GALAXIES IN SILHOUETTE

Using Mg II Absorption to Study the Circumgalactic Medium

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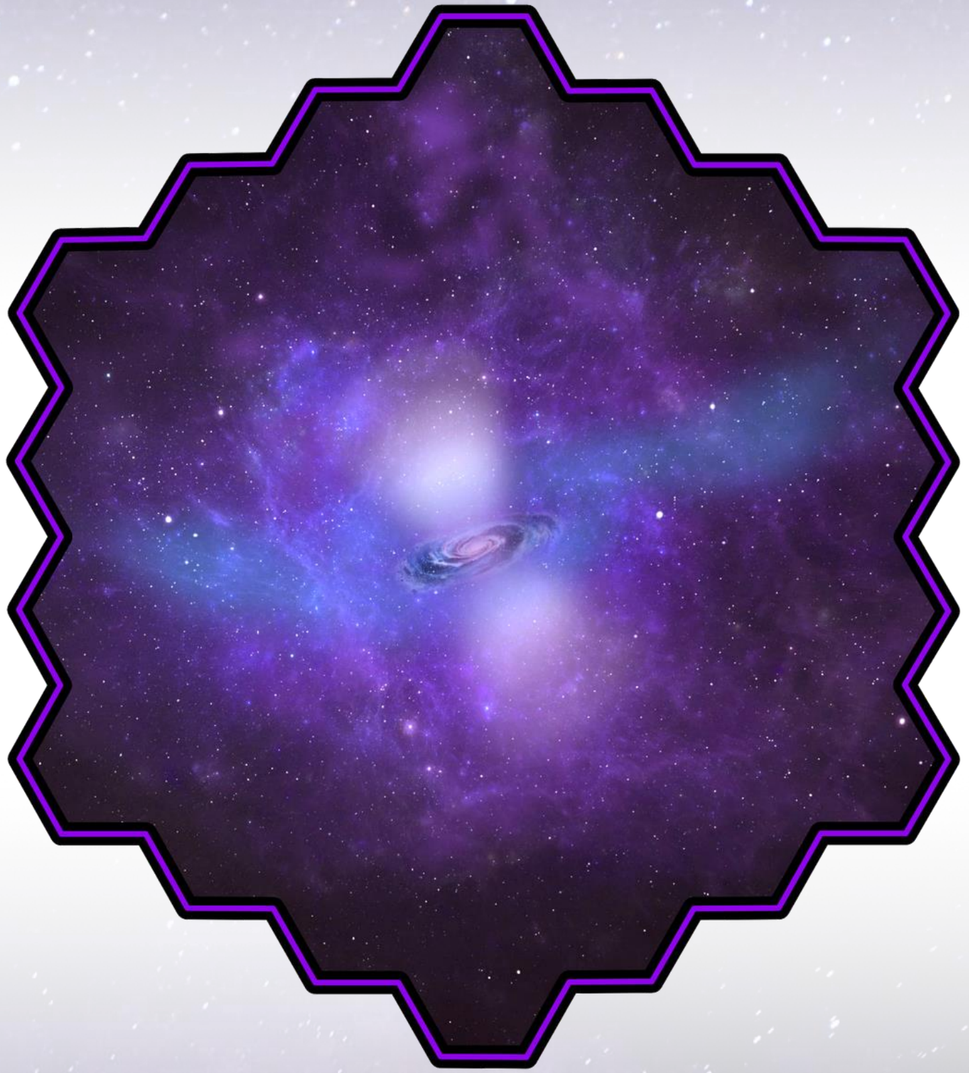


Image Credit: Cristy Roberts from ANU/ASTRO 3D

The CGM

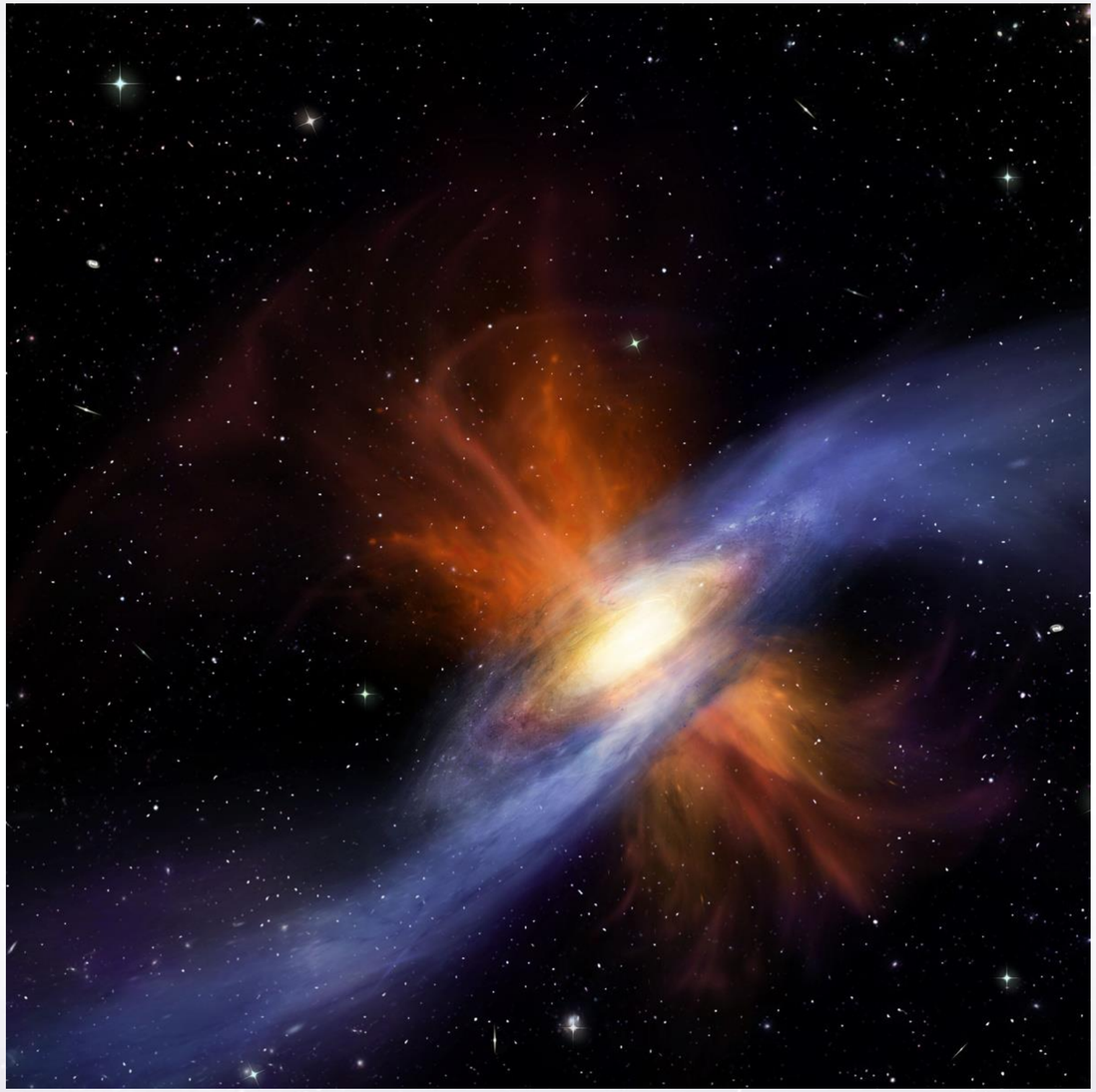


Image Credit: James Josephides

- The CGM is a vast reservoir of gas surrounding a galaxy
- It provides many ways for a galaxy to implement inflows, outflows, and recycling mechanisms that in turn feed the galaxy
- The CGM is part of a broader picture, the Cosmic Ecosystem, that allows us to study galaxy evolution

Magnesium II Absorption

- Probing the background quasars allows astronomers to obtain a continuous absorption spectrum
- The Magnesium II Doublet is an indicator of the cool CGM surrounding the galactic disk

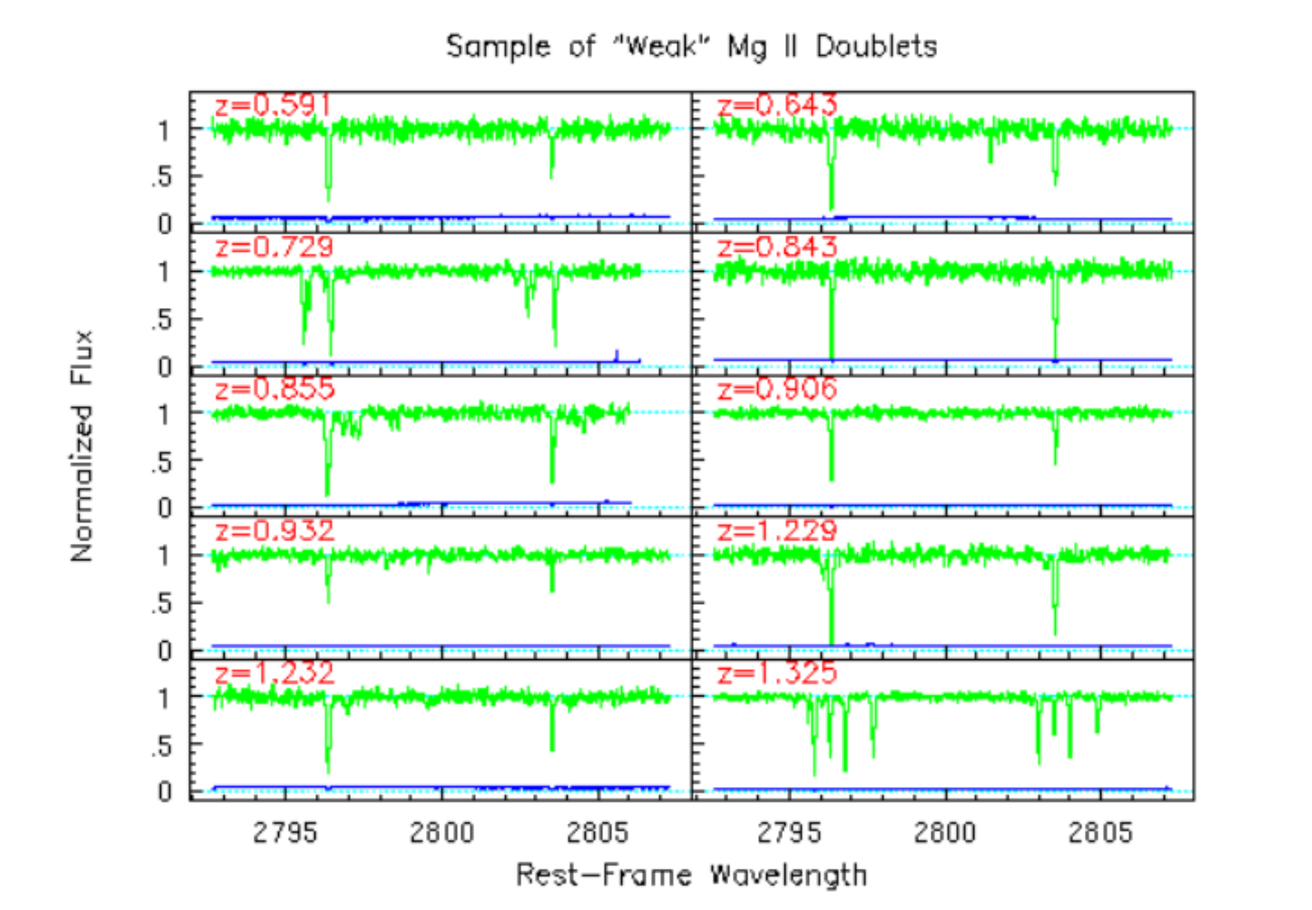


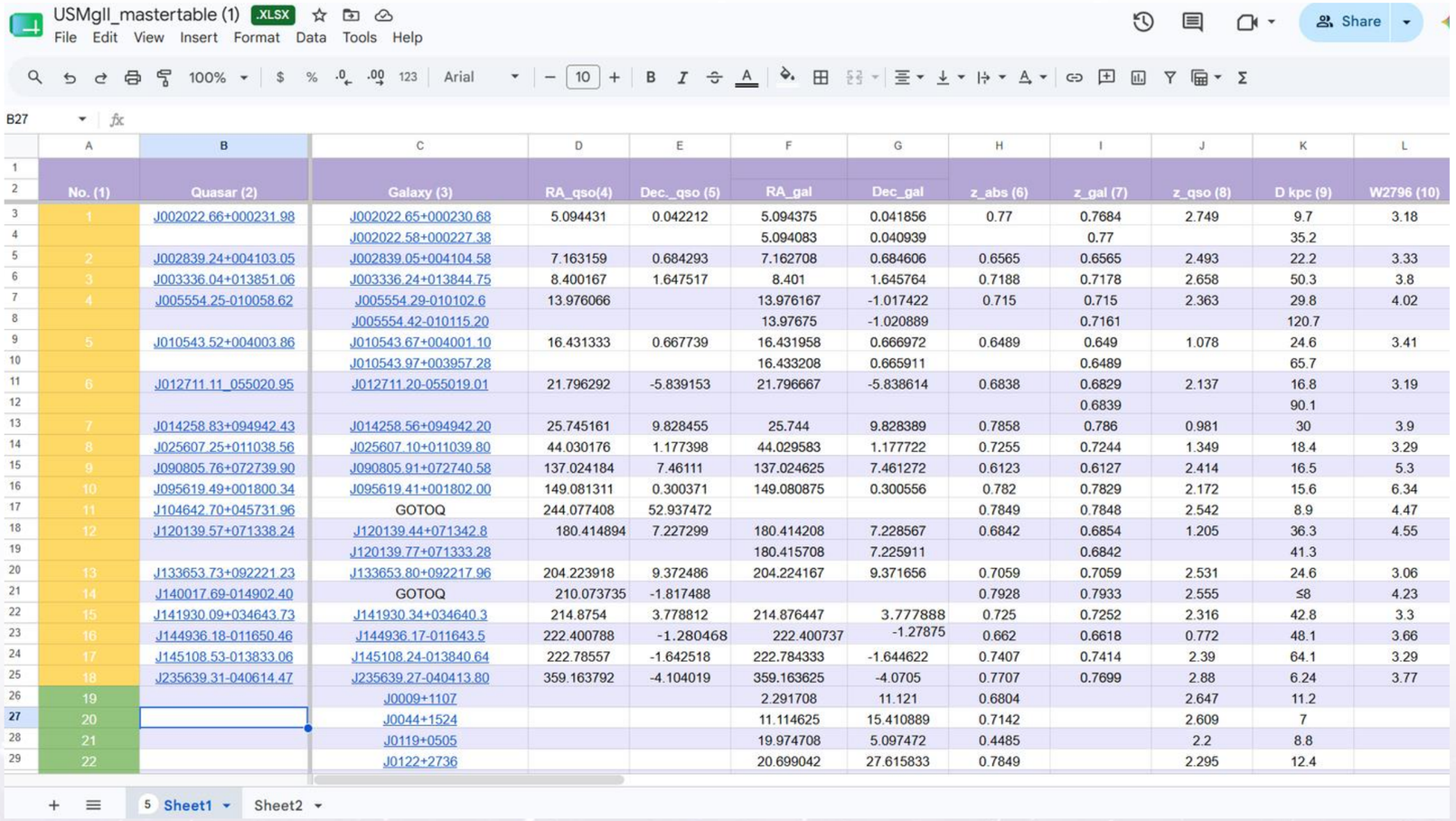
Image credit: Churchill et al. 1999, ApJS, 120, 51

MAGIICAT

Image Credit: Dr. Nikki Nielsen

- Magnesium II Absorber-Galaxy Catalog
- The catalog contains 182 isolated galaxies and their properties
- The goal of Magiicat is to standardize data from literature in order to use observational trends to explain evolutionary processes

My Contribution



USMgII_mastertable (1) .XLSX

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	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	No. (1)	Quasar (2)	Galaxy (3)	RA_qso(4)	Dec._qso (5)	RA_gal	Dec_gal	z_abs (6)	z_gal (7)	z_qso (8)	D kpc (9)	W2796 (10)
3	1	J002022.66+000231.98	J002022.65+000230.68	5.094431	0.042212	5.094375	0.041856	0.77	0.7684	2.749	9.7	3.18
4			J002022.58+000227.38			5.094083	0.040939		0.77		35.2	
5	2	J002839.24+004103.05	J002839.05+004104.58	7.163159	0.684293	7.162708	0.684606	0.6565	0.6565	2.493	22.2	3.33
6	3	J003336.04+013851.06	J003336.24+013844.75	8.400167	1.647517	8.401	1.645764	0.7188	0.7178	2.658	50.3	3.8
7	4	J005554.25-010058.62	J005554.29-010102.6	13.976066		13.976167	-1.017422	0.715	0.715	2.363	29.8	4.02
8			J005554.42-010115.20			13.97675	-1.020889		0.7161		120.7	
9	5	J010543.52+004003.86	J010543.67+004001.10	16.431333	0.667739	16.431958	0.666972	0.6489	0.649	1.078	24.6	3.41
10			J010543.97+003957.28			16.433208	0.665911		0.6489		65.7	
11	6	J012711.11_055020.95	J012711.20-055019.01	21.796292	-5.839153	21.796667	-5.838614	0.6838	0.6829	2.137	16.8	3.19
12									0.6839		90.1	
13	7	J014258.83+094942.43	J014258.56+094942.20	25.745161	9.828455	25.744	9.828389	0.7858	0.786	0.981	30	3.9
14	8	J025607.25+011038.56	J025607.10+011039.80	44.030176	1.177398	44.029583	1.177722	0.7255	0.7244	1.349	18.4	3.29
15	9	J090805.76+072739.90	J090805.91+072740.58	137.024184	7.46111	137.024625	7.461272	0.6123	0.6127	2.414	16.5	5.3
16	10	J095619.49+001800.34	J095619.41+001802.00	149.081311	0.300371	149.080875	0.300556	0.782	0.7829	2.172	15.6	6.34
17	11	J104642.70+045731.96	GOTOQ	244.077408	52.937472			0.7849	0.7848	2.542	8.9	4.47
18	12	J120139.57+071338.24	J120139.44+071342.8	180.414894	7.227299	180.414208	7.228567	0.6842	0.6854	1.205	36.3	4.55
19			J120139.77+071333.28			180.415708	7.225911		0.6842		41.3	
20	13	J133653.73+092221.23	J133653.80+092217.96	204.223918	9.372486	204.224167	9.371656	0.7059	0.7059	2.531	24.6	3.06
21	14	J140017.69-014902.40	GOTOQ	210.073735	-1.817488			0.7928	0.7933	2.555	≤8	4.23
22	15	J141930.09+034643.73	J141930.34+034640.3	214.8754	3.778812	214.876447	3.777888	0.725	0.7252	2.316	42.8	3.3
23	16	J144936.18-011650.46	J144936.17-011643.5	222.400788	-1.280468	222.400737	-1.27875	0.662	0.6618	0.772	48.1	3.66
24	17	J145108.53-013833.06	J145108.24-013840.64	222.78557	-1.642518	222.784333	-1.644622	0.7407	0.7414	2.39	64.1	3.29
25	18	J235639.31-040614.47	J235639.27-040413.80	359.163792	-4.104019	359.163625	-4.0705	0.7707	0.7699	2.88	6.24	3.77
26	19		J0009+1107			2.291708	11.121	0.6804		2.647	11.2	
27	20		J0044+1524			11.114625	15.410889	0.7142		2.609	7	
28	21		J0119+0505			19.974708	5.097472	0.4485		2.2	8.8	
29	22		J0122+2736			20.699042	27.615833	0.7849		2.295	12.4	

Sheet1 Sheet2

- A second data curation for Magiicat is underway
- My set of papers covers recent USMgII absorber surveys
- Properties such as RA, Declination, redshifts, and luminosity and color have been pulled from the paper so far

Impact Parameter

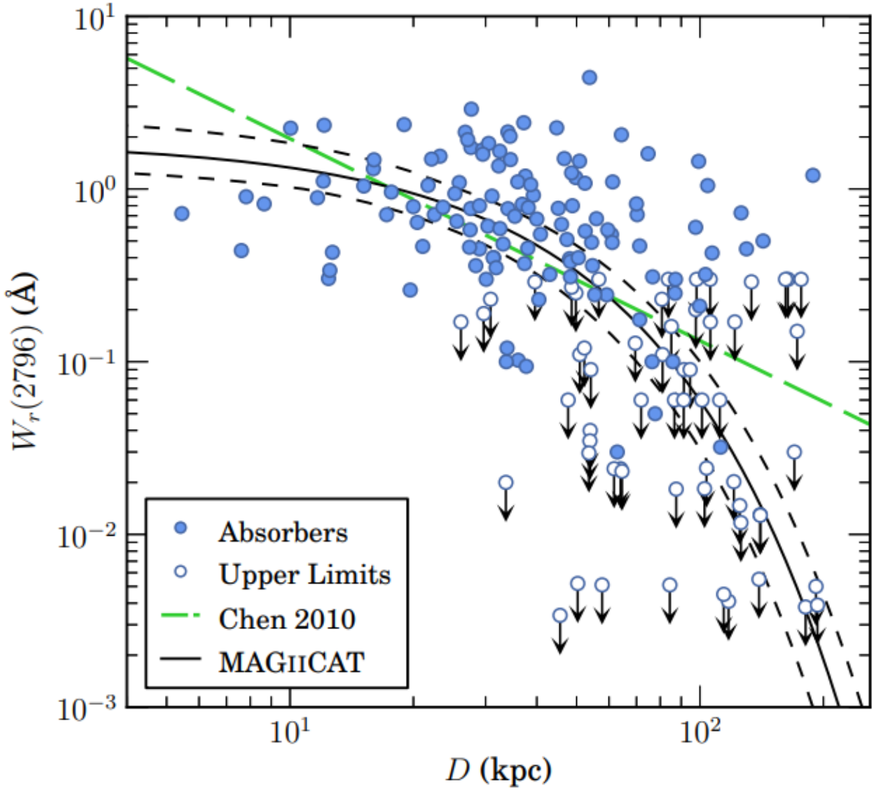

Image Credit:Nielsen, Nikole M., et al. "MAGIICAT II. GENERAL CHARACTERISTICS OF THE Mg II ABSORBING CIRCUMGALACTIC MEDIUM." The Astrophysical Journal, edited by , vol. 776, no. 2, Oct. 2013, p. 115. Crossref, https://doi.org/10.1088/0004-637x/776/2/115.

- Using QSO and Galactic coordinates, angular separation and impact parameter quantities can be calculated
- A commonly known trend of Mg II absorbers is the anticorrelation between equivalent width and impact parameter
- The next step is determining whether this trend is valid as the Mg II absorber sample increases

Questions?

Resources

Churchill, Christopher W., et al. “The Population of Weak Mg Absorbers. I. A Survey of 26 QSO HIRES/Keck Spectra.” The Astrophysical Journal Supplement Series, edited by , vol. 120, no. 1, Jan. 1999, pp. 51–75. Crossref, https://doi.org/10.1086/313168.

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