**INTRODUCTION**

Observations of Type la supernovae (SN Ia) are a key component of the standard cosmological model. Their luminosity-distance calibration provides evidence for the existence of dark energy, but the nature of their progenitor remains unknown. Studying physical properties of the host galaxies can provide insight into the environment and stellar populations in which SN Ia occur. Using host galaxy photometry spanning the ultraviolet, optical, and infrared bands allows us to constrain stellar masses and star-formation history of SN Ia host galaxies by comparing the observed photometry to synthetic photometry generated from stellar population synthesis codes. Future work with spectroscopy can be used to better estimate the metallicity of these galaxies as well. Knowledge of both star formation and metallicity of host galaxies will improve our understanding of SN Ia progenitors and the diversity of their light curves.

**DATA SAMPLE**

- Galaxy Evolution Explorer (GALEX) FUV & NUV, Sloan Digital Sky Survey (SDSS) ugriz, UKIDSS LIRK photometry
- 469 SDSS galaxies identified as hosts for the spectroscopically confirmed SNe Ia discovered in the SDSS-4 Supernova Survey (0.01 < z < 0.48)
- GALEX magnitudes and UKIDSS Petrosian magnitudes are matched to these SDSS galaxies with a search radius of 5"
- Of the 469 SDSS galaxies, 192 GALEX matches and 289 UKIDSS matches were found
- 3 surveys together provide complete coverage from the ultraviolet through the near infrared

**METHOD**

- Generate grid of models using the flexible stellar population synthesis (FSPS) code of Conroy et al. 2009a. The code is able to flexibly handle elements such as the initial mass function (IMF), spectral libraries, dust attenuation, convective overshooting, and advanced stages of stellar evolution
- We use Padova isochrones, the BaSeL2.3 1spectral library, and the Charlot 2003 IMF
- We assume a flat ΛCDM cosmology of $(\Omega_m, \Omega_{\Lambda}, \Omega_{\gamma}) = (0.26, 0.74, 0.0)$
- We also assume the age of each galaxy is equal to the age of the Universe at the redshift of the galaxy and star-formation begins at $t=0$ (Big Bang)
- Model photometry is redshifted to the observed frame of the galaxy for comparison
- We choose to parameterize the star-formation history (SFH), $\Psi(t)$, by a 2-component $\psi_1 + \psi_2$ model, where $\psi_1$ is the e-folding timescale of the exponentially decreasing component and $\psi_2$ is the fraction of star formation that occurs at a constant rate: $\Psi(t) = \psi_2 \exp\left(-\frac{t}{\psi_1}\right) + \psi_2$

where $\Psi$ is normalized such that 1 M$_\odot$ of stars is created over the age of the Universe, $\psi_1$, and $\psi_2$ is the e-folding timescale of the exponentially decreasing component and $\psi_2$ is the fraction of star formation that occurs at a constant rate.

**RESULTS**

- 30% of our galaxies have SFRs beat fit by $\psi_1 = 10$ Gyr (a very slow exponential decline) and/or $\psi_2 = 1$ (all stars formed at a constant rate) which implies that they are actively star-forming
- 30% beat fit by $\psi_2 < 0.01$, with the distribution of higher values decreasing exponentially
- $\psi_2$ beat fit by the lowest metallicity allowed ($Z = 0.001$), and the fraction steadily decreases with increasing $\psi_2$ until a gentle turn-around point is reached at $\psi_2 = 0.30$ (50% of galaxies), while a $Z = 0.03$ beat fit 11% of galaxies
- From the beat-fit parameters we derive two galaxy properties:
  - stellar mass – calculated by multiplying the luminosity in the $r$ band by the mass-to-light ratio in the same band as provided by the beat-fit model
  - current average star-formation rate (SFR) – calculated by averaging the best-fit normalized SFH, $\Psi_0$, over the past 10 years and converting into an absolute SFR (in M$_\odot$/yr) using the stellar mass

**CONCLUSIONS & FUTURE WORK**

- We attempt to correlate our galaxy properties with SN Ia properties obtained from the multi-color lightcurve shape method filter of Jha et al. 2007 (MLCS2k2). (Of the galaxies in our sample, 313 passed the S/N and temporal coverage cuts necessary for MLCS2k2.)
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- In particular, we hoped to confirm the result that, on average, intrinsically luminous SNe Ia tend to occur in blue spiral galaxies with ongoing star formation while dimmer SNe Ia tend to occur in passive galaxies (Hamuy et al. 2004, Sullivan et al. 2008, and others). We do find some evidence that supports this trend that galaxies with higher SFRs host more luminous SNe Ia (i.e., SNe Ia with lower values of the MLCS parameter $\lambda$, which is a particular SN's under- or overluminosity).
- More work is needed to discover further correlations between galaxy properties such as metallicity, age, dust attenuation, stellar mass, and SFR and SN Ia properties such as $\lambda$ and $\lambda$. A thorough investigation of errors is also necessary to quantify the certainty of any correlations found

**REFERENCES**