

Variability in Quasar Light Curves

Using Quasars as Standard Candles

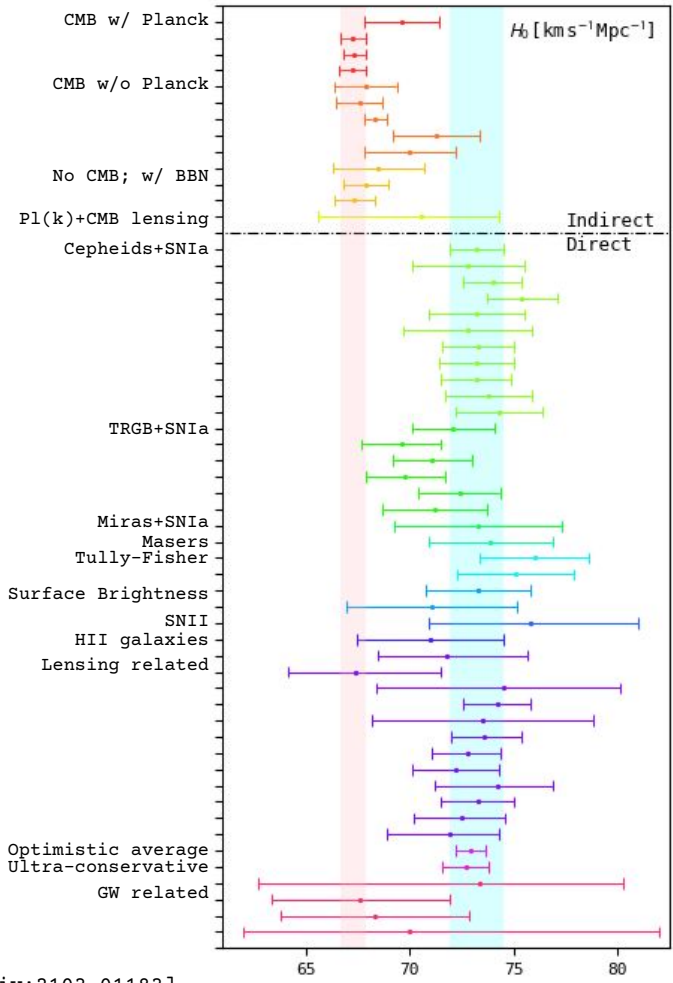
Rance Matthew Solomon

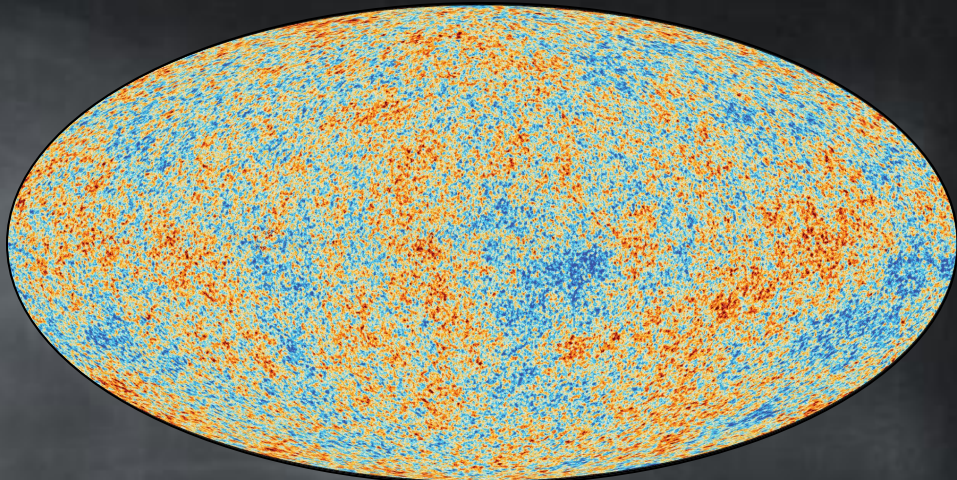
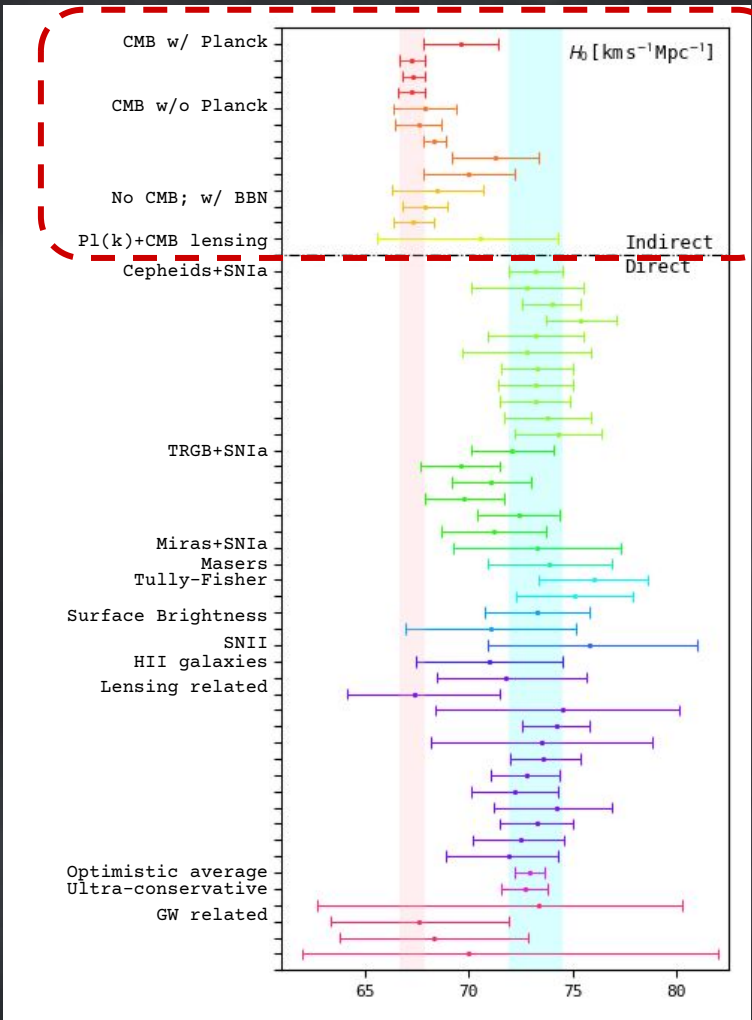
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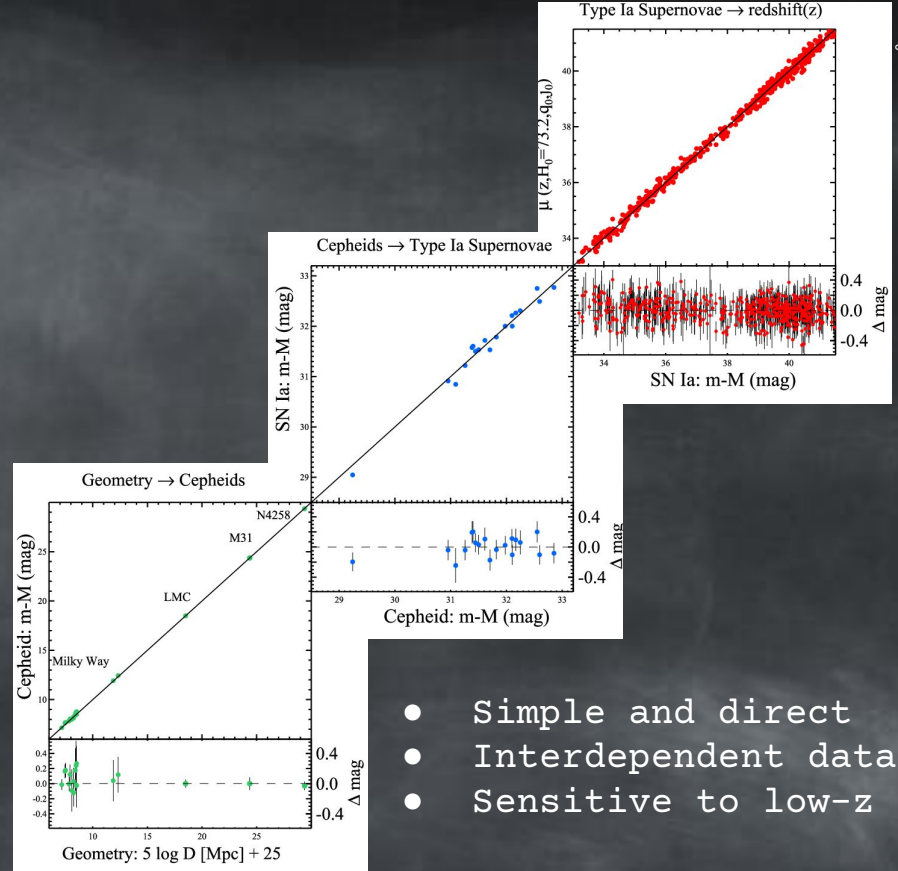
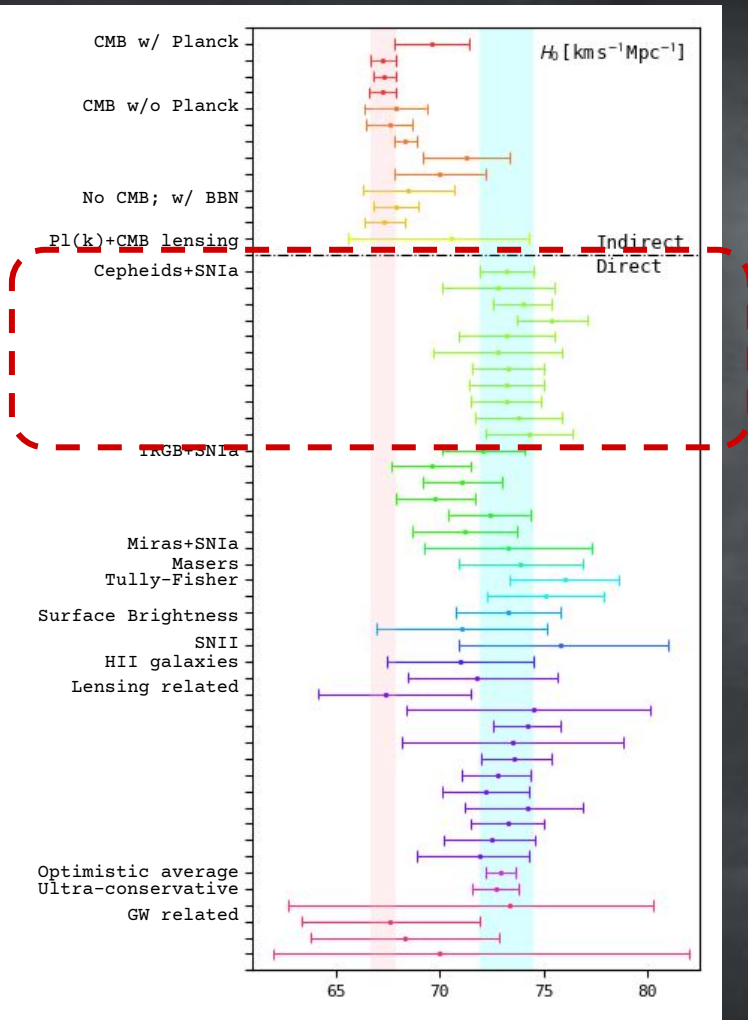




Planck 2018 [arXiv:1807.06205]

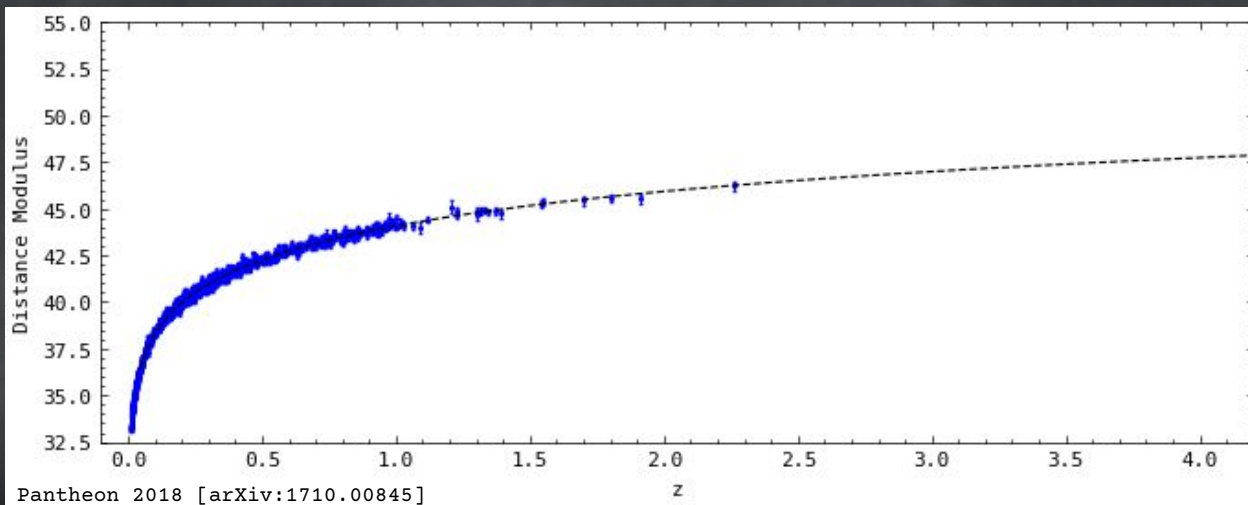
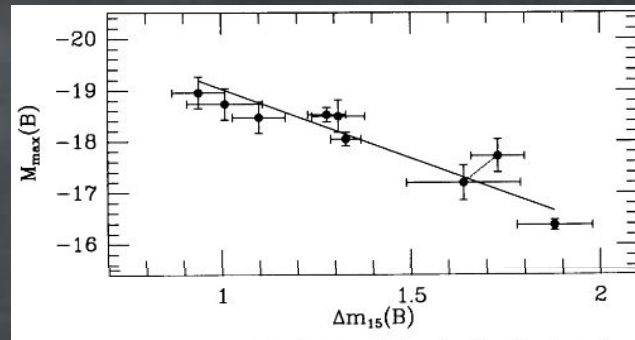
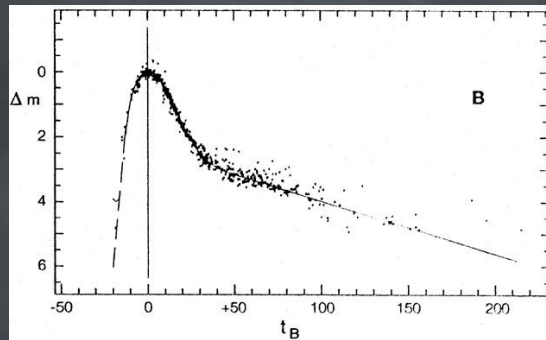
$$H(z) = H_0 \sqrt{\Omega_{r0}(1+z)^4 + \Omega_{m0}(1+z)^3 + \Omega_{\Lambda}}$$

- Robust in early universe physics
- Indirectly determines H_0
- Model dependent: Λ CDM



- Simple and direct
- Interdependent data
- Sensitive to low-z

Standardizing SNe



SNe



- ✓ plentiful
- ✓ bright
- ✓ clean / well studied
- ✓ anchored with Cepheids

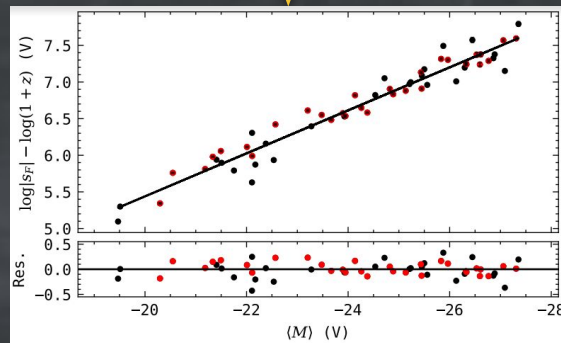
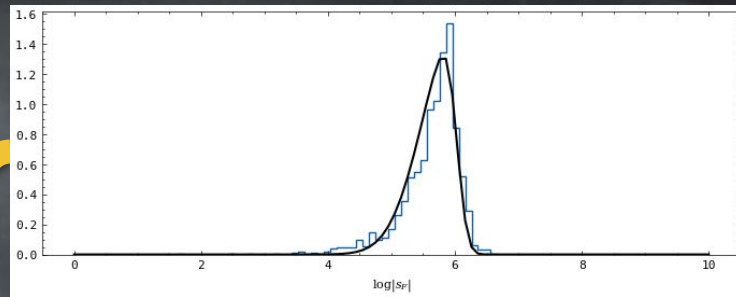
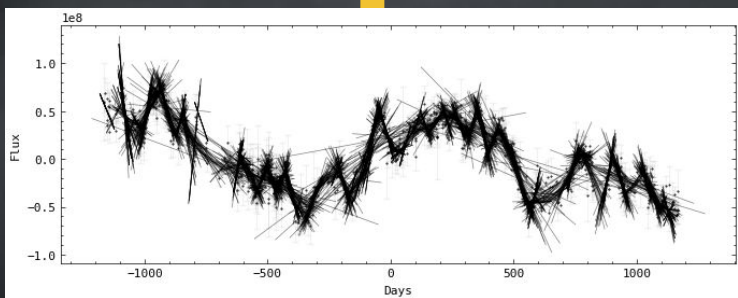
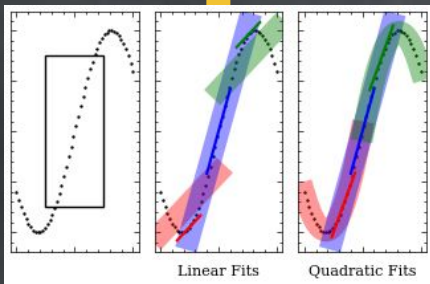
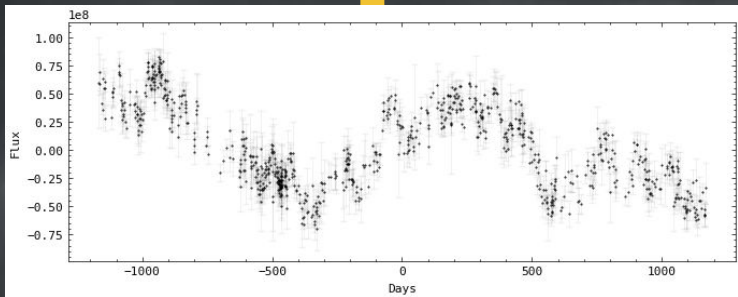
- ✗ short lived
- ✗ only -19

QSOs

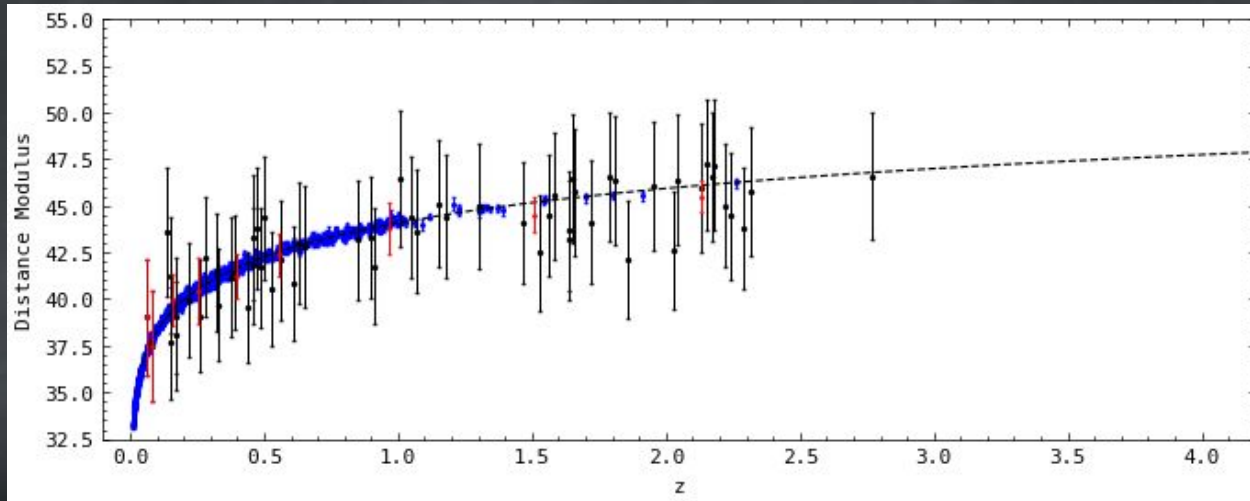
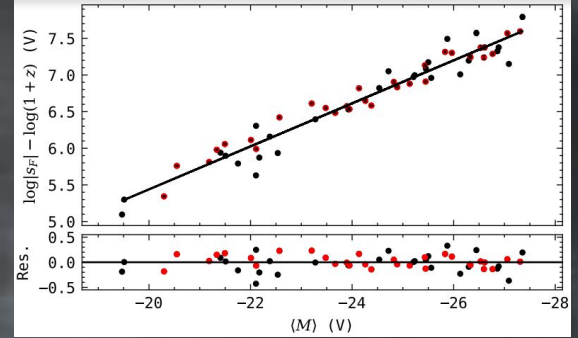
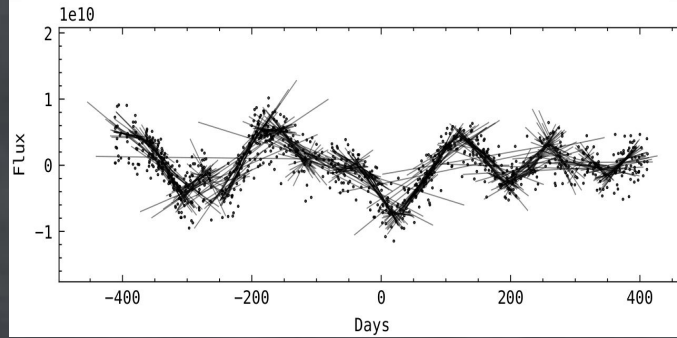


- ✓ plentiful
- ✓ bright
- ✓ long lived
- ✓ -23 ÷ -30

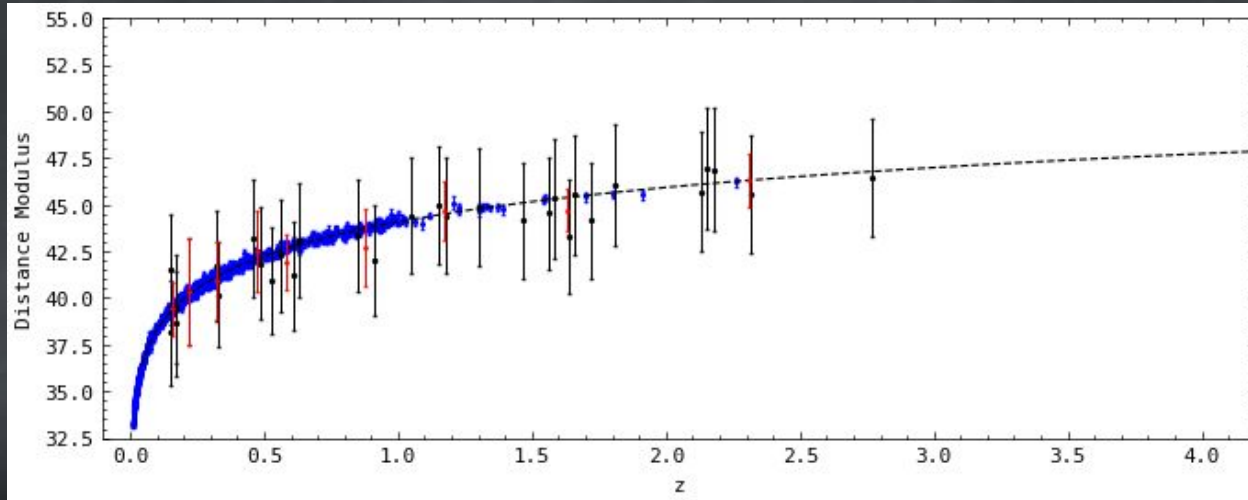
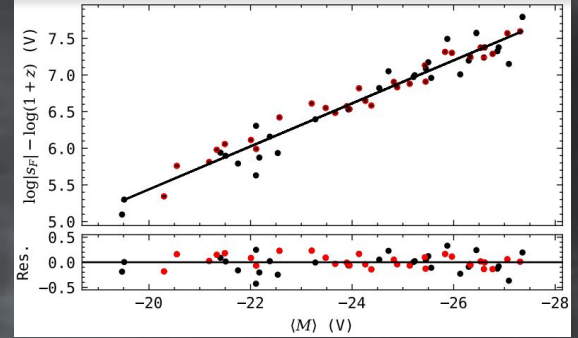
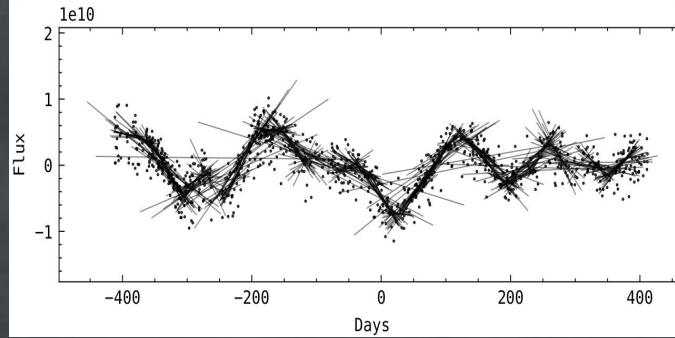
- ✗ messy / less studied
- ✗ unanchored (?)

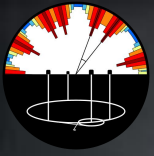


Standardizing Quasars



Standardizing Quasars





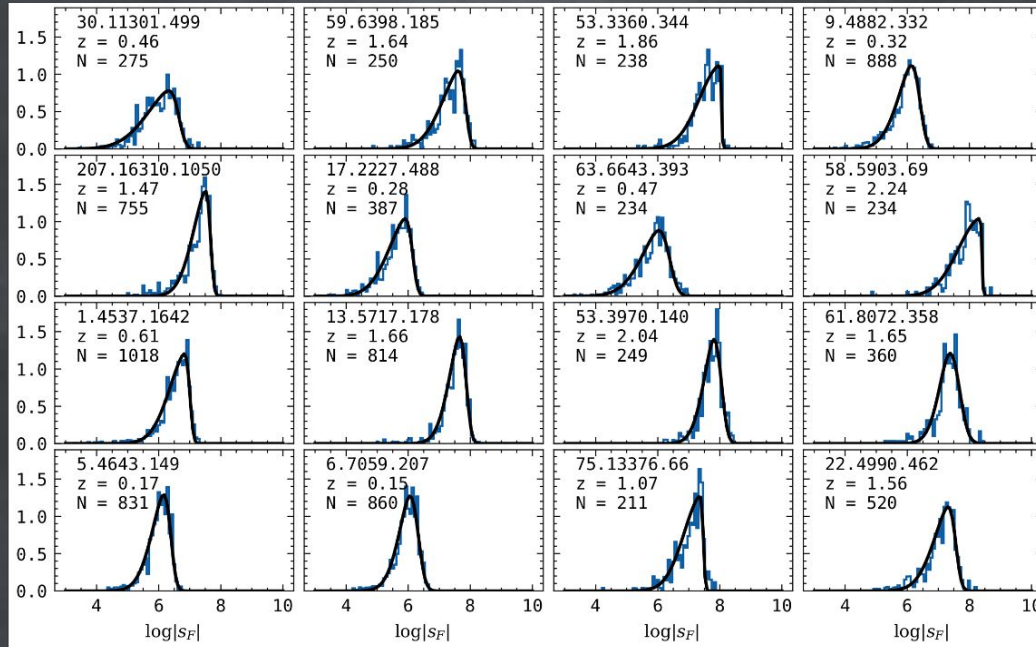
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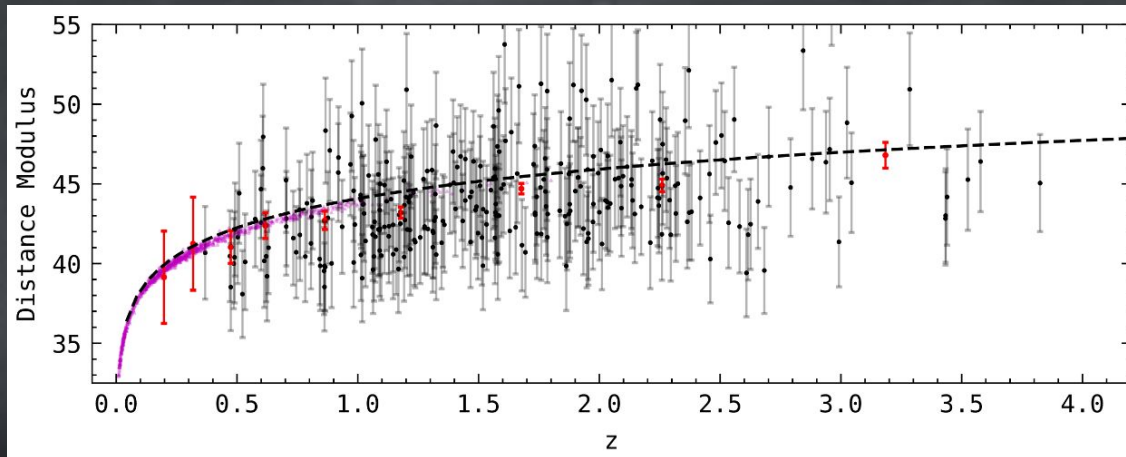
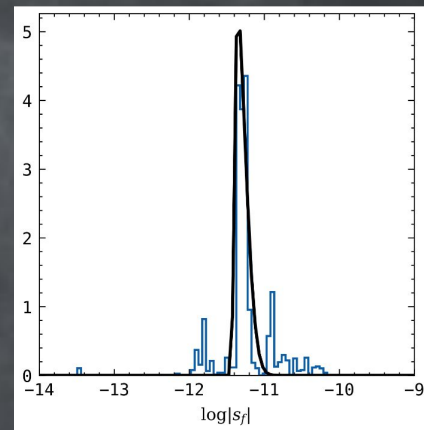
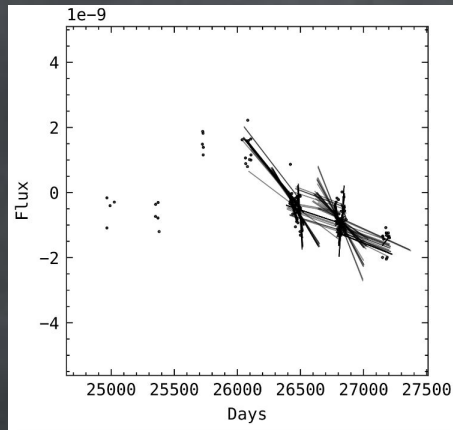


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MACHO QSOs



SDSS QSOs



DRW QSOs

