# Comparison of the Stellar Populations of Bulges and Discs using the MaNGA Survey

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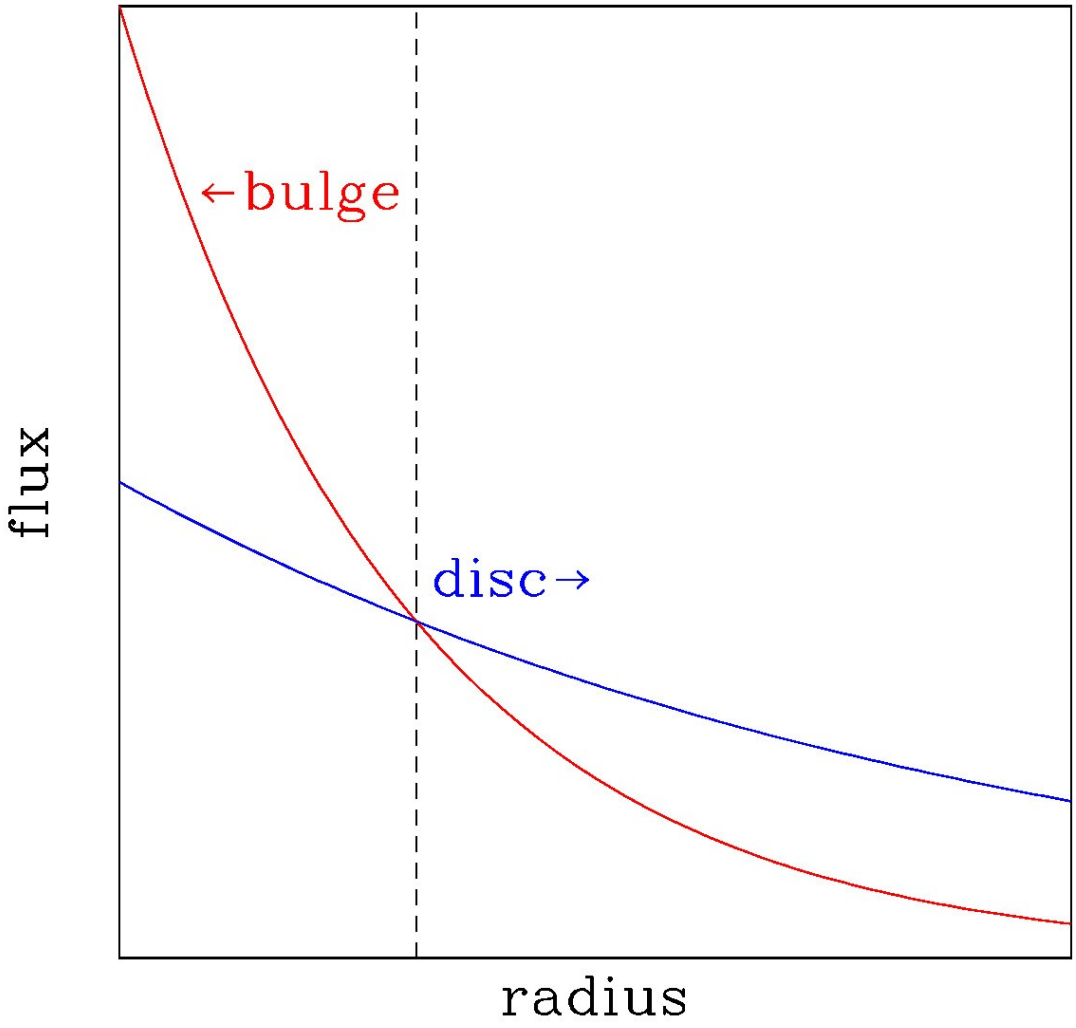
# The MaNGA Survey

- The Sloan Digital Sky Survey (SDSS) Mapping Nearby Galaxies at APO (MaNGA) is a large optical integral-field survey of low-redshift galaxies spanning a broad range in stellar mass, star formation rate, Sersic index and morphology
- It is an IFU survey ranging in size from 12 arcsec to 32 arcsec
- We selected a sample of 374 galaxies with SN≥15 and well defined bulges and disks

# Selecting Bulge and Disc Regions

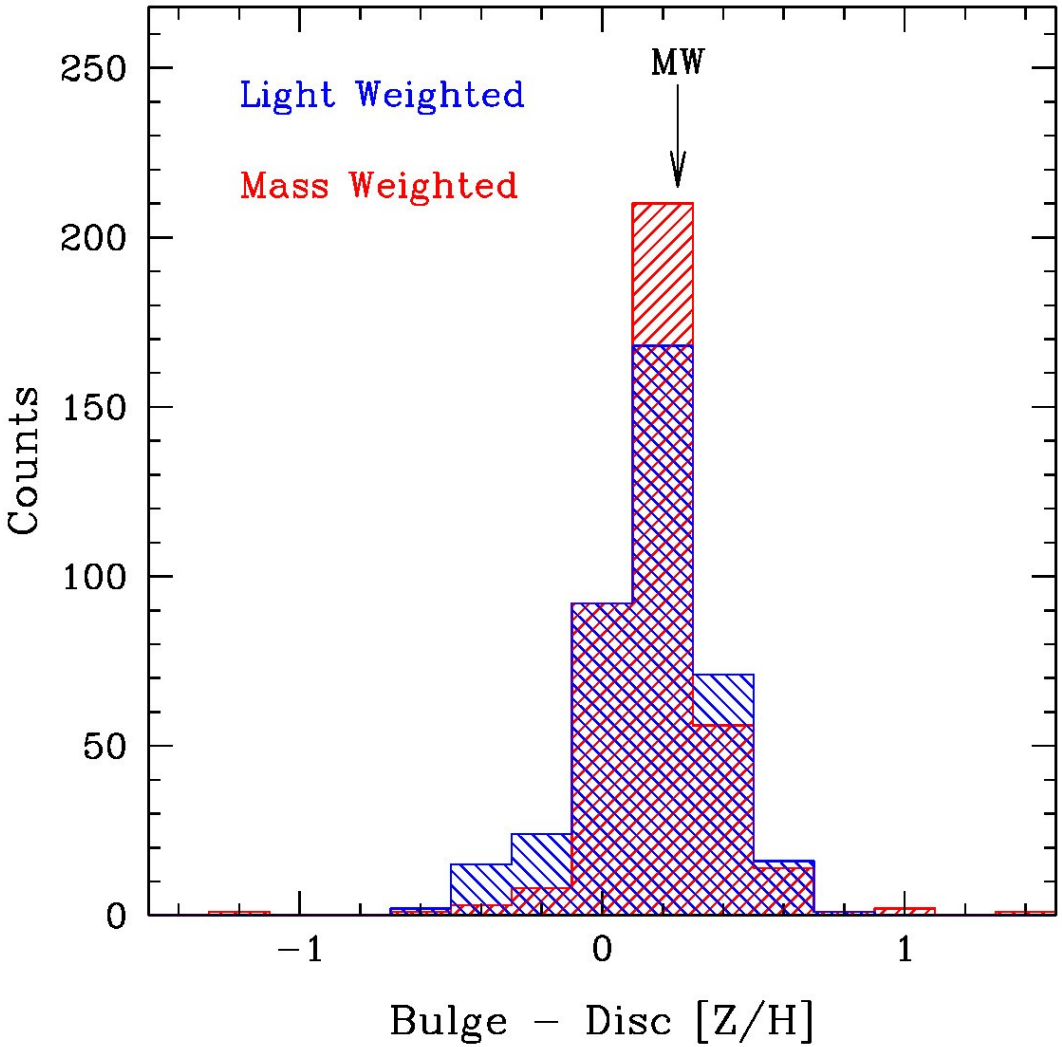



For the galaxies two component Sersic profiles have been measured – one representing the bulge, the other the disc. The extent of the bulge is defined as the region where the bulge Sersic profile is brighter than the disc Sersic profile. Similarly the disc region is defined where its profile is brighter than the bulge profile.

# The Stellar Population Measurements

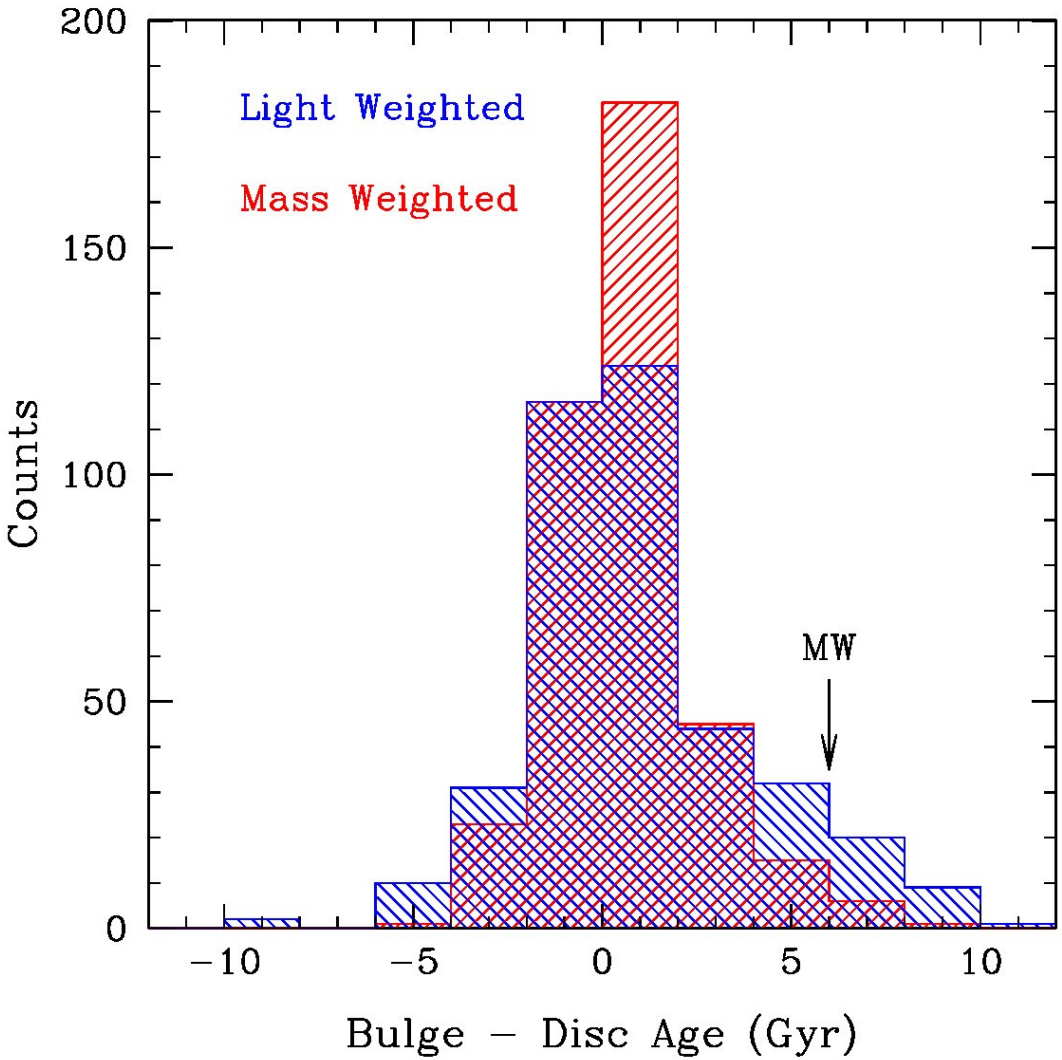
- **Stellar population ages and metallicites are measured from the summed, one-dimensional bulge and disc spectra using a full spectral fit based on theoretical stellar population models from the Medium resolution INT Library of Empirical Spectra, BaSTI isochrones and a Chabrier et al. 2003 initial mass function**

# Stellar Metallicity Difference Between Bulge and Disk



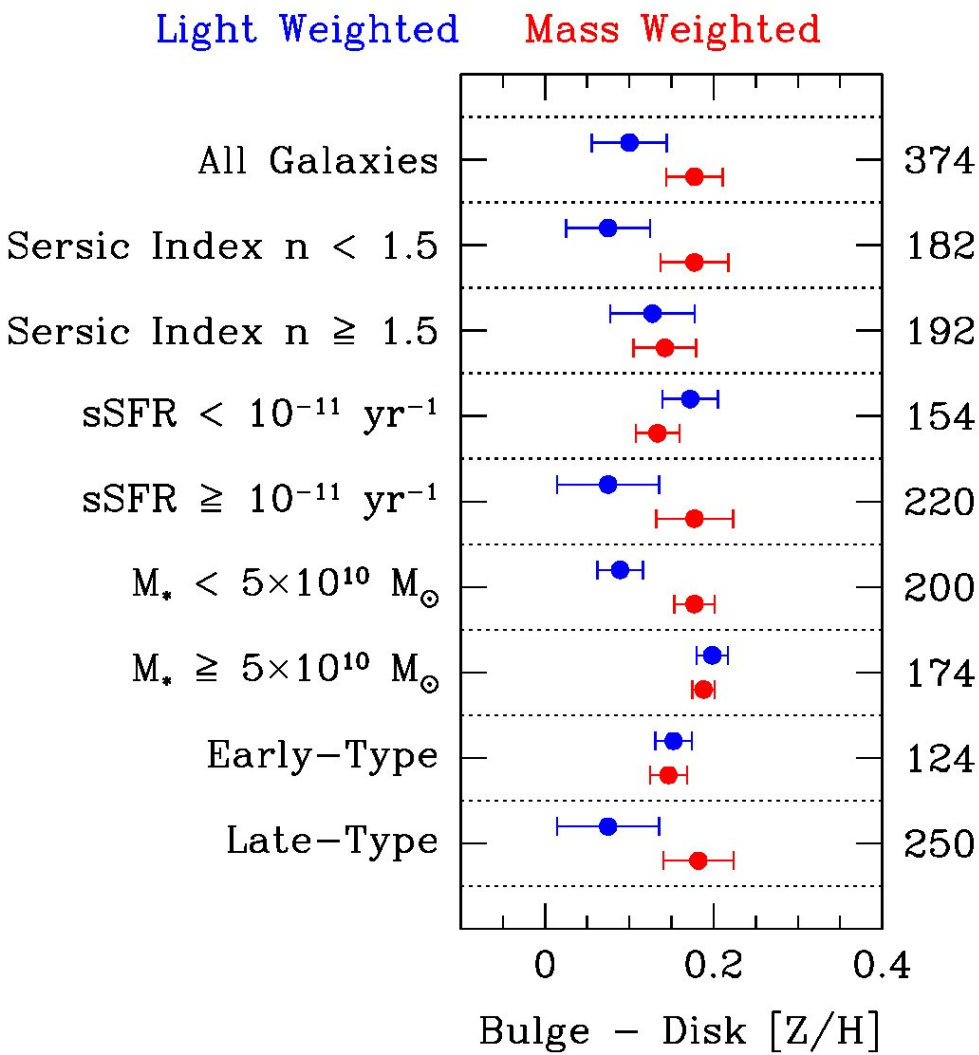

The stellar metallicity difference between bulge and disc for the sample is in general slightly positive for both light weighted and mass weighted measurements. MW is the approximate value for the Milky Way galaxy.

# Stellar Age Difference Between Bulge and Disk



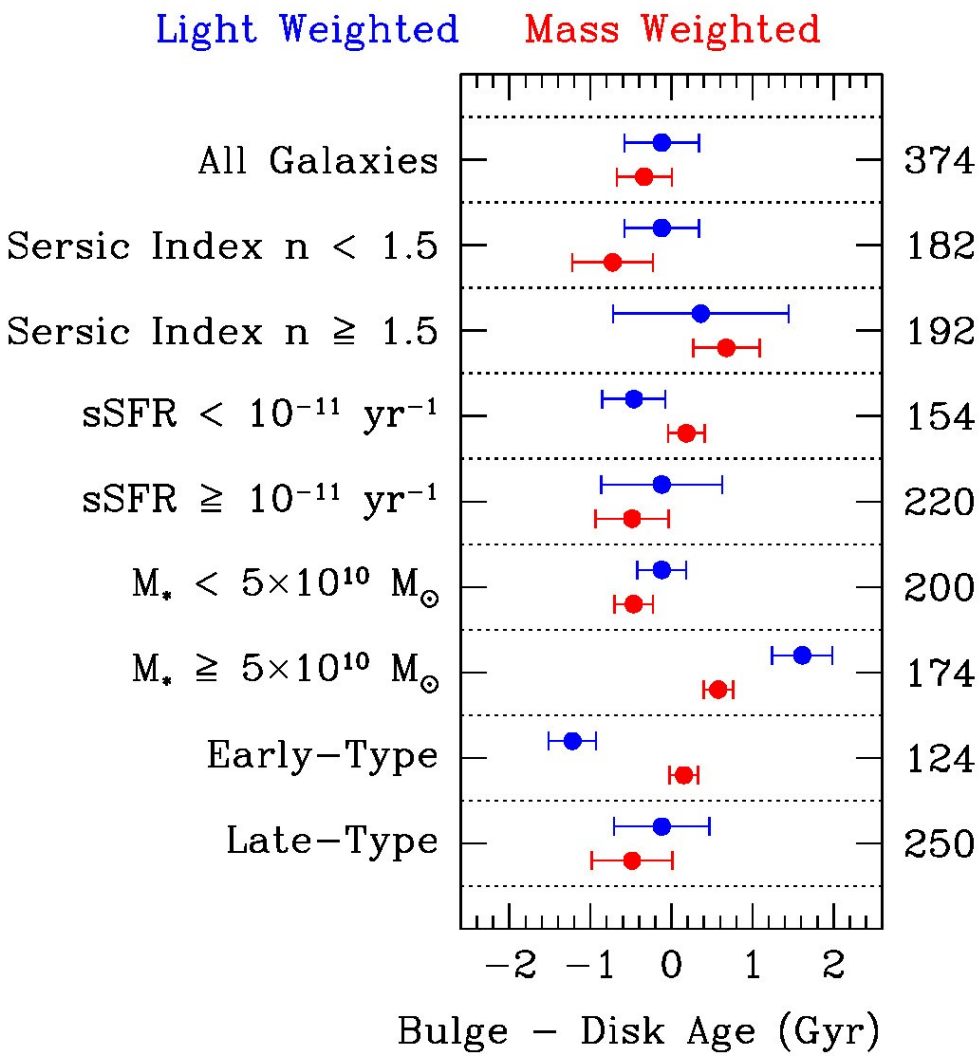

The stellar age difference between bulge and disc for the sample is in general close to zero for light weighted measurements and slightly positive for mass weighted measurements. MW is the approximate value for the Milky Way galaxy and it is way out in the wings of the distributions.

# Stellar Metallicity Difference Between Bulge and Disk for Subsamples




These measurements are weighted median values with the weights correcting for completeness of the sample. The errors on the weighted medians were estimated using a bootstrapping method. The numbers on the right are the number of galaxies in each subsample.

# Stellar Age Difference Between Bulge and Disk for Subsamples




These measurements are also weighted median values.

# Conclusions

- Both light-weighted and mass-weighted measurements show that bulges tend to be more metal-rich than discs and that bulges and discs have similar ages.
- For mass-weighted measurements, there is no significant trend in the metallicity difference between bulge and disc with stellar mass, specific star formation rate, galaxy morphology or the Sersic index of the bulge component.
- For light-weighted measurements, galaxies with higher stellar masses have bulges with a larger metallicity difference between bulge and disc than lower-mass galaxies, as do early-type galaxies relative to late-type galaxies.
- High-stellar-mass galaxies tend to have bulges that are significantly older than discs.
- Early-type galaxies have younger bulges than discs in the light-weighted measurements but the reverse in the mass-weighted measurements, indicating a complex star formation history.