

## 13 : GALAXY GROUPS & CLUSTERS

### (13.1) Introduction

### (13.2) Cluster Surveys and Catalogs

- (a) Optical Identification
  - (i) Abell : Catalog of Rich Clusters
  - (ii) Zwicky : The CGCG
  - (iii) Automated Digital Catalogs
- (b) X-ray Identification
- (c) Other (Future) Methods of Identification

### (13.3) Cluster Classification

### (13.4) Important Timescales

- (a) Crossing Time
- (b) Violent Relaxation Time
- (c) 2-Body & Dynamical Friction Times

### (13.5) Cluster Shapes & Kinematics

- (a) "Smoothed" Properties
- (b) Substructures

### (13.6) Two Nearby Examples : Virgo & Coma

### (13.7) The Morphology-Density Relation

- (a) Early Work at Low Redshift
- (b) Possibly Relevant Physical Processes
- (c) HI Deficiency & Stripping
- (d) Recent Work at High Redshift
- (e) Caveat

### (13.8) Luminosity Functions

### (13.9) cD Galaxies

### (13.10) The Hot Intercluster Medium

- (a) Simple Physics
- (b) Hydrostatic Atmosphere & "Beta" Models
- (c) X-ray Correlations
- (d) Abundances (& Temperatures)
- (e) Cooling Flows
- (f) Radio Sources & the ICM
- (g) ICM Substructures & Cluster Mergers

### (13.11) Cluster Masses