

Contents

1	An Introduction to Disk Evolution of Dwarf Galaxies	1
1.1	Dwarf Irregular Galaxies	1
1.2	Star Formation in Dwarf Irregular Galaxies	4
1.3	Star Formation Histories of Dwarf Irregular Galaxies	5
1.3.1	The Technique: Evolutionary Population Synthesis	6
1.4	Evolution of Galactic Disk: Spirals Versus dIrrs	10
1.5	Turbulence, Power Spectra and Multiphase Neutral H I	12
1.5.1	The ISM Turbulence and Power Spectra	12
1.5.2	Velocity Channel Analysis and Cold H I in dIrr Galaxies	13
1.6	Dwarf Galaxies in a Λ CDM Cosmological Context	14
	References	15
2	Stellar Disk Evolution of Nearby Dwarf Galaxies	21
2.1	The Sample	21
2.1.1	Parent Sample of LITTLE THINGS	22
2.1.2	LITTLE THINGS: A Representative Sample of Nearby Dwarf Irregular Galaxies	23
2.1.3	A Subsample of LITTLE THINGS for Studying the Stellar Disk Evolution	29
2.2	Data	33
2.2.1	GALEX FUV/NUV	33
2.2.2	Optical <i>UBV</i>	33
2.2.3	Narrow-Band H α Imaging	34
2.2.4	<i>Spitzer</i> 3.6 μ m	34
2.3	Surface Photometry	35
2.4	Multi-wavelength Surface Brightness Profiles	37
2.5	SED Modeling Technique	40
2.5.1	Creating a Library of Star Formation Histories	40
2.5.2	Determining the Physical Parameters	41

2.5.3	Correcting the <i>GALEX</i> NUV Data for Galactic Extinction	42
2.5.4	Testing the SED Modeling Techinque on Mock Dataset	43
2.6	Results of SED Modeling to Our Sample Galaxies	46
2.6.1	Integrated SED-Based Versus Stellar CMD-Based SF Histories	49
2.6.2	Globally Integrated SF Histories	50
2.6.3	Azimuthally Averaged Radial Star Formation Histories	52
2.6.4	Stellar Mass Surface Density Profiles	65
2.7	Discussions	67
2.7.1	The Disk Assembly Mode of dIrr Galaxies: Outside-In	67
2.7.2	The Relationship Between Σ_{SFR} , $\Sigma_{\star}$ and Star Formation History	73
2.8	Summary	75
	References	76
3	Gaseous Disk Turbulence of Nearby Dwarf Irregular Galaxies	81
3.1	Sample and Observing	81
3.2	Data Reduction	84
3.3	Power Spectrum Variations with Channel Width	88
3.4	Comparison with a Visibility-Based Estimation of Power Spectra	94
3.5	Effective Velocity Slice Width and Multiphase Neutral H I	96
3.6	Power Spectral Index Versus SF	101
3.7	Power Spectral Index Versus Baryonic Mass	107
3.8	The Turbulent Velocity Field	108
3.9	Summary	110
	References	111
4	Blue Compact Dwarf Galaxies Formed Through Gravitational Torques	115
4.1	The Context: “BCD” as an Extreme Version of Dwarf Irregulars	115
4.2	Clump Accretion in BCDs	118
4.2.1	The Case with a Few Giant Clumps	118
4.2.2	Clumps with a Power Law Mass Function	122
4.2.3	Clump–Clump Interactions	123
4.3	Observations of Clump Properties in Dwarf Irregulars and BCD Galaxies	124
4.3.1	Clump Mass Fractions and Accretion Times	124
4.3.2	Galaxy Thickness and Scale Length Ratios	128

4.4	Summary	129
	References	130
5	Summary	135
5.1	Main Findings of This Thesis Work	135
5.2	Recent Development in the Literature	136
5.2.1	Observational Studies	136
5.2.2	Theories and Numerical Simulations	138
5.3	Closing Remarks	141
	References	141
 Appendix A: Starburst Triggering Process in “Giant” Irregular Galaxies: Spiral–Spiral Merger		 143