







# DARK ENERGY SPECTROSCOPIC INSTRUMENT

U.S. Department of Energy Office of Science

DESIGN LOGICAL CONSTRAINTS - Aug 2024 X11 CNFP @ Crete, Greece, 2024

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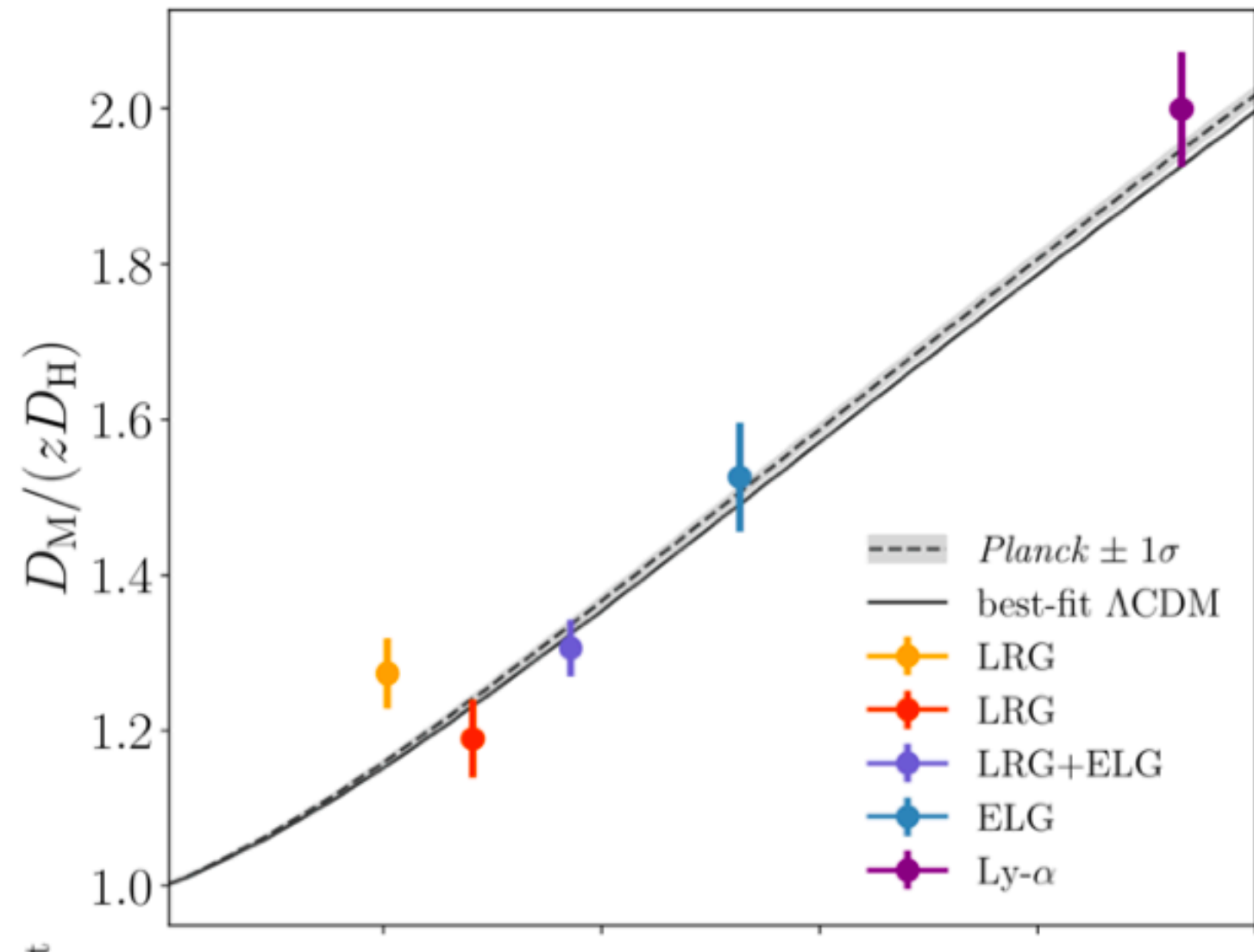
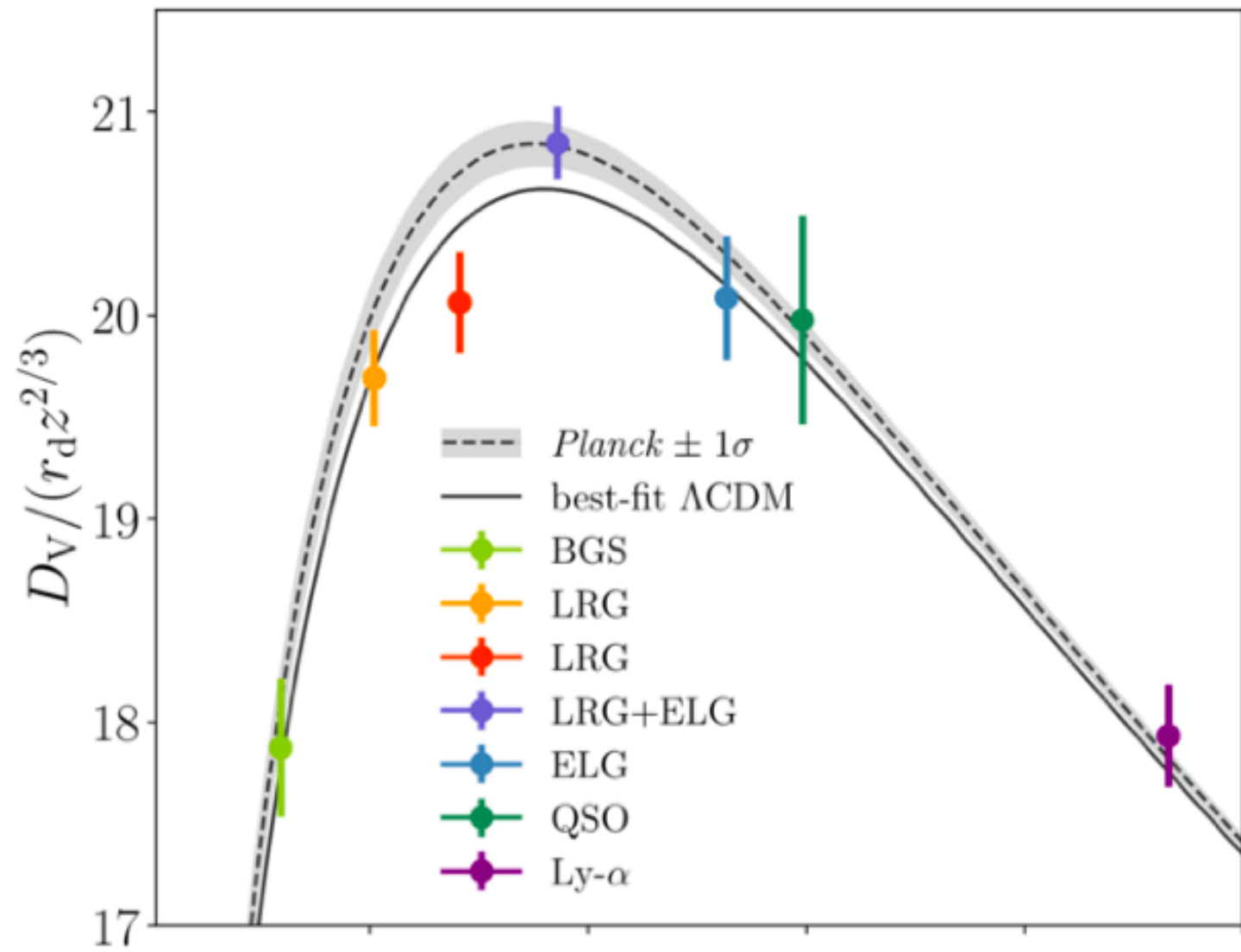




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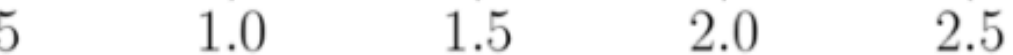
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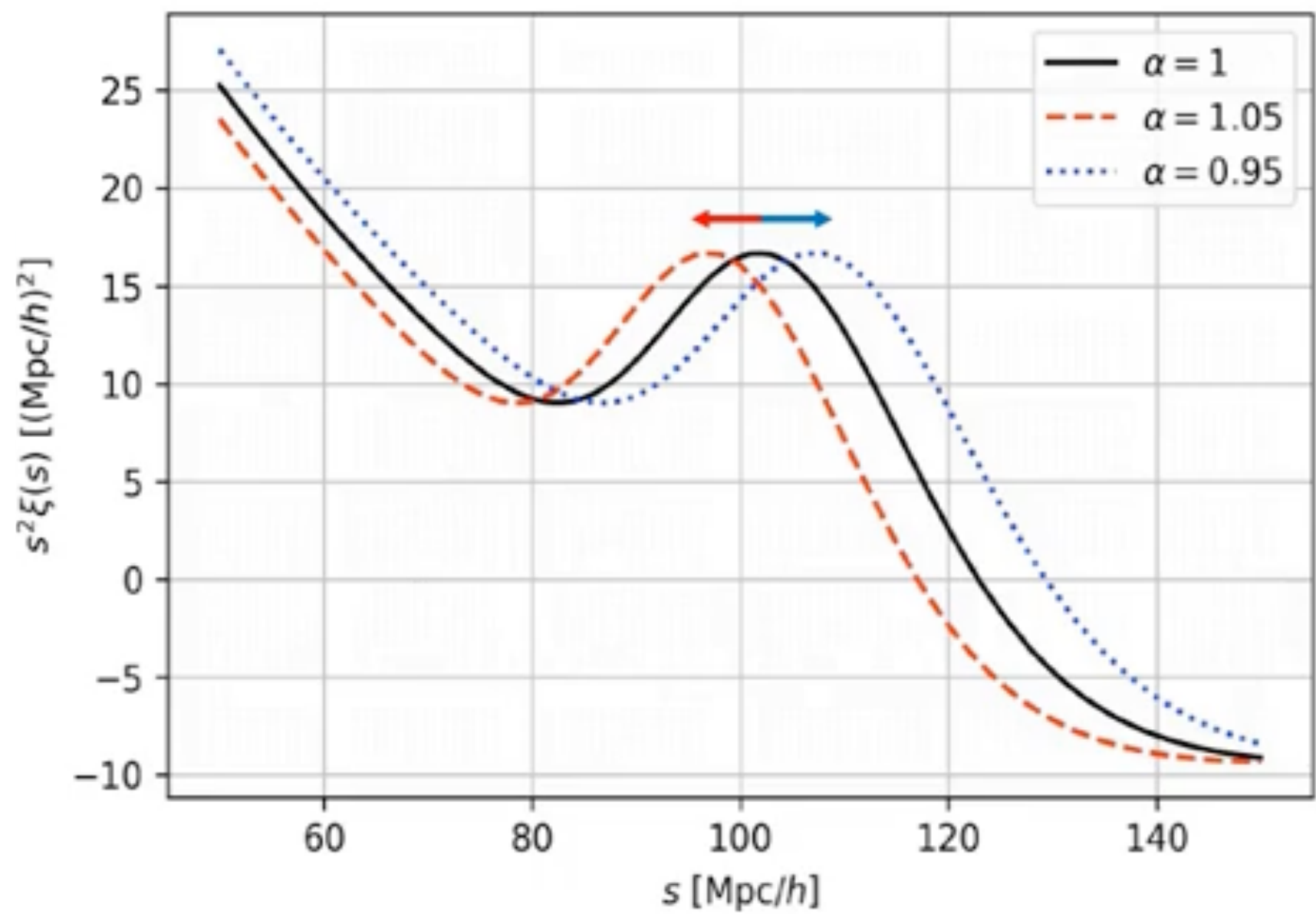




Redshift  $z$



Redshift  $z$



*Credit: Michael Rashkovetskyi*















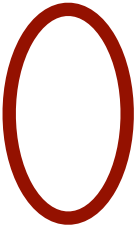




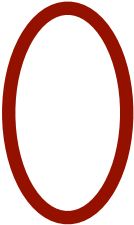


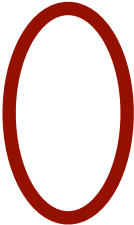






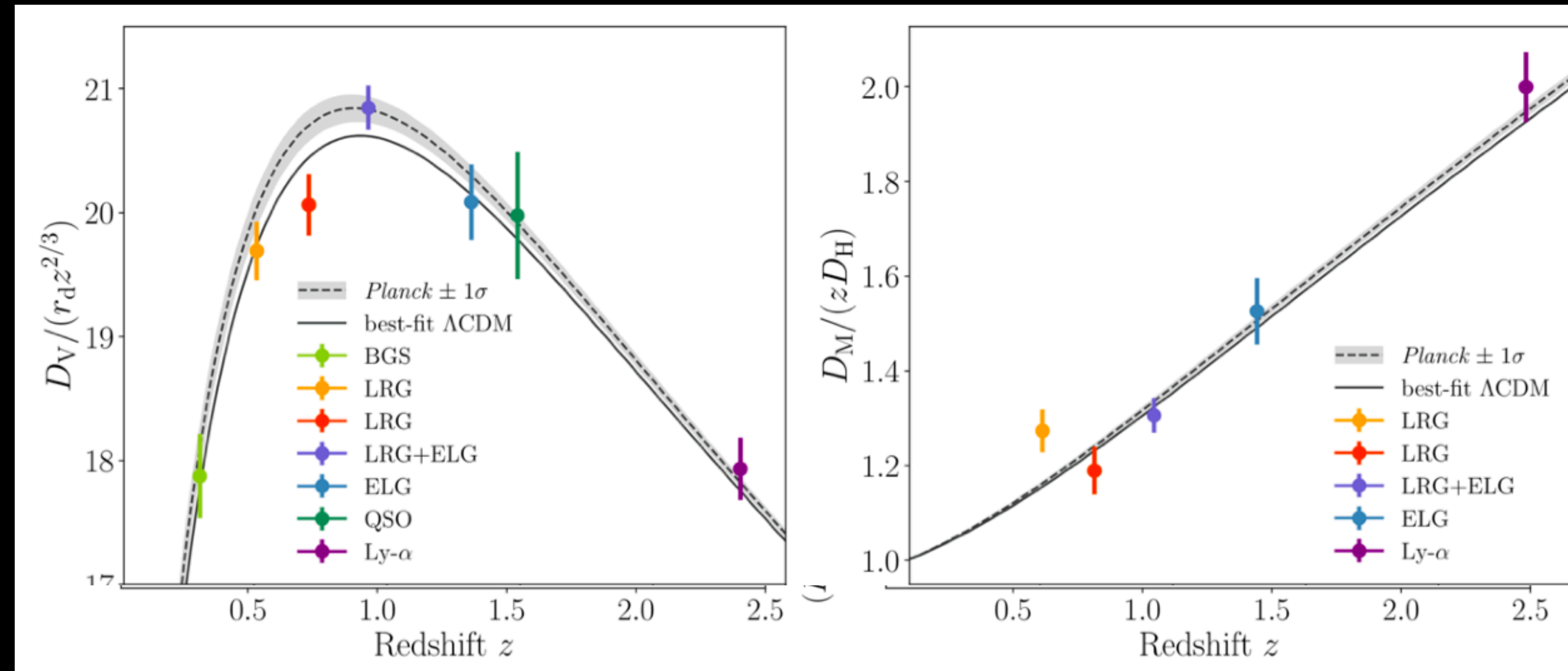
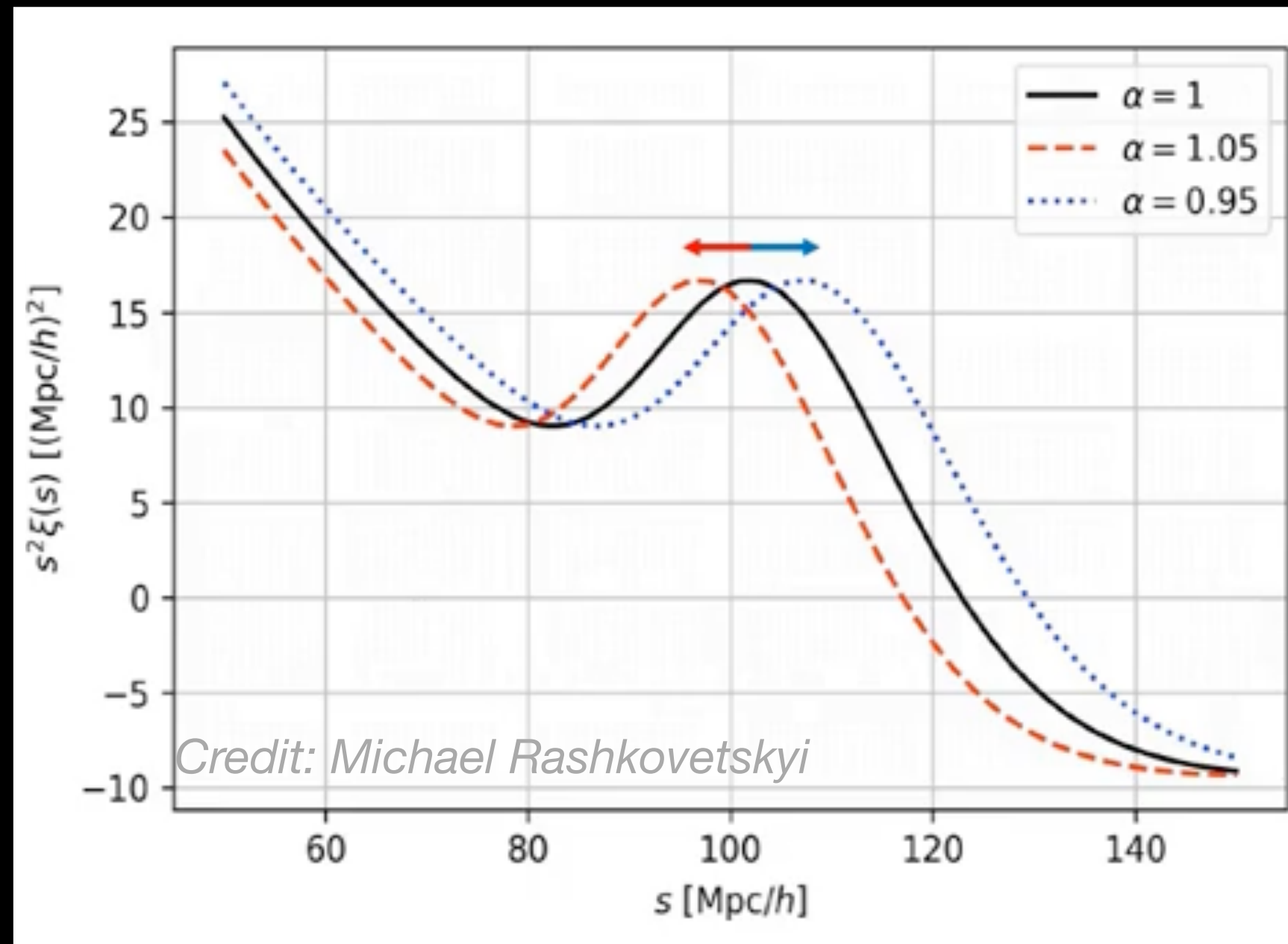






# Distance Measurements

Relation between BAO parameters, e.g.,  $(\alpha_{\parallel}, \alpha_{\perp})$  and distances  $(D_M, D_H, D_V)$



$$\frac{D_M(z)}{r_d} \equiv \frac{D_A(z) (1+z)}{r_d} = \alpha_{\perp} \frac{D_M^{\text{fid}}(z)}{r_d^{\text{fid}}}$$



comoving angular diameter distance  $D_M(z)$

$$\frac{D_H(z)}{r_d} \equiv \frac{c}{H(z)r_d} = \alpha_{\parallel} \frac{D_H^{\text{fid}}(z)}{r_d^{\text{fid}}}$$



Hubble distance  $D_H(z)$

$$\frac{D_V(z)}{r_d} \equiv \frac{[z D_M^2(z) D_H(z)]^{1/3}}{r_d} = \alpha_{\text{iso}} \frac{D_V^{\text{fid}}(z)}{r_d^{\text{fid}}}$$



spherically-averaged distance  $D_V(z)$

$$\alpha_{\text{iso}} = (\alpha_{\parallel} \alpha_{\perp}^2)^{1/3}, \quad \alpha_{AP} = \alpha_{\perp} / \alpha_{\parallel}$$

# Internal consistency of DESI results

