

Gravitational Interactions as Contributors to Supermassive Black Hole Growth

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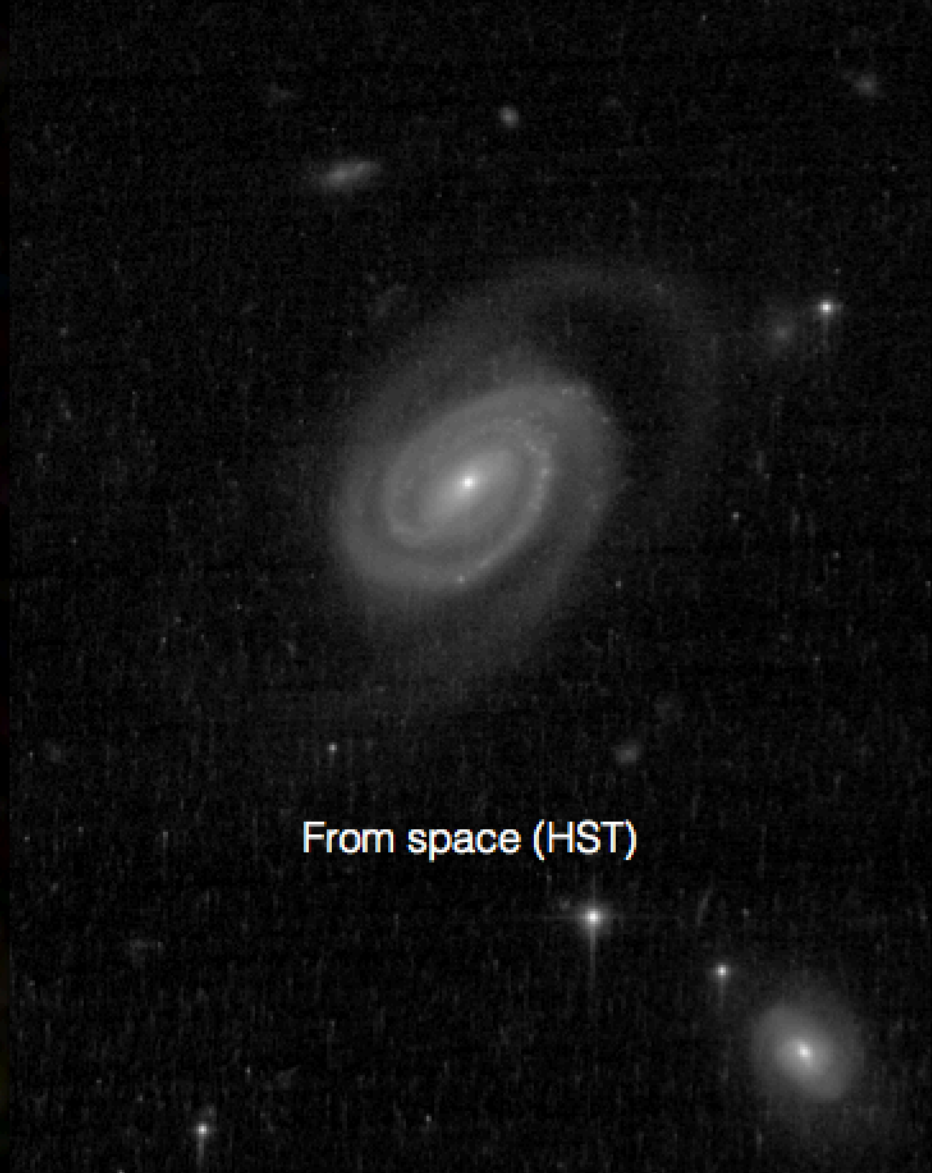
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Motivation

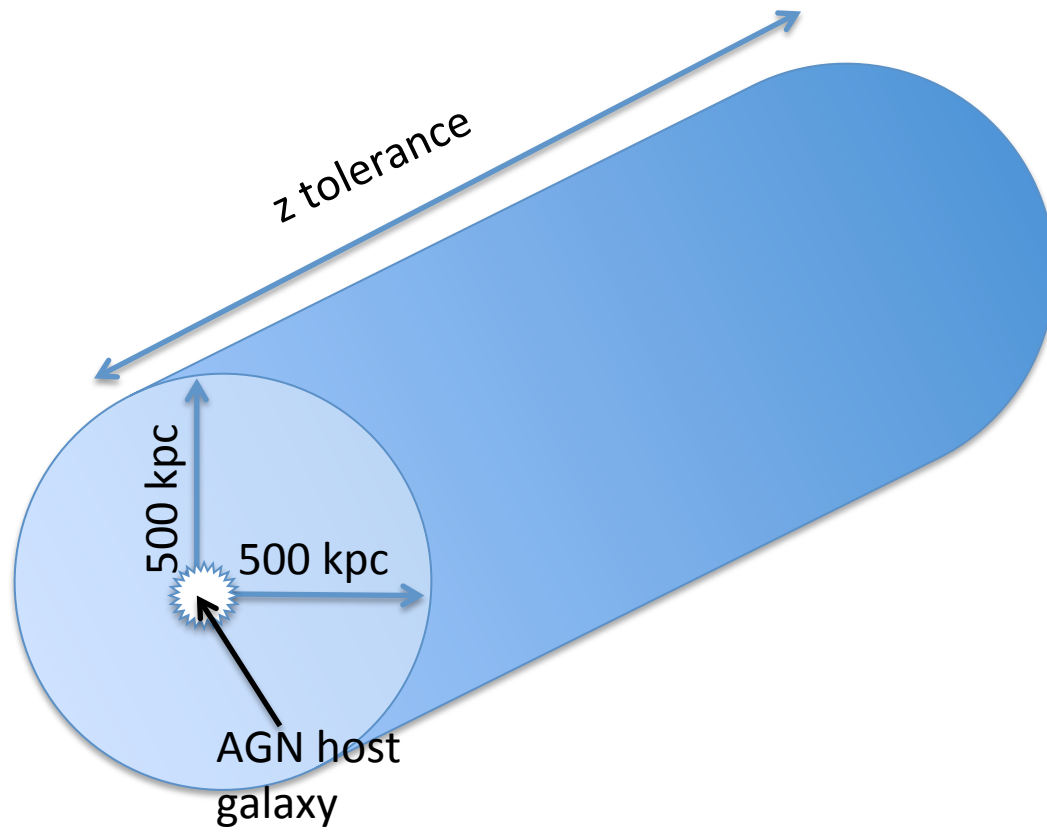
- SMBH growth is known to occur via galaxy mergers
- Indications that growth occurs in galaxies with no history of mergers (e.g. Simmons et al 2017)
- One possible pathway is minor gravitational interactions



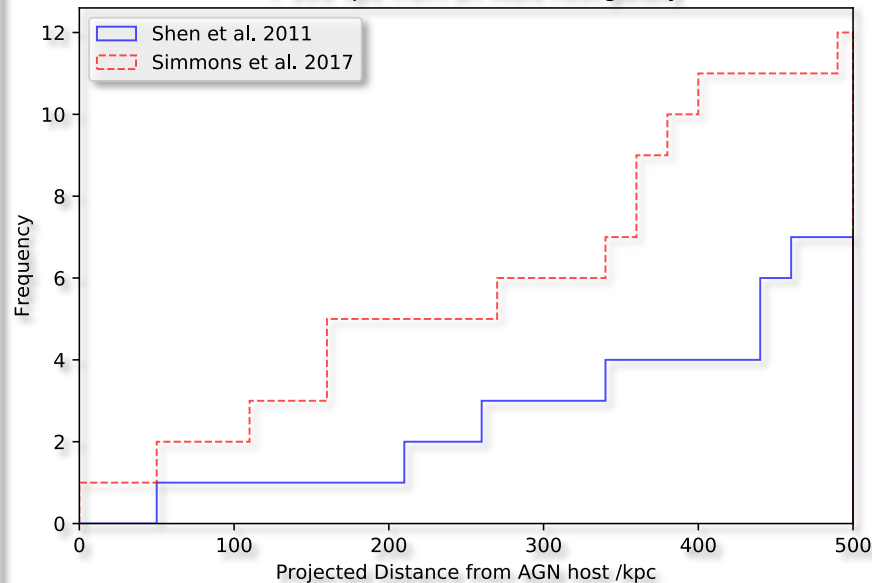
From the ground (SDSS)



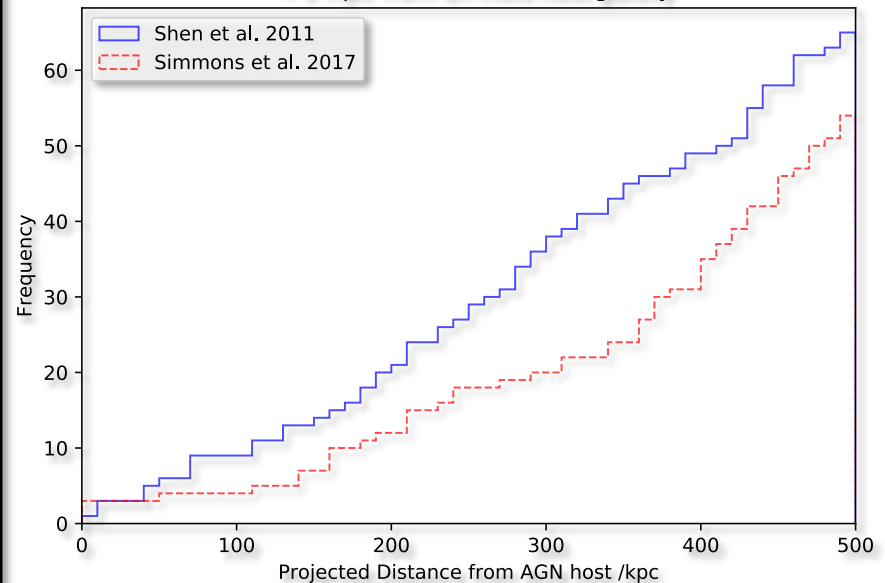
From space (HST)



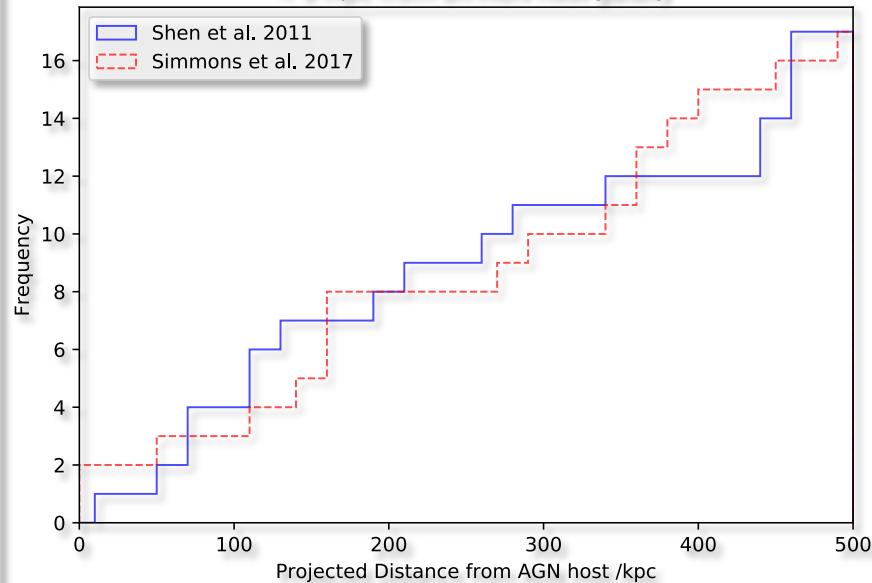
Frequency of Companion Galaxies at Redshift Distances
< 500 kpc from an AGN host galaxy



Frequency of Companion Galaxies at Redshift Distances
< 5 Mpc from an AGN host galaxy



Frequency of Companion Galaxies at Redshift Distances
< 1 Mpc from an AGN host galaxy

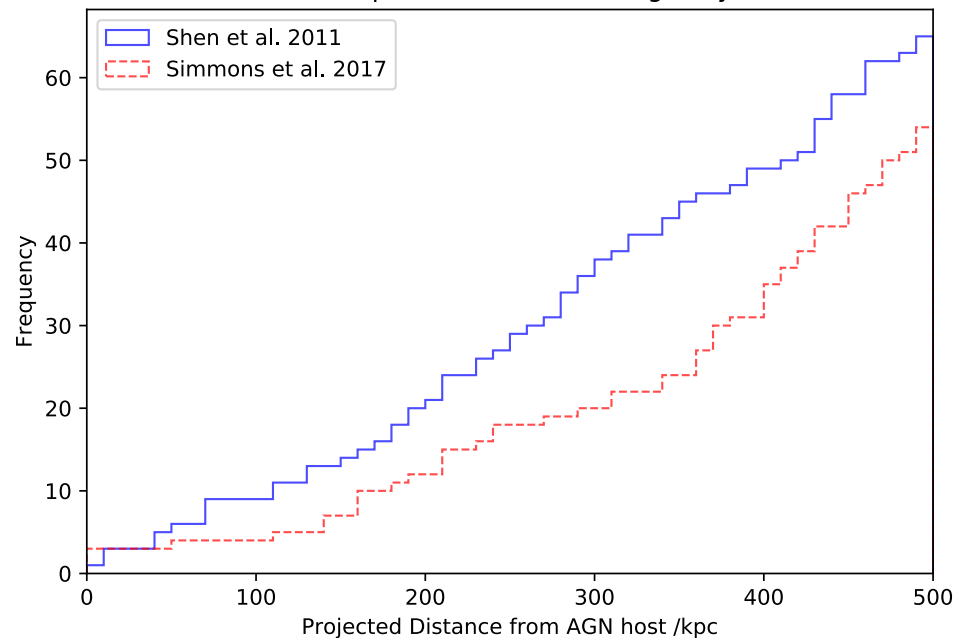


- A greater frequency of companions in the Simmons sample at lower redshift 'tolerances'
- The reverse is true for higher redshift 'tolerances'

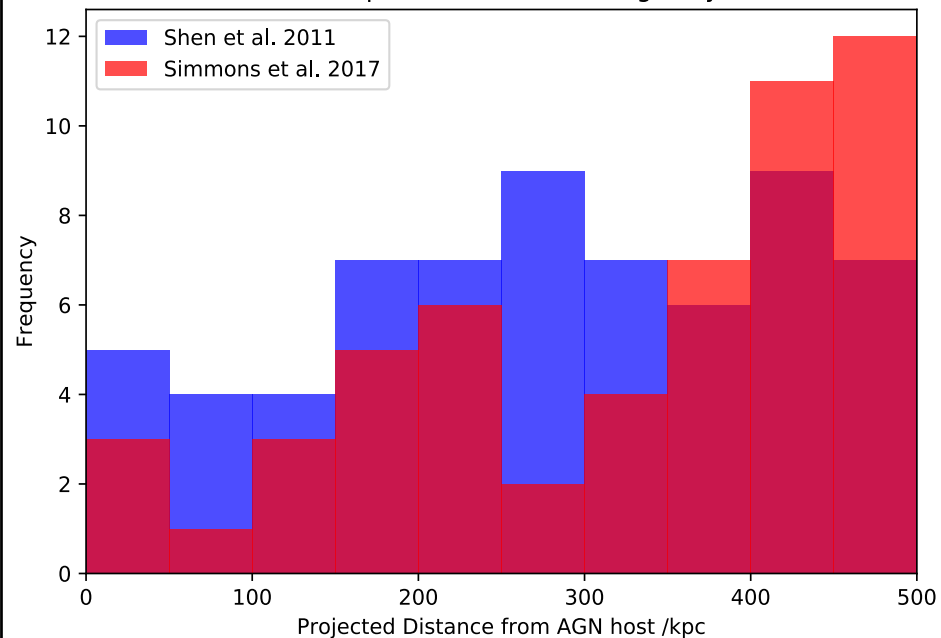
Statistical Comparison of Samples

- 500 kpc KS $p = 5.68e-01$ (significance at 0.6 sigma level)
- 1 Mpc KS $p = 9.30e-01$ (significance at 0.1 sigma level)
- 5 Mpc KS $p = 3.63e-02$ (significance at 2.1 sigma level)

Frequency of Companion Galaxies at Redshift Distances
< 5 Mpc from an AGN host galaxy



Frequency of Companion Galaxies at Redshift Distances
< 5 Mpc from an AGN host galaxy



Conclusion

- No significant difference apart from at high redshift difference 'tolerance'
- Simmons et al 2017 AGN hosts have fewer close companions but more further away
- Suggests Simmons et al 2017 AGN hosts have lower density immediate environments and/or interactions are from flybys