

星系结构和动力学

束 成 钢

(中国科学院上海天文台 上海 200030)

摘 要

从星系形成和演化的角度出发,对星系结构和动力学进行粗略的评述。内容包括:(1)初步描述了星系中各主要成分的物理特征(空间分布、运动学和化学)及其形成和演化;(2)Damped Lyman- α systems (DLAs)是本地星系的化石,对其进行观测研究是 HST 的主要任务之一,对 DLAs 宽的谱线轮廓的物理机制和其恒星形成、化学演化进行了讨论;(3)目前已证明 Lyman Break 方法是发现高红移高恒星形成星系的有效手段,讨论了 Lyman Break Galaxies 的动力学过程和恒星形成;(4)旋涡星系和椭圆星系的 Scaling Law 是星系形成和演化所必须解释的问题,对近期该方面的研究结果作了介绍;(5)整体超新星的反馈作用在星系形成和演化中起了重要作用,评述了该物理过程对星系演化的影响;(6)随着观测资料的不断积累,各种物体对河外背景辐射的贡献已成为一个重要的研究方向,讨论了宇宙整体的恒星形成历史和化学演化;(7)银河系是进行星系形成和演化研究的归算零点,介绍了银河系的结构、动力学及演化。

关键词 星系形成—动力学演化—恒星形成

分类号 P157

Structure and Dynamics of Galaxies

Shu Chenggang

(Shanghai Astronomical Observatory, Chinese Academy of Sciences, Shanghai 200030)

Abstract

Structure and dynamics of galaxies are reviewed from the point of galactic formation and evolution scenario. The content includes: (1) Physical characteristics (such as space distribution, dynamical and chemical properties) of main ingredients of galaxies and their formation and evolution are described. (2) Damped Lyman- α systems (DLAs) are believed to be proto-galaxies of the local galaxies. DLAs observation is one of the main targets of HST. Formation mechanism for wide spectral profile, star formation and chemical evolution of DLAs are discussed. (3) Lyman Break technique has been proven to be a powerful tool to discover galaxies with high star formation rate at high redshift. Dynamical and star formation processes of Lyman break galaxies are discussed. (4) Scaling law of spiral and elliptical galaxies is one of questions needed to be explained by theories of galactic formation and evolution. Recent progress in the scaling law of galaxies is reviewed. (5) Feedback process of supernova explosion has important effect on galactic formation and evolution. Its influence on galactic evolution is reviewed. (6) Contributions of different objects on extragalactic radiation background have already become one important research object due to accumulation of observational data. Cosmic star formation history and chemical evolution are discussed. (7) Milky Way galaxy is regarded as a standard for exploring galactic formation and evolution. Structure, dynamics and evolution of the Milky Way are introduced.

Key words galaxy formation—dynamical evolution—star formation