

Table of Content

1. Introduction	1
1.1. Motivation	1
1.2. The circumgalactic medium	2
1.2.1. Baryon cycle	3
1.3. Advances in CGM science used in the present thesis	4
1.3.1. CGM in absorption	4
1.3.2. Mg II absorption data	6
1.3.3. Equivalent width	8
1.3.4. Velocity Two-point correlation function	10
1.4. This Thesis	13
2. Modeled data	14
2.1. The model	14
2.1.1. Model geometry	14
2.1.2. Mg II clouds	18
2.1.3. Cloud kinematics	22
2.2. Absorption line spectra	24
2.3. Synthetic catalogs of spectra	29
2.3.1. Geometrical parameters	29
2.3.2. Mg II clouds	31
2.3.3. Velocity parameters	31
2.3.4. Absorption line parameters	32
3. Model comparison with QSO statistics	35
3.1. Equivalent width vs. impact parameter	35
3.2. Two-point correlation function	39
3.3. Markov Chain Monte Carlo	41
3.3.1. The Likelihood function	42
3.3.2. Priors	43
3.3.3. Computational times	43
4. Results	45
4.1. Filling factor	45
4.2. MCMC results	50
4.2.1. $W_r - d/R_{\text{vir}}$ relations	56
4.2.2. Number of clouds	59
4.3. Two-point correlation function results	61
4.4. Summary of the results	63

5. Discussion and Conclusions	65
5.1. Discussion	65
5.1.1. MgII spatial distribution	65
5.1.2. Kinematics of the CGM	67
5.2. Summary and conclusions	68
5.3. Future work	69
Bibliography	70