



Fermilab: New Perspectives 2023

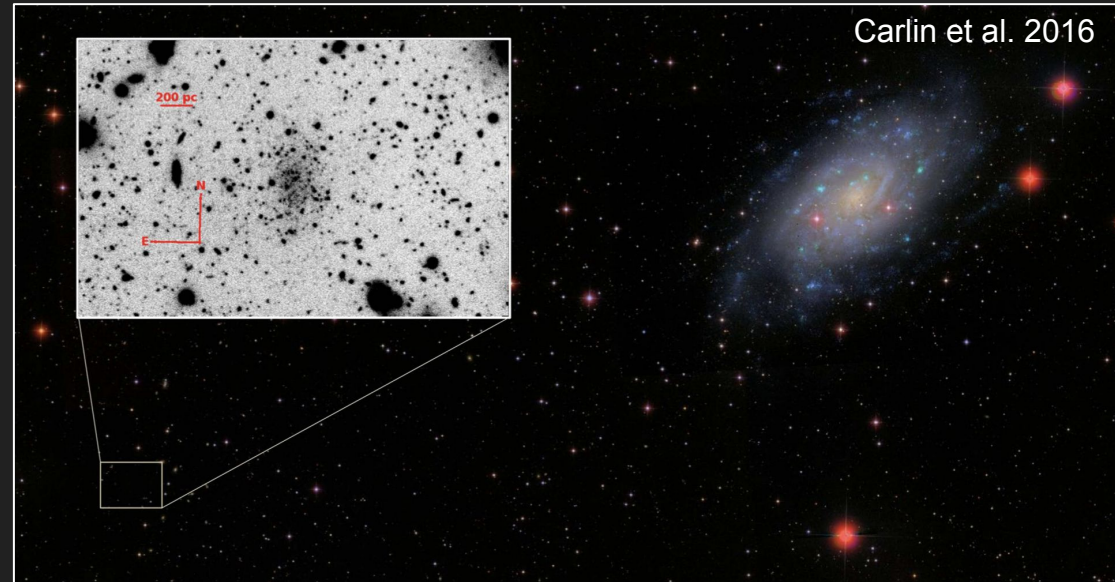
Searching for Dwarf Galaxy Satellites of Isolated, Low-Mass Hosts

Jonah Medoff

Motivation

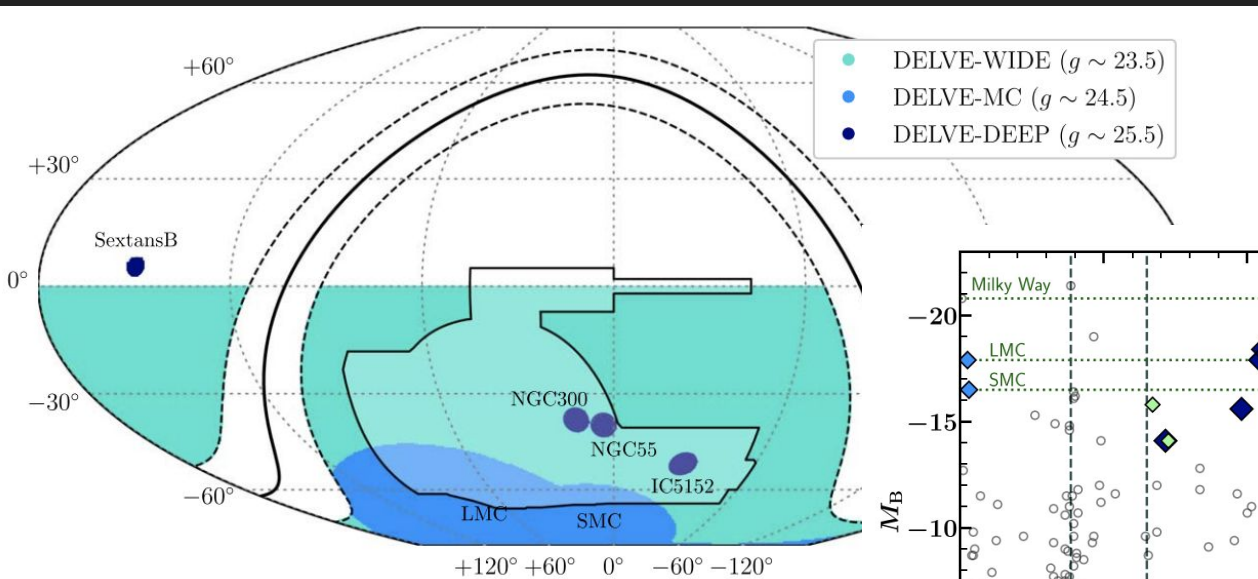
Searching for dwarfs around small hosts beyond the Local Group allows us to...

- Probe galaxy formation and dark matter abundance
- Examine the role of environmental influence in dwarf evolution



DECam Local Volume Exploration (DELVE) – DEEP

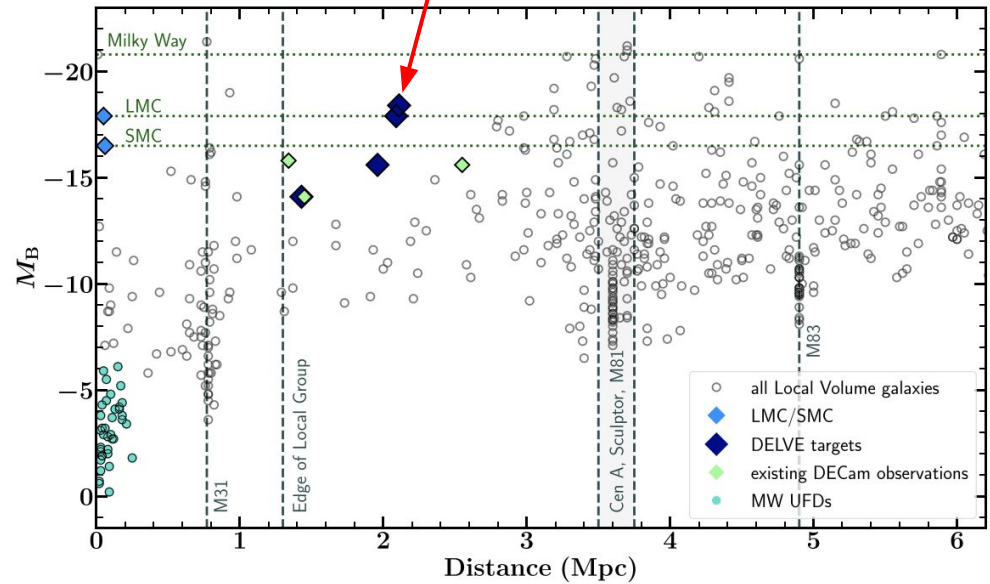
(Dark Energy Camera)



NGC 55

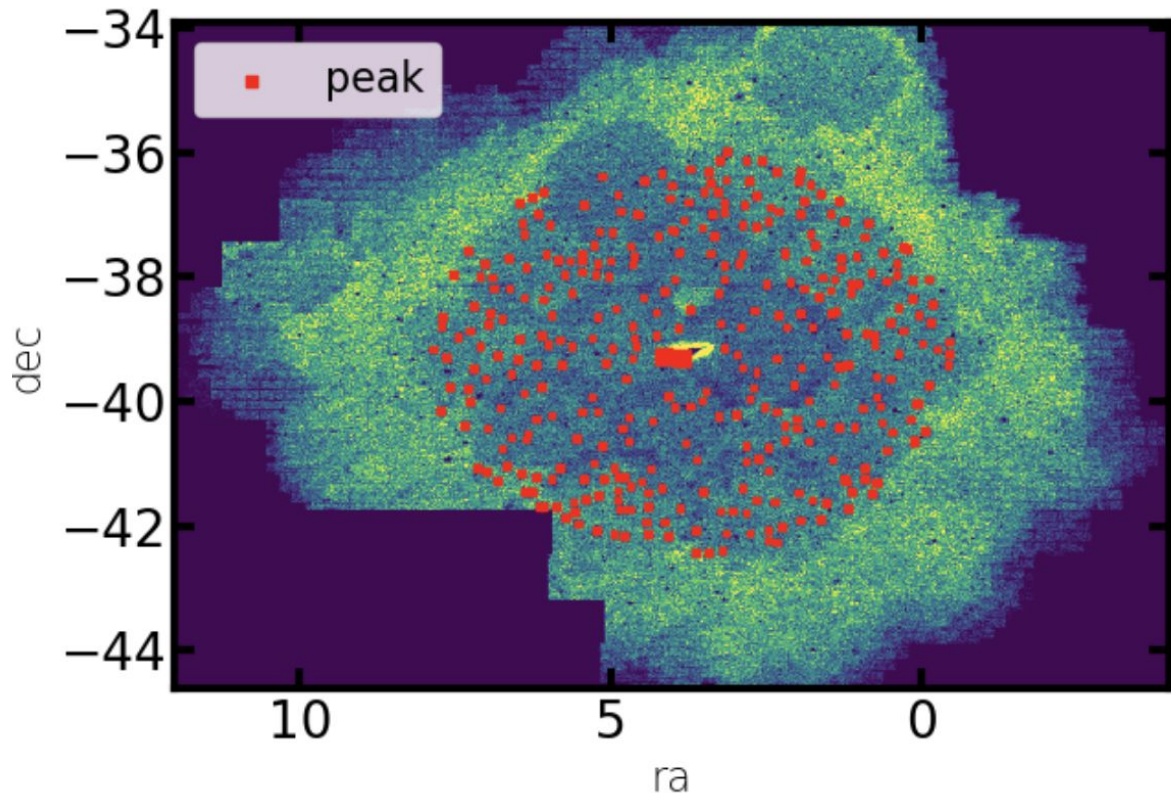
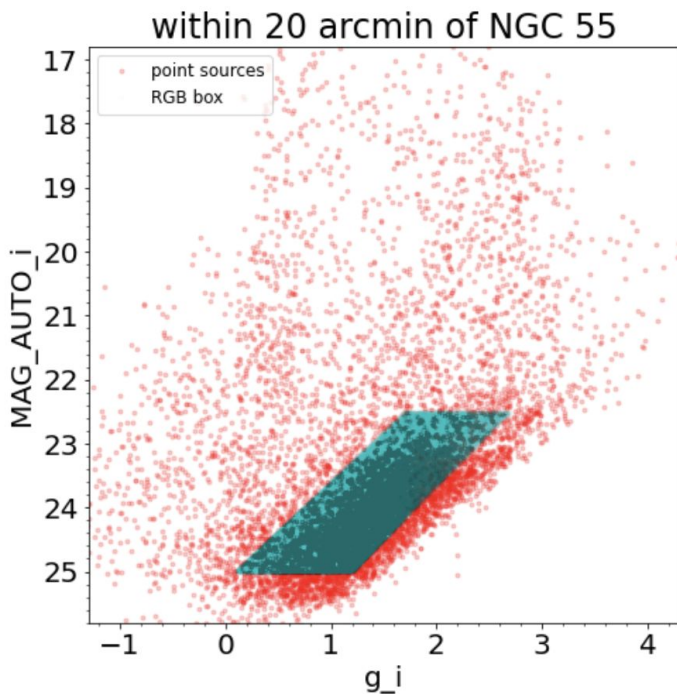
Drlica-Wagner et al. 2021

- Sensitivity to stars >1.5 mags below TRGB, M_V up to -7
- 6-20 expected dwarfs in total around all 4 targets



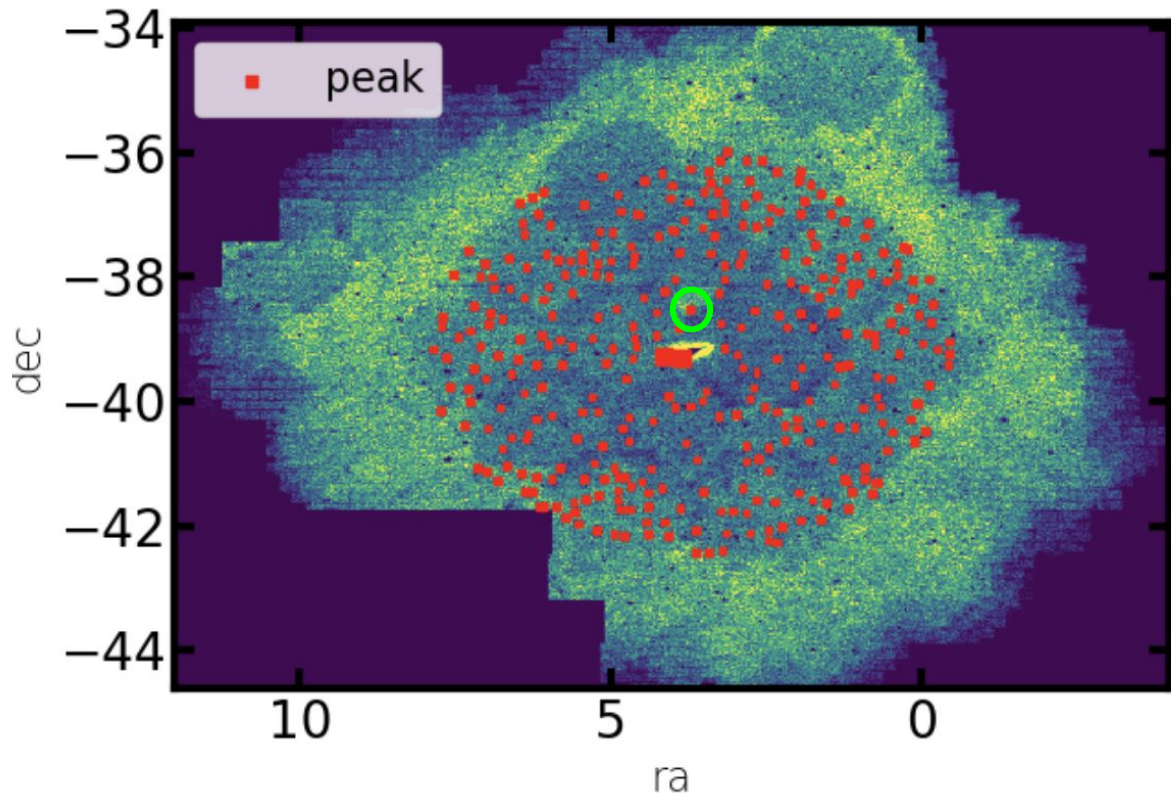
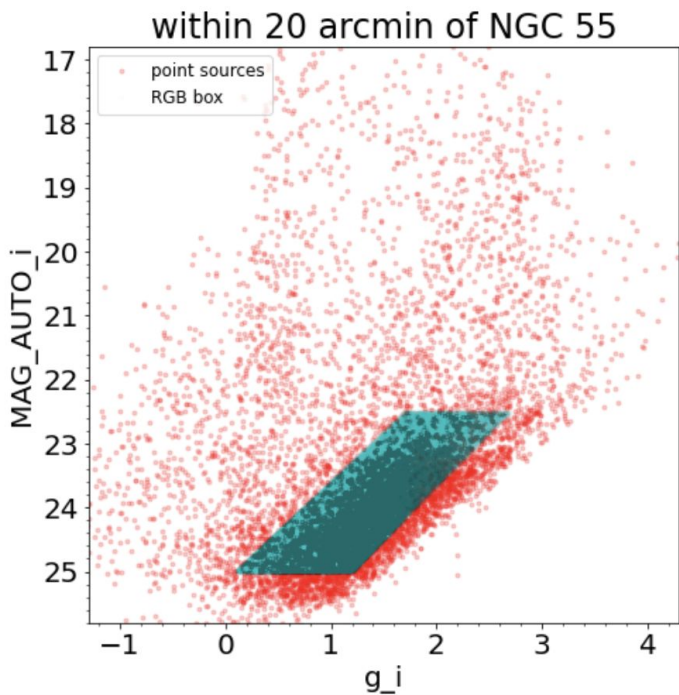
Dwarf search

- 344 peaks \rightarrow



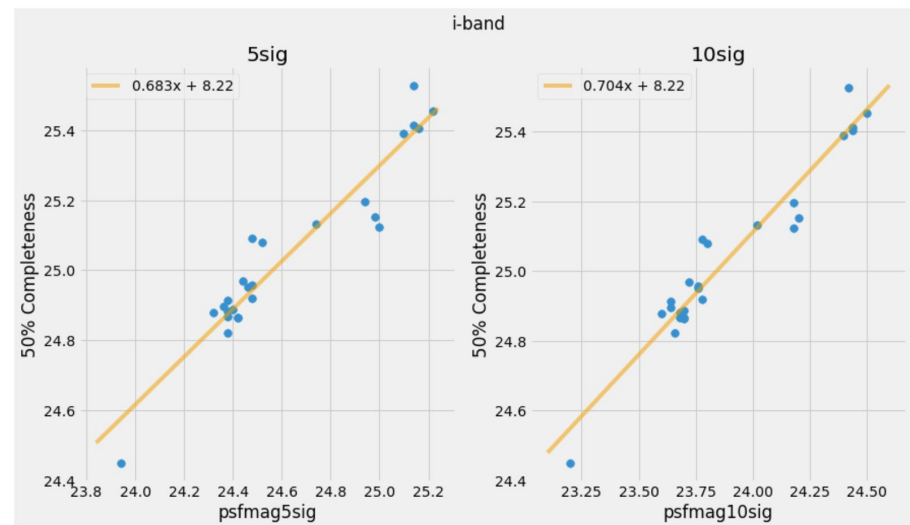
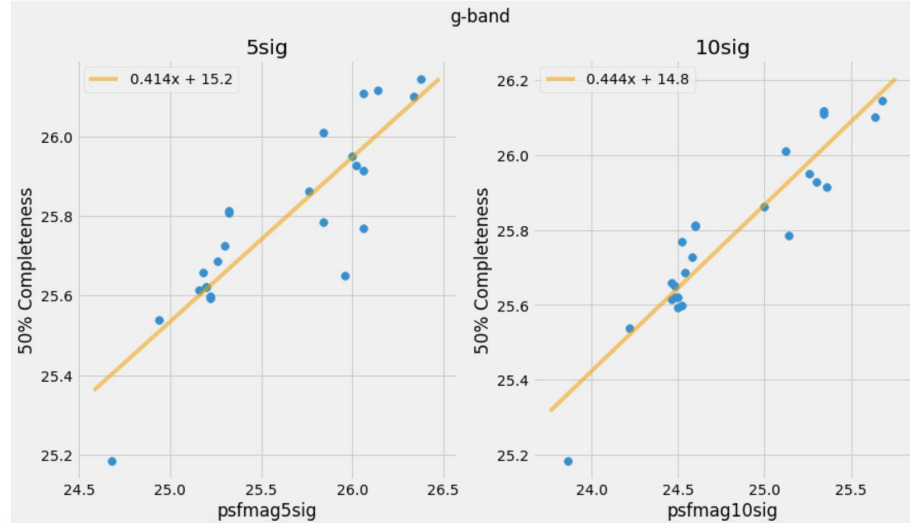
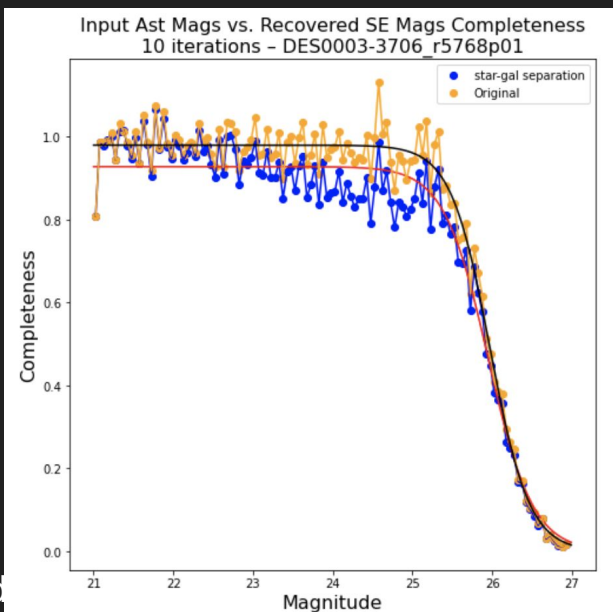
Dwarf search

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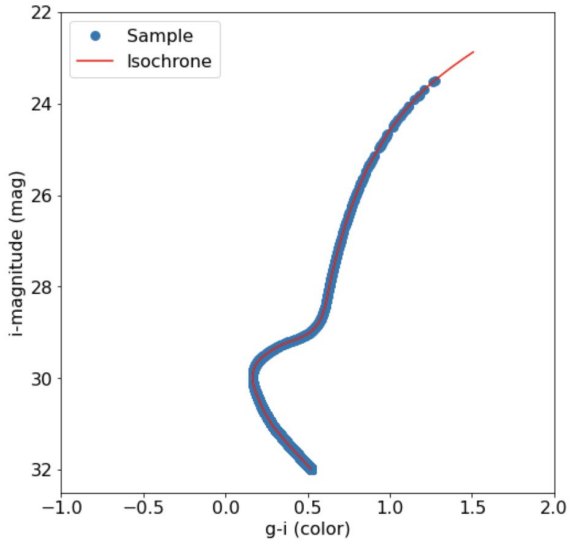
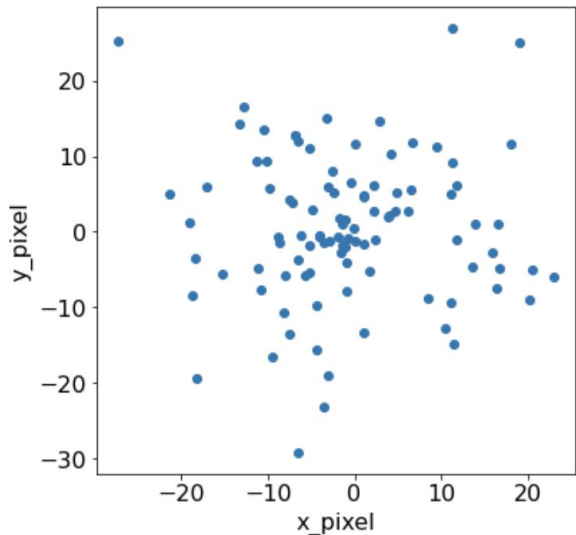
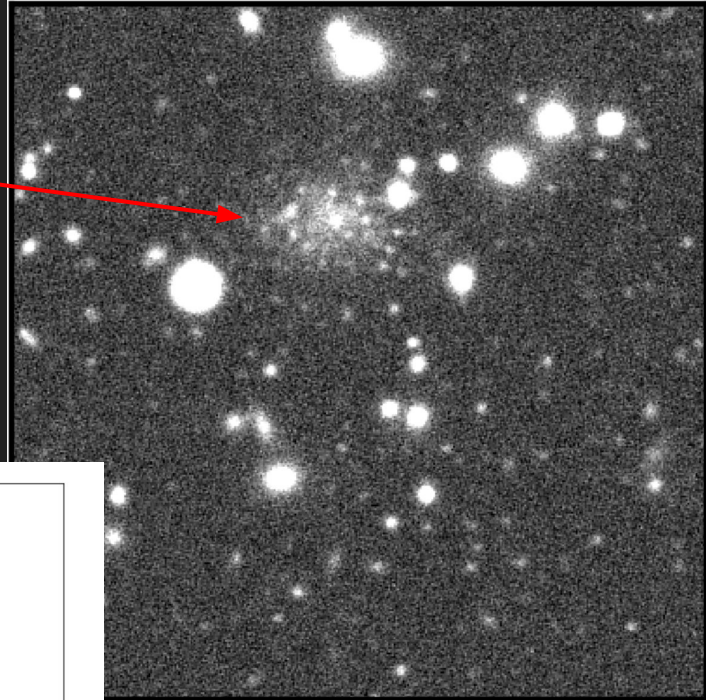
Artificial Star Tests and Completeness

- Artificial stars modeled using GalSim
- Derived completeness of 26 out of ~80 NGC 55 coadds
- Linear relationship between completeness and limiting magnitude



Dwarf Galaxy Injection

- Exponential distribution
- Sampled stars from expected dwarf isochrone
- Injection into coadds rather than catalog



Summary

- Dwarf galaxies are probes of galaxy formation & evolution and dark matter abundance
- DELVE DEEP aims to find dwarfs 4 isolated, low mass galaxies: NGC 55, NGC 300, Sextans B, IC 5152
- Initial dwarf search → 344 peaks
 - Candidate satellite of NGC 55 discovered
- Artificial Star tests to determine completeness of NGC 55 coadds
- Dwarf galaxy injection to measure effectiveness of dwarf detection