

Minimizing Velocity Dispersion Uncertainty in Dwarf Galaxies

Or... taking the dispersion of the
dispersion of a velocity dispersion

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Dwarf Galaxies

- Interact with Milky Way

They have:

- Dark Matter
- Stellar Matter

Different from star clusters which lack DM/aren't DM dominated

Dynamical matter <- dispersion of stellar velocities



LMC* taken by the Kuiper Airborne Observatory in 1987

Question: If you had a finite observing time, how would you minimize the uncertainty of your measurements?

- Observe a few stars for as long as possible?
- Observe as many stars as possible (with less time for each)?

Assume some maximum amount of time, and assume you can simultaneously observe some number of stars. How might you select stars to observe (spectroscopically) to minimize the velocity dispersion uncertainty

Dwarf Galaxy Draco



~80 kpc away, 3×10^5 Msun stellar mass

a larger dwarf galaxy

Dwarf Galaxy Segue 1



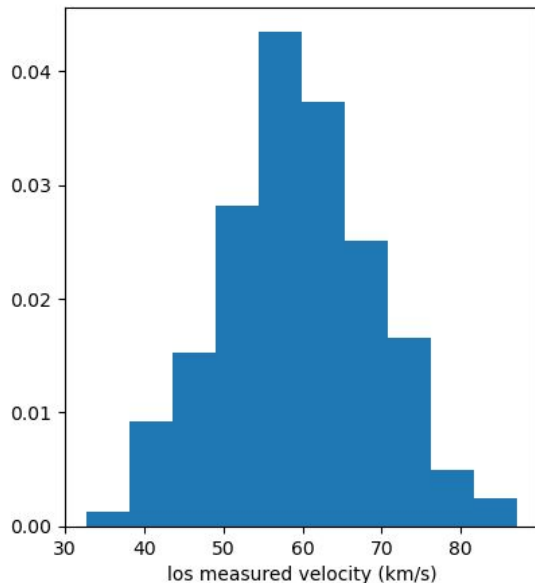
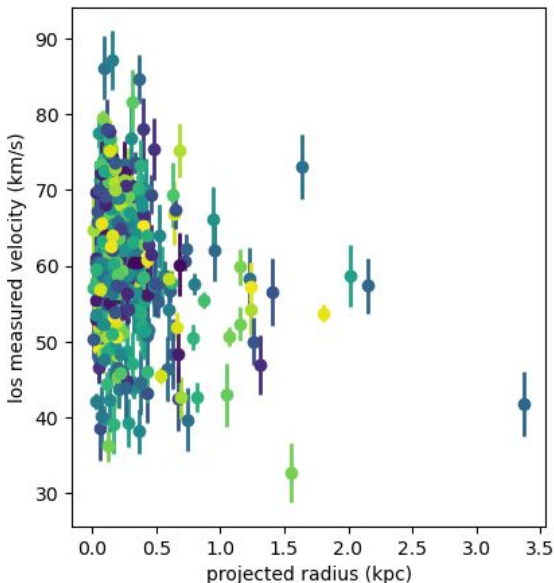
~23 kpc away, ~2k Msun stellar mass

a smaller dwarf galaxy

dsphsim

<https://github.com/kadrlica/dsphsim>

to simulate spectroscopic velocity
measurements of dwarf galaxies



generates stellar velocities assuming DM halo.

independently generates stellar magnitudes from isochrone, converts to velocity measurement uncertainty

#RA	DEC	MAG_G	MAG_I	ANGSEP	RPROJ	SNR	VTRUE	VSTAT	VSYS	VMEAS	VMEASERR	VSYSERR	VERR
53.81688	-53.60258	22.77082	22.40459	0.41188	0.16534	12.53068	58.93309	-0.97965	-3.05706	54.89637	1.52205	2.00000	2.51329
54.04855	-54.02840	23.60100	23.09672	0.04025	0.01616	6.78388	63.66810	-0.70316	1.18774	64.15267	3.17853	2.00000	3.75540
53.89857	-54.04526	21.34655	21.12593	0.07482	0.03004	35.15967	59.65569	0.19237	1.01243	60.86050	0.44131	2.00000	2.04811
54.09343	-54.03136	22.57875	22.23965	0.06323	0.02538	14.51271	61.03604	0.08625	-1.08804	60.03424	1.27615	2.00000	2.37246
54.05341	-54.04219	21.53336	21.29987	0.05258	0.02111	31.30934	63.77625	0.03457	-1.60578	62.20504	0.50721	2.00000	2.06331
54.05027	-53.00007	21.00070	20.07507	0.07605	0.01447	12.65755	60.72121	0.50400	1.50226	61.71066	0.24005	2.00000	2.02020

lets go to

the

jupyter notebook