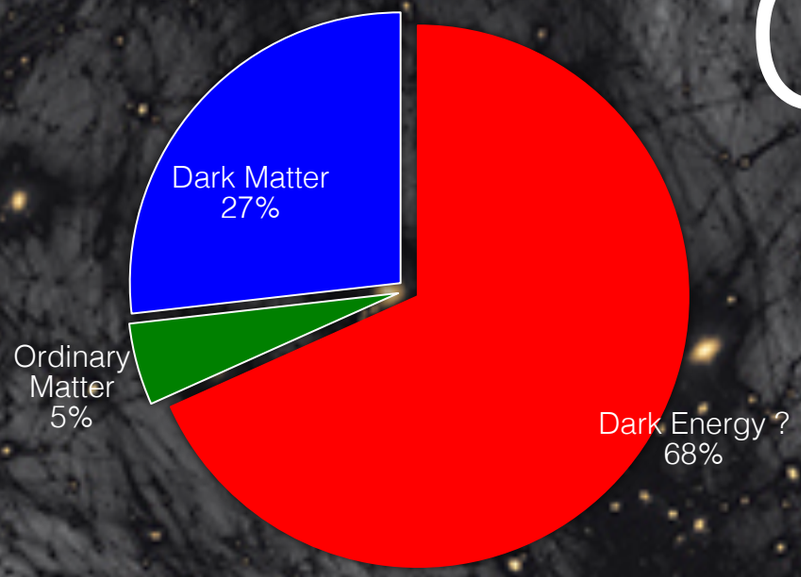
Goals:

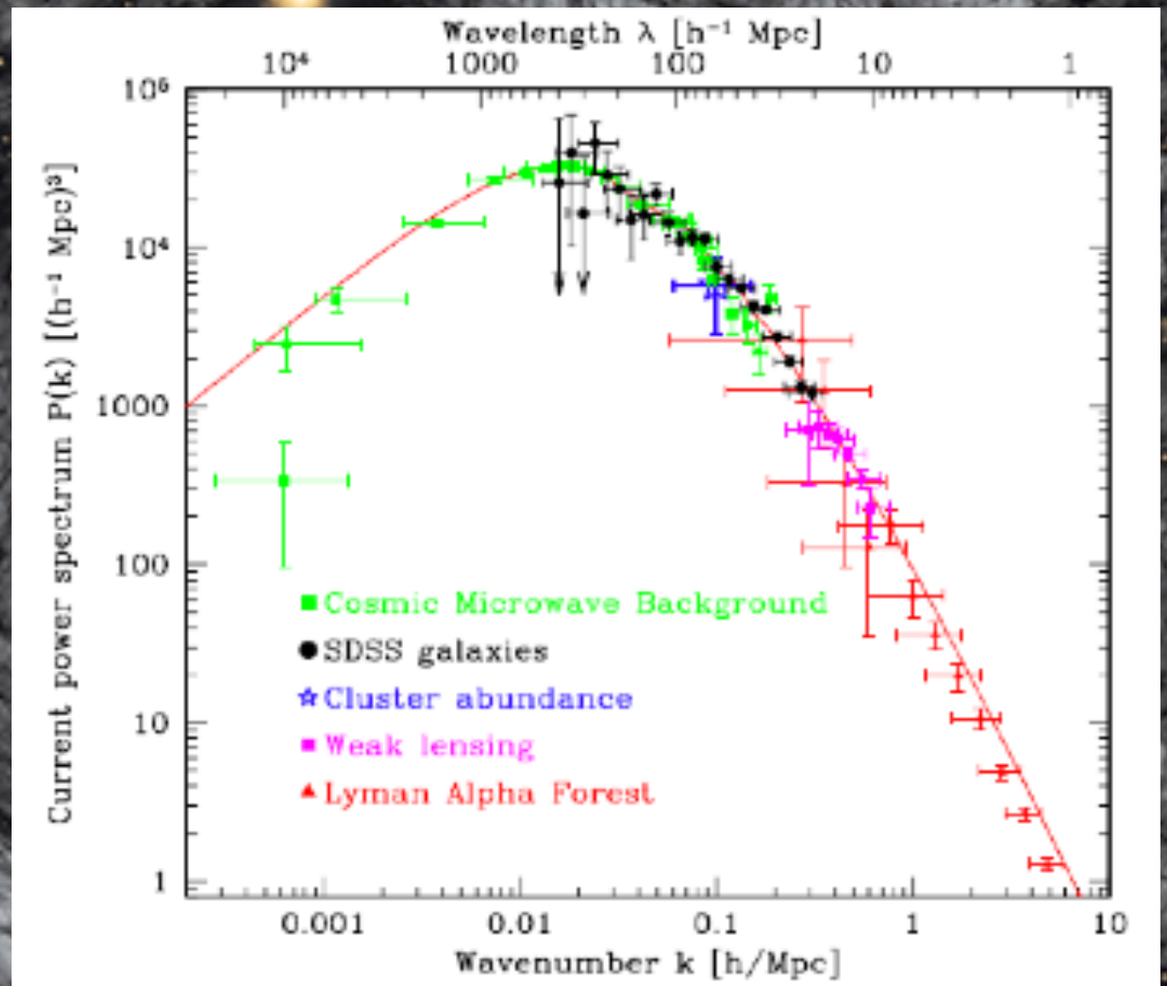
- **Neutrino mass**: Achieve the constraint of $\Sigma m\nu < 0.1$ eV, which is important threshold to determine the mass hierarchy of neutrinos

- **Dark energy/modified gravity**: Constrain the model of dark energy and/or gravity by measuring the distance and the growth rate of structure as a function of redshift

- **Investigate tensions** between Planck CMB and the large-scale structure, and between the low-z and high-z BAO

Cosmology





Tegmark et al. 2004, ApJ, 606, 702

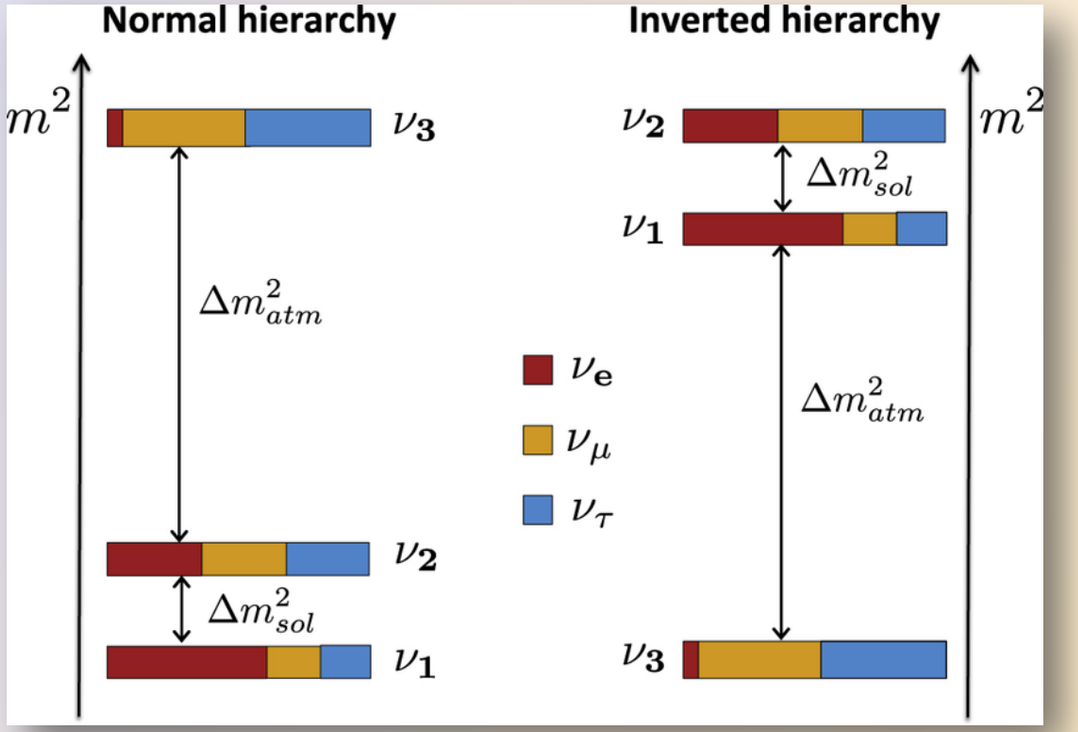
Cosmology

- Neutrino mass:

Achieve the constraint of $\Sigma m\nu < 0.1$ eV, which is important threshold to determine the mass hierarchy of neutrinos

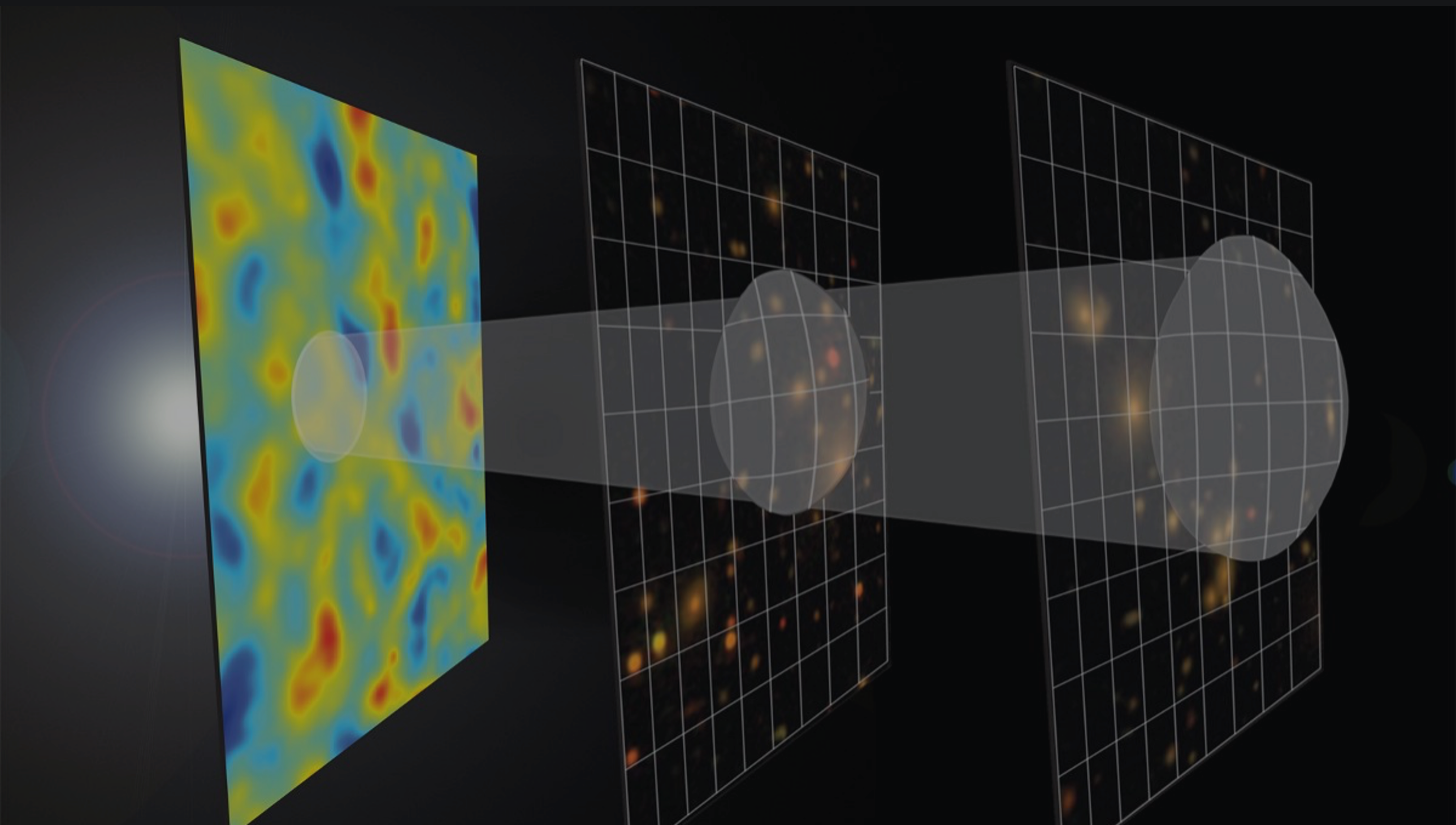
→ Rule out inverted mass hierarchy

$\Sigma m_\nu \sim 0.1$ eV

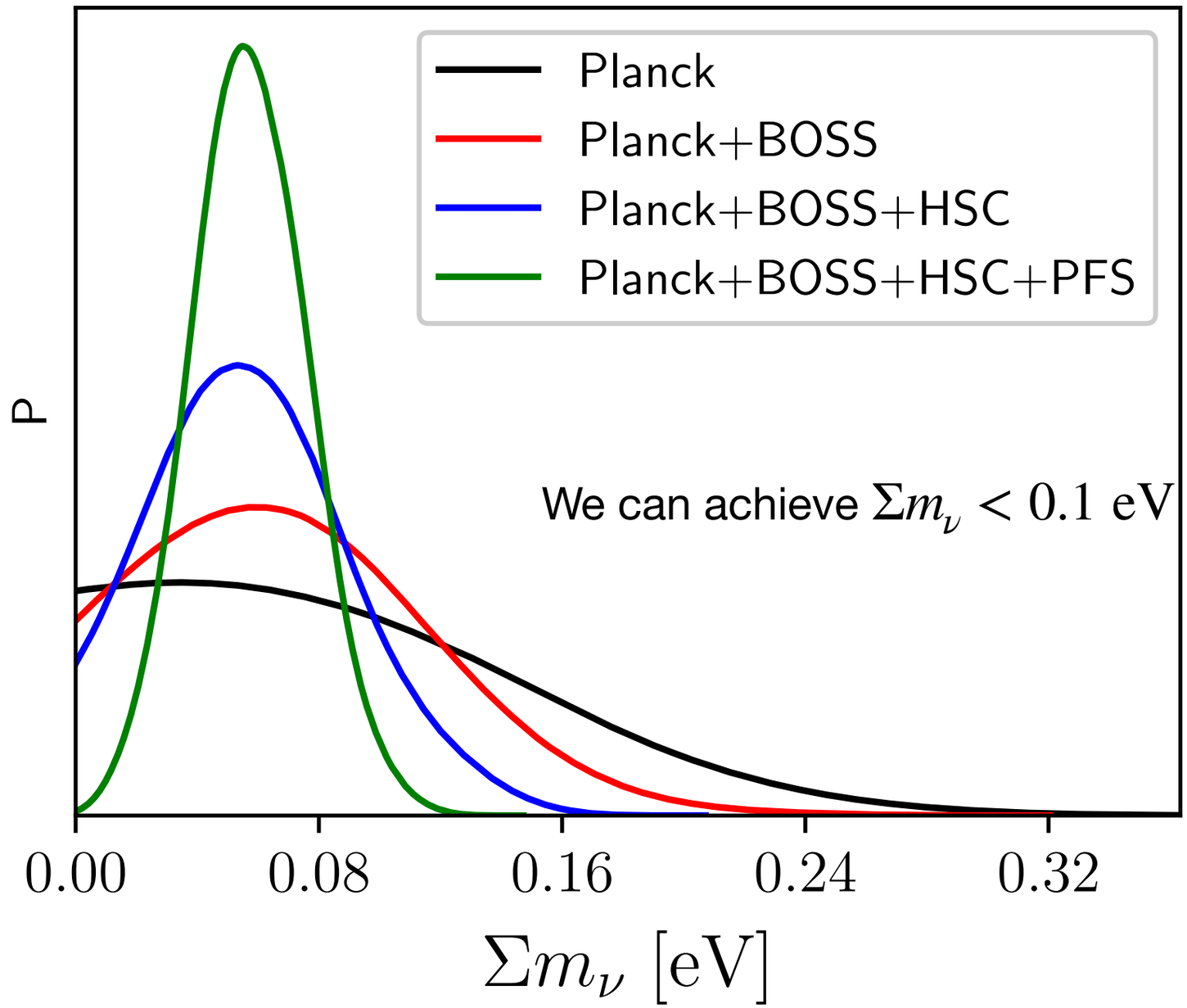


Growth of structure

Baryonic Acoustic Oscillations

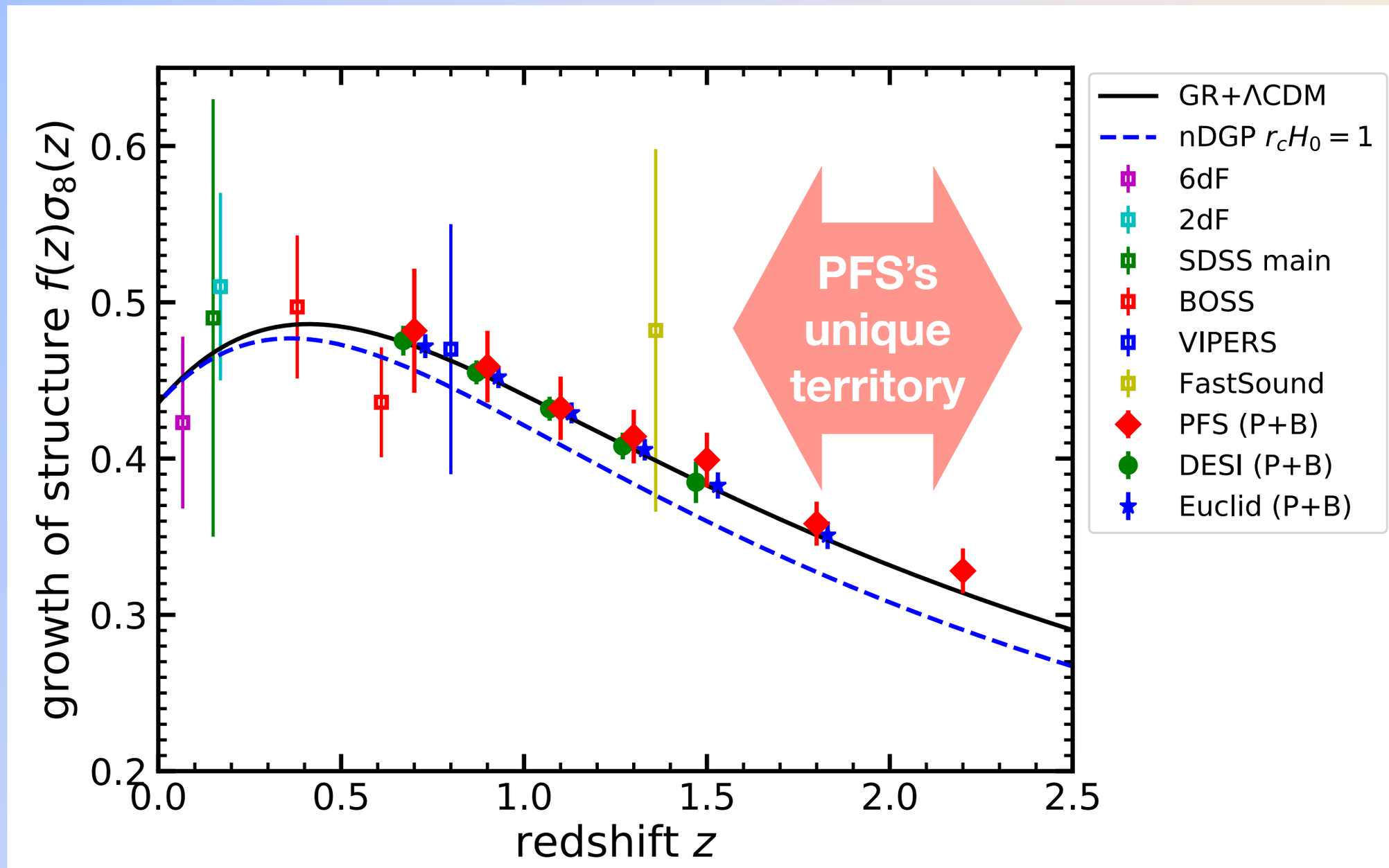


Neutrino forecast

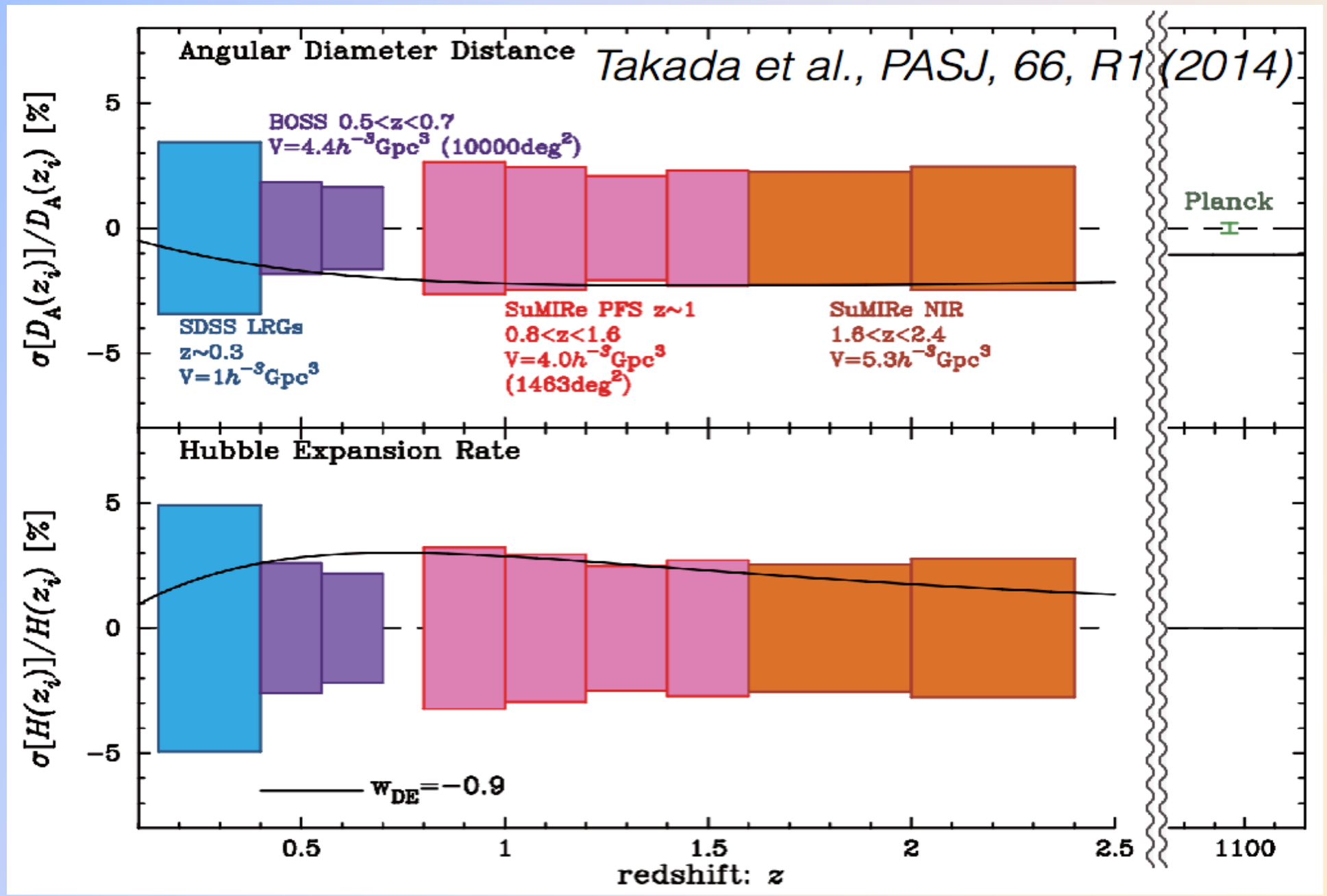


We can achieve $\Sigma m_\nu < 0.1$ eV (95 % C . L.)

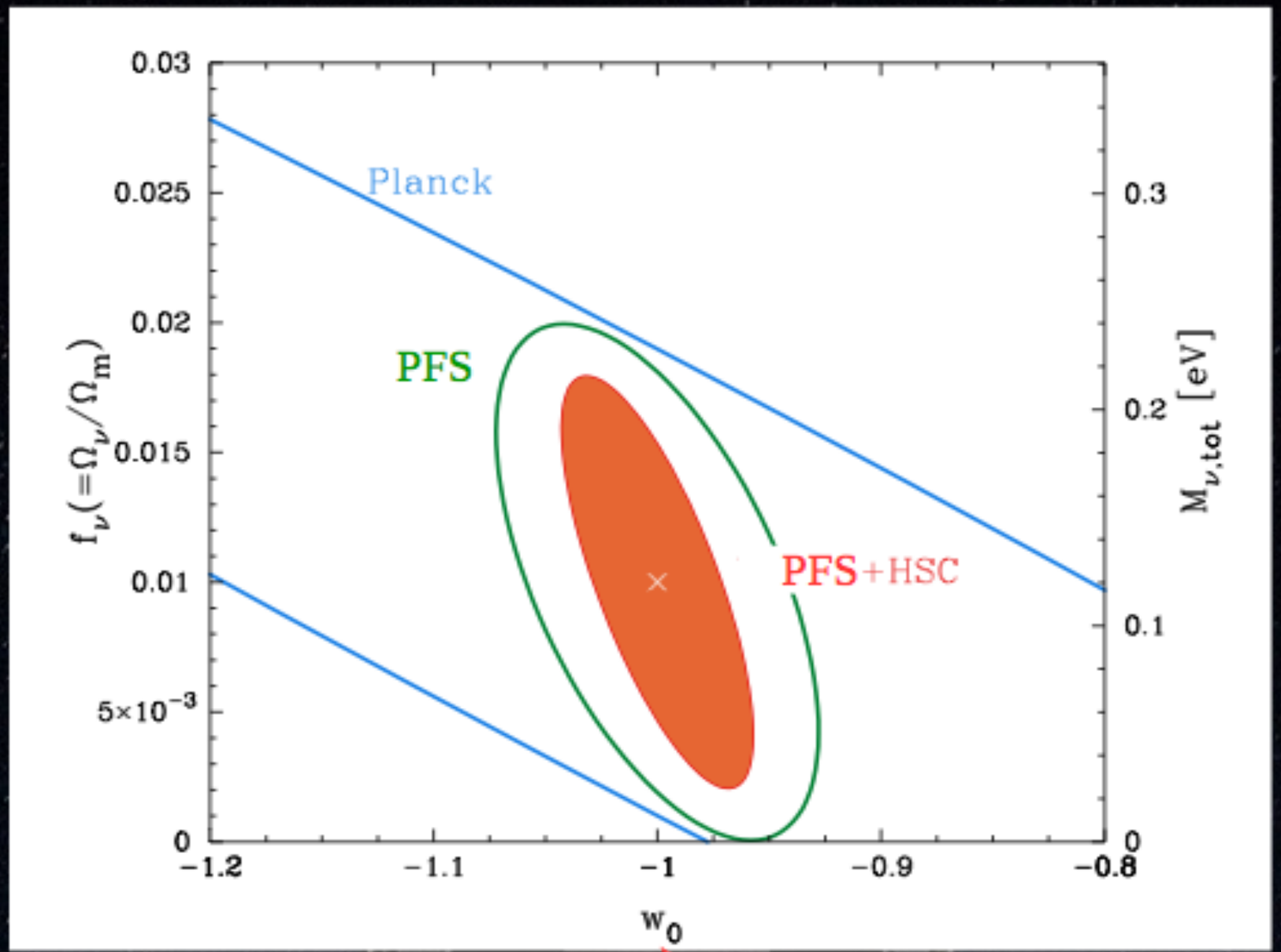
Testing gravity



Testing geometry/DE



PFS will provide joint constraints on f_ν and w_0



Competition

- DESI will observe ELGs as well as the luminous red galaxies (LRGs) at $0.6 < z < 1.6$

- Both PFS and DESI is aiming to reach the neutrino mass constraint of $\Sigma m_\nu < 0.1$ eV

- DESI will start the science run at April 2021 but the survey speed would be slower than PFS

PFS uniqueness

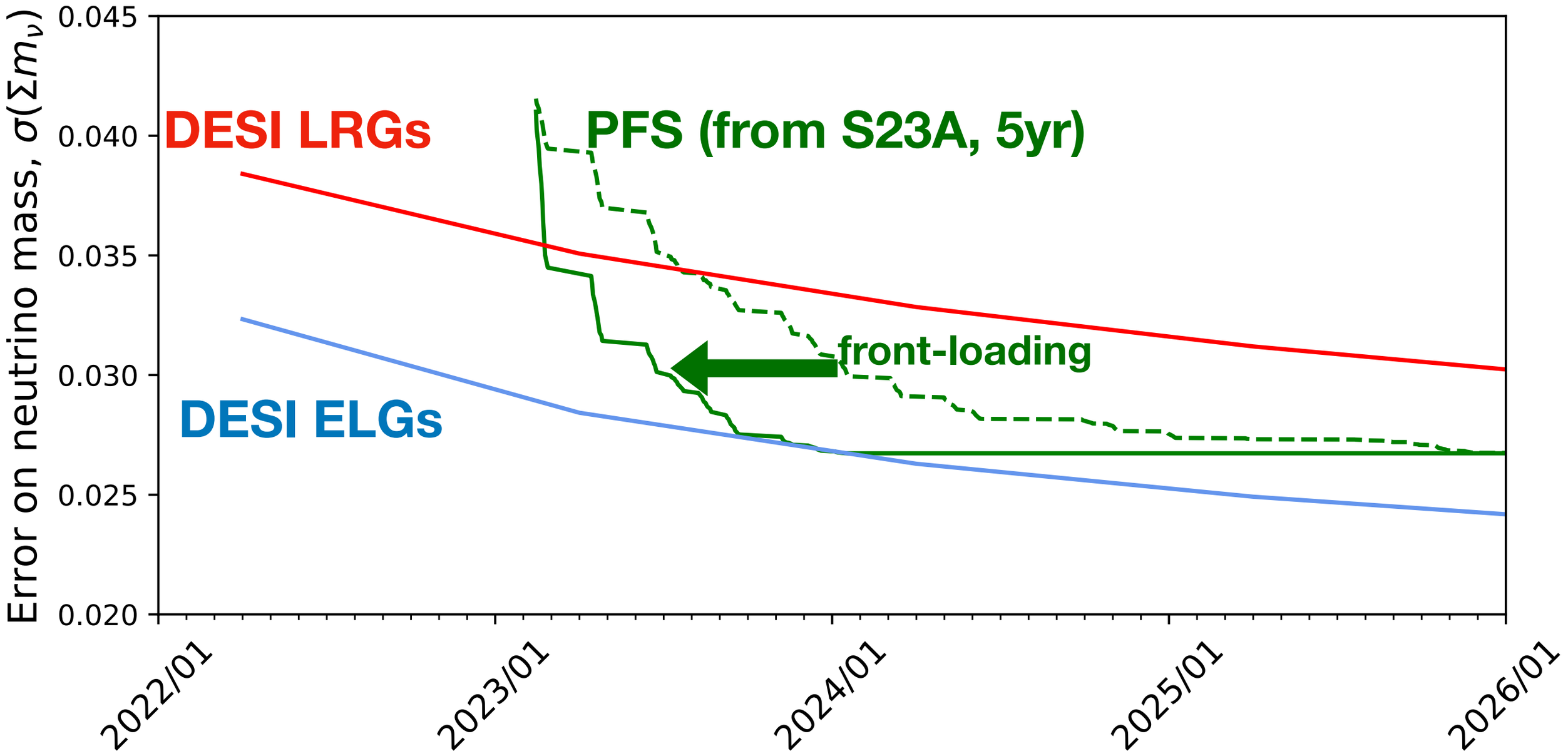
- Only PFS can access z > 1.6 by galaxy samples

→ DESI will explore z > 1.6 with Lyman-alpha forests, which can measure distances but not accurately the linear growth rate

- Only the PFS x HSC do the tomographic analysis of lensing at z > 1.6

- Thanks to the high quality data of HSC, we can construct cleaner and more uniform spectroscopic sample

Front-loading



Front-loading