Estructura de Gran Escala
LSS

Catálogos

Observaciones

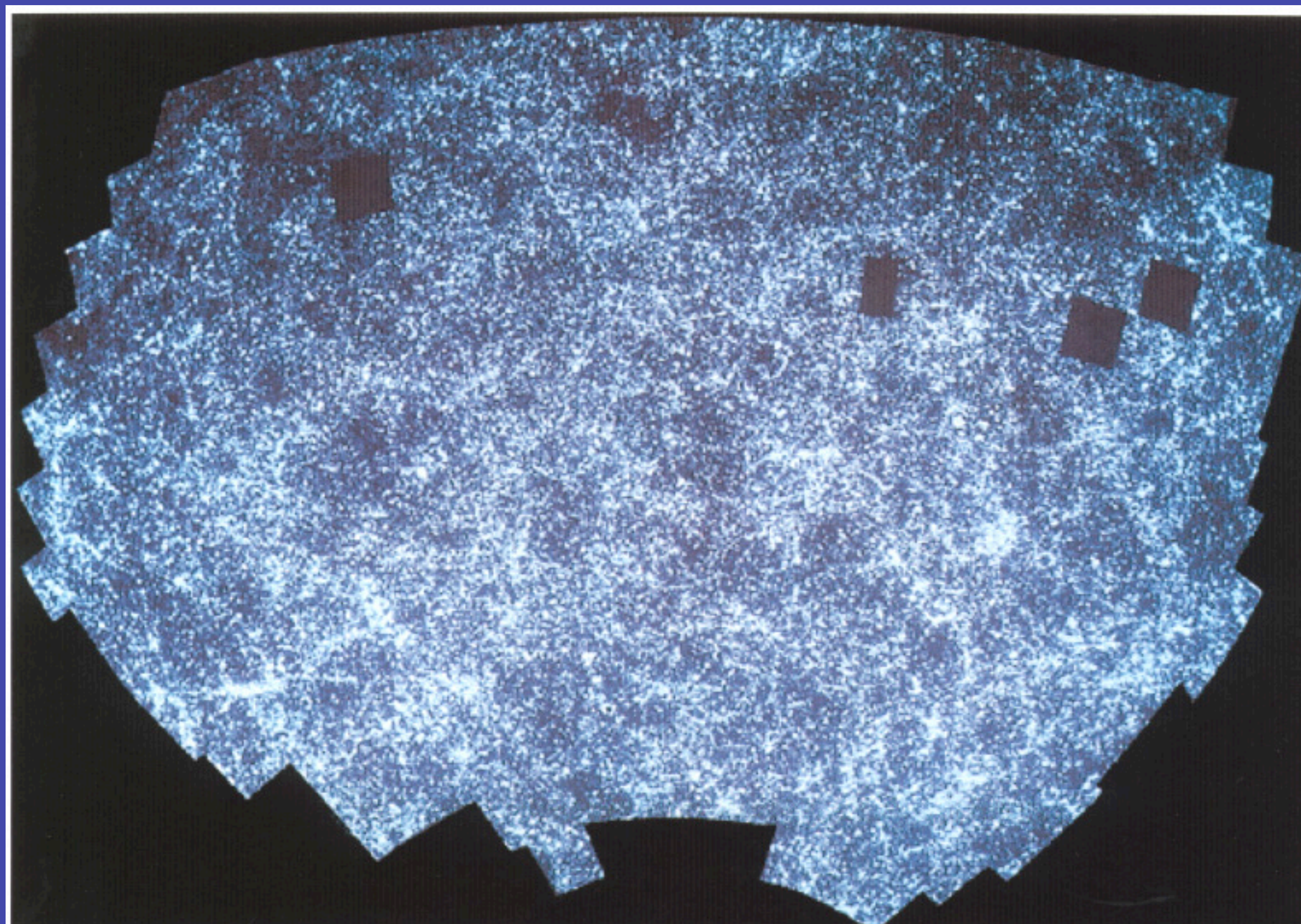
Métodos Estadísticos

- Funciones de Correlación
- Espectro de Potencia

Observaciones
Catálogos
Distribución de Galaxias

Catálogos Fotométricos

Catálogos de Redshift



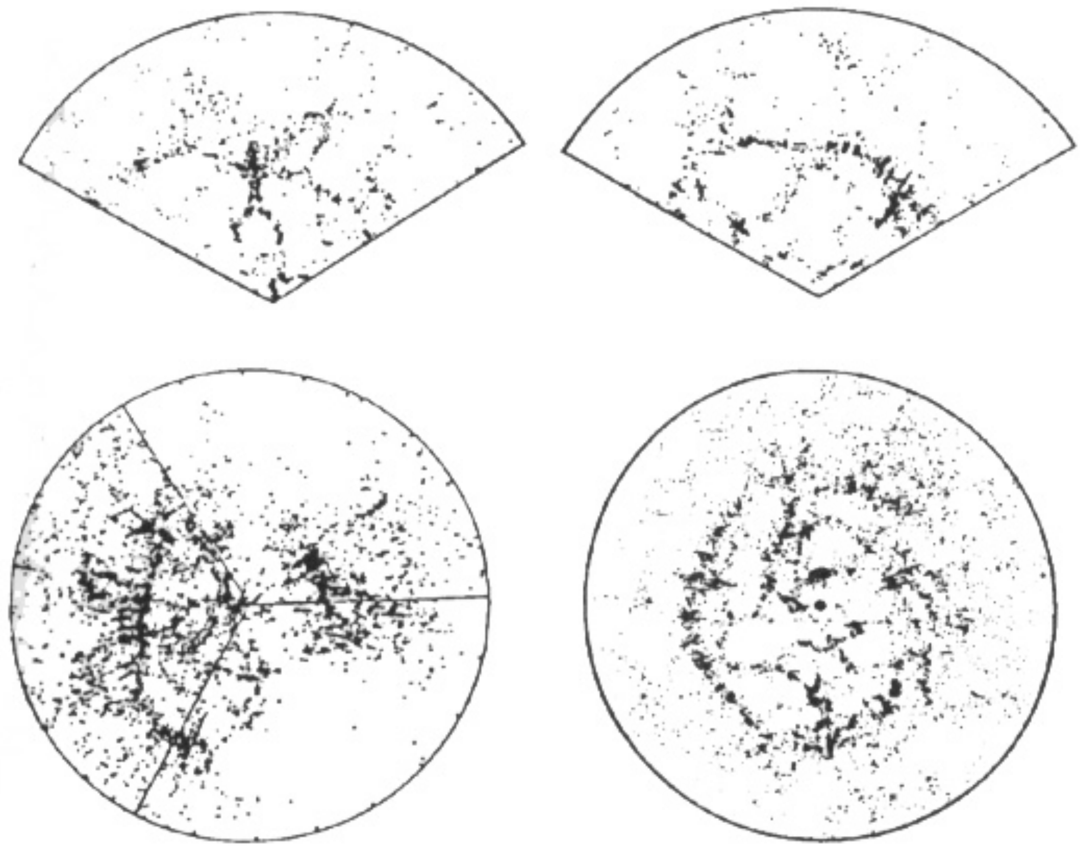


Figure 4.3: Redshift cone diagrams for observed (CfA survey) and simulated (CDM cosmology with $\Omega_m h = 0.3$) galaxy (mass) distributions in the present universe. Which are data and which are simulations? The similarity of the two indicates the underlying success of basic cosmology in reproducing the observed structure.

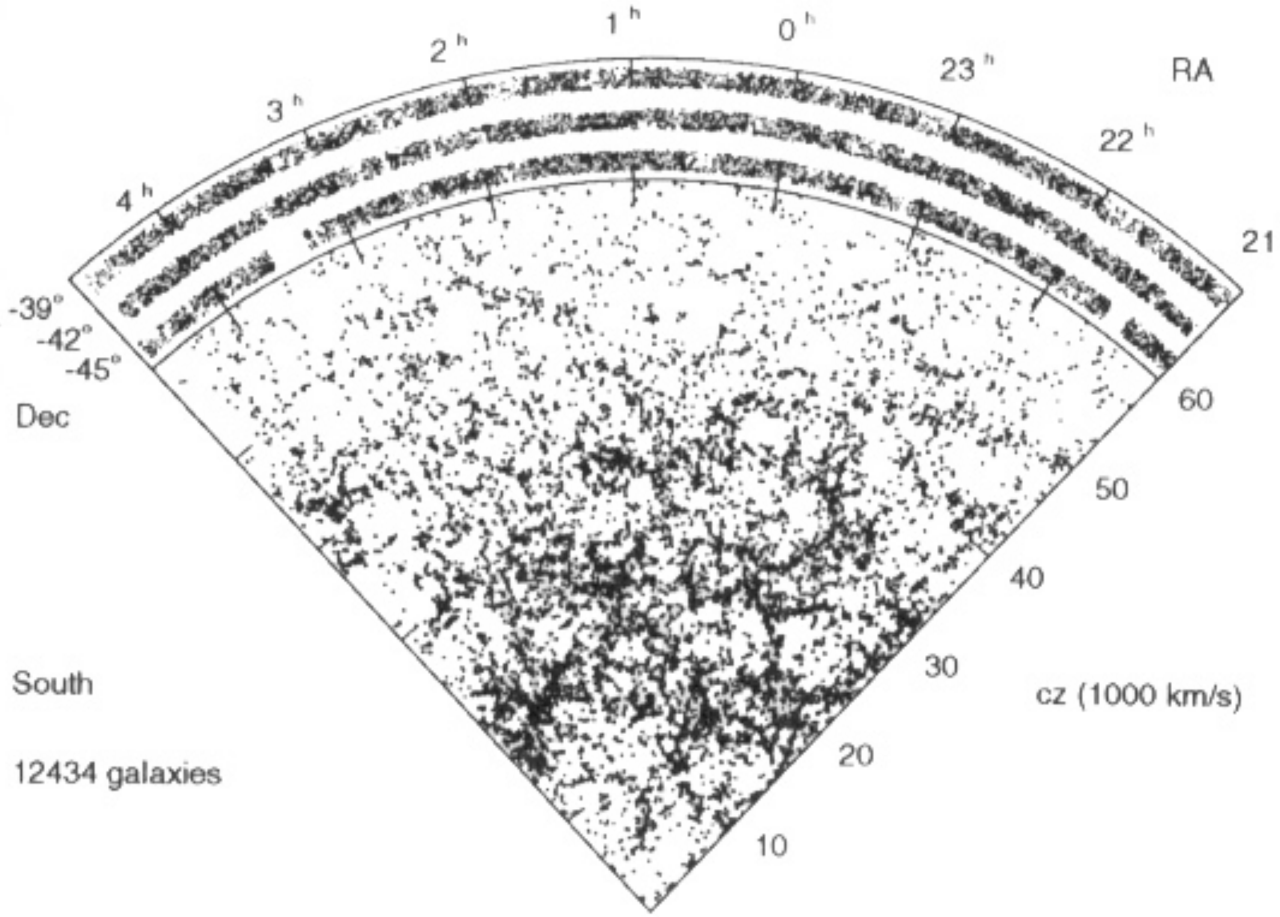


Figure 4.1: Redshift cone diagram for galaxies in the Las Campanas survey [35].

SDSS

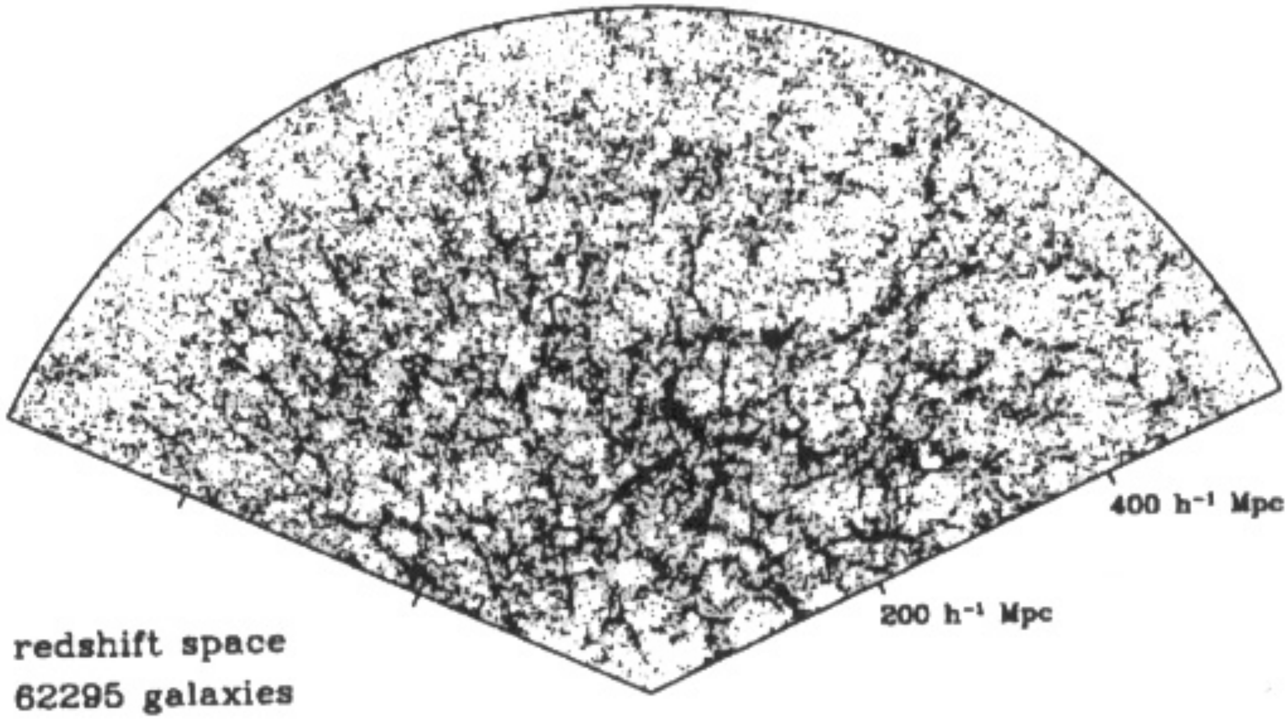
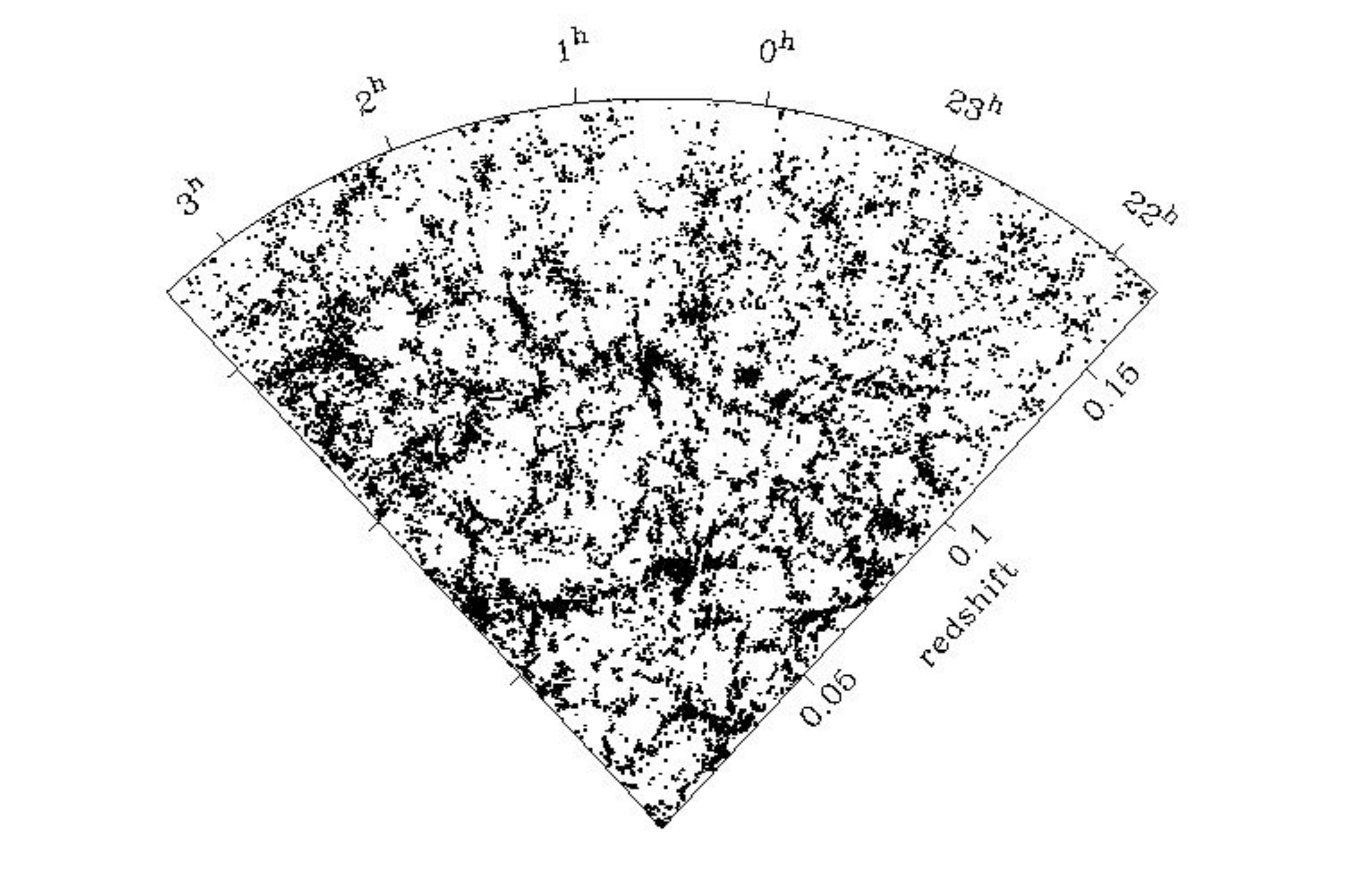


Figure 4.2: The redshift-space distribution of galaxies in a 6° thick slice along the SDSS survey equator from a large N-body cosmological simulation (cold-dark-matter with $\Omega_m h \simeq 0.24$; Gott, et al., in preparation). This slice contains approximately 6% of the 10^6 galaxies in the spectroscopic survey.



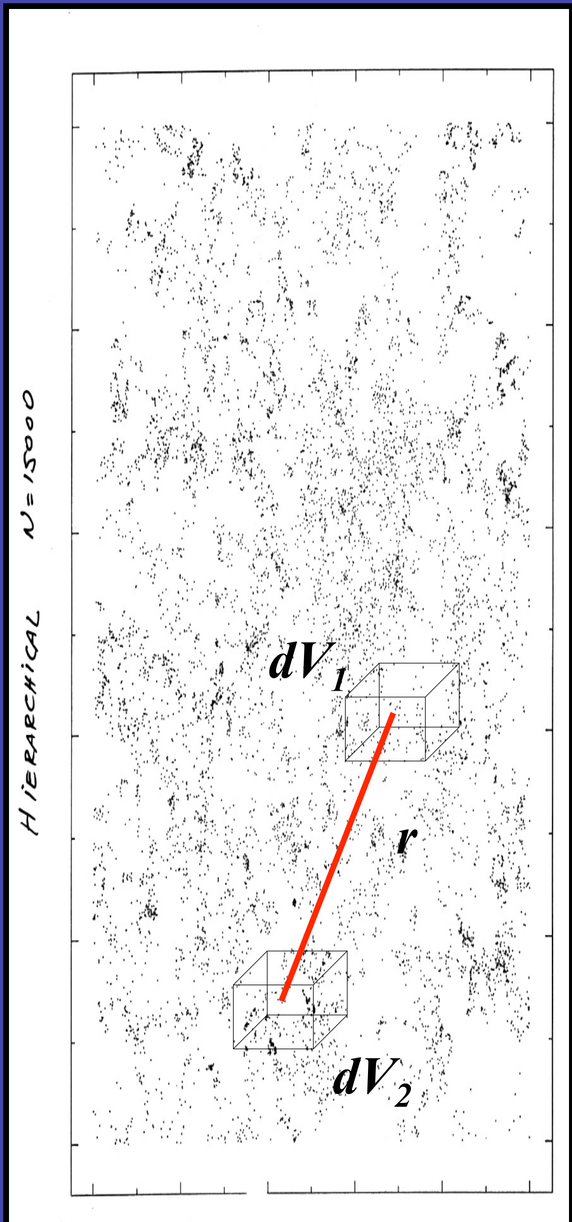
Catálogo 2-dF, 16.419 galaxias en una franja del Sur.

Métodos Estadísticos

Funciones de Correlación

Espectro de Potencia

Random Distribution



1-Point

$dP = n\,dV$

Continuous Distribution

Si $f(x)$ CONTINUA

$$\langle f(x_1) f(x_2) \rangle = \langle f \rangle^2 \left(1 + \xi(x_{12})\right)$$

Fourier Transform

$$\xi(r) = \int_{\vec{k}} e^{i \vec{k} \cdot \vec{r}} P(\vec{k}) \, d^3\vec{k}$$

Since P depends only on k

$$\xi(r) = 4\pi \int_0^\infty k^2 P(k) \frac{\operatorname{sen}(kr)}{kr} \, dk$$

$$r \equiv |\vec{r}|$$

In Practice

2-Dimensions - Angles θ

$$dP(\theta) = n^2 \left(1 + w(\theta)\right) d\Omega_1 \, d\Omega_2$$

Estimators

A

$$w(\theta) = \frac{N_{dd}(\theta)}{N_{rr}(\theta)} - 1$$

CORRECCIONES

EFECTOS DE BORDE

$$w_{rd} = \frac{N_{rd}}{N_{rr}} - 1$$

INTEGRAL

$$\int w(\theta) \, d\Omega_1 \, d\Omega_2 = 0$$

OBJETOS NO ACUMULADOS

$$w(\theta) = \frac{N_{dd} \, N_r}{B \, N_{dr} (N_d - 1)} - \frac{N_{rr} \, N_{r_1}}{N_{rr_1} (N_r - 1)}$$

B

(Landy & Szalay (1993))

$$w(\theta) = \frac{N_{dd} - 2N_{dr} + N_{rr}}{N_{rr}}$$

SIMULACIONES

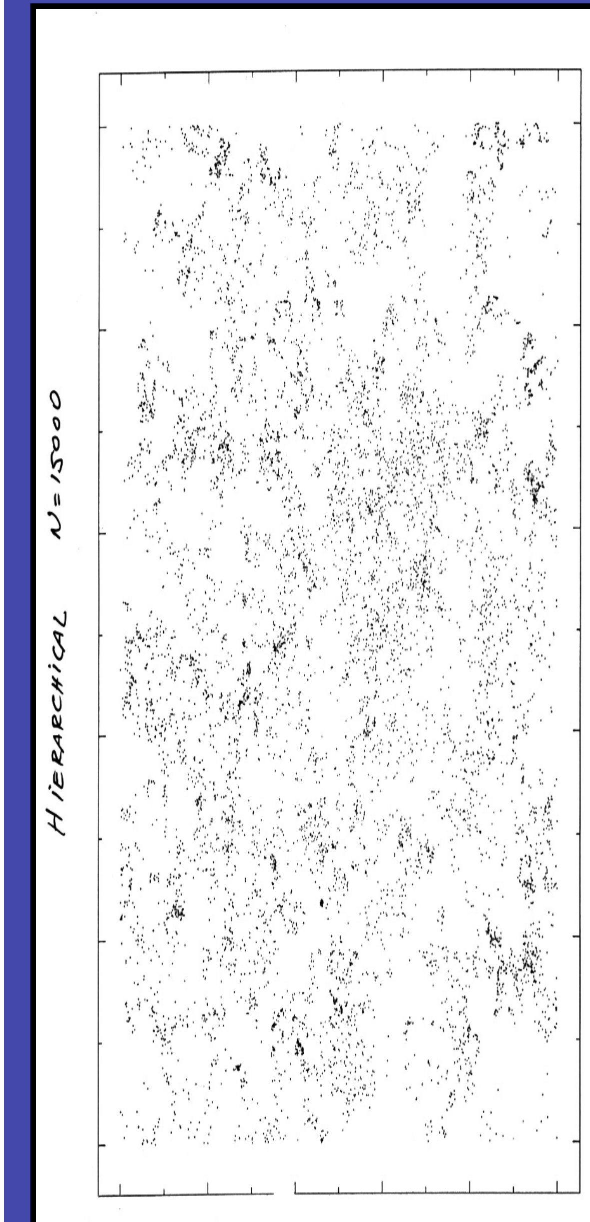
Se quiere detectar los efectos que la configuración observada introduce en la estimación de $\omega(\Theta)$

Soneira & Peebles
metodo "DUMBELL"

Número final de posiciones $N = 2^L$

Parametros L_{max} : $p(L) = A N_L^{-\alpha}$

Θ_L : $\Theta_{L+1} = \lambda \Theta_L$



MODELO

SUPONIENDO: $\xi(r,z) = \left(\frac{r_0}{r}\right)^{\gamma} (1+z)^{-(1+\varepsilon)}$

$r_0 = 5.5\ h^{-1}\,\mathrm{Mpc}$, $\gamma = 1.8$ ← DISTANCIA PROPIA

Coords. Propias

ε
- < 0 – AMP. ↓ ; DISMINUYE CLUSTERING
- $= 0$ – CLUSTERING ESTABLE
- > 0 – AMP. ↑ ; AUMENTA CLUSTERING

$\varepsilon = \gamma - 3 = -1.2$ – CLUSTERING FIJO EN COORDS. COMOVIL

INTEGRANDO: $\omega(\theta) = A_\omega\, \theta^{1-\gamma}$

donde

$$A_\omega = C\, r_0^{-\gamma}\, \frac{\int_0^\infty g(z) \left(\frac{dN}{dz}\right)^2 dz}{\left[\int_0^\infty \left(\frac{dN}{dz}\right) dz\right]^2}$$

SOLO FACTORES NUMERICOS (C)

DEPENDE DE ε, γ y COSMOLOGIA ($g(z)$)

- NO HAY DEPENDENCIA EN EVOL. DE GALAXIA EXCEPTO EN dN/dz
- SIN EMBARGO, $\frac{dN}{dz}$ OBSERVADO NO DIFIERE MUCHO DE MODELOS SIN EVOLUCION

* NUESTRO MODELO: $\gamma = 1.8$, $\varepsilon = 0$, $\Omega = 0.2$, $r_0 = 5.5\ h^{-1}\,\mathrm{Mpc}$

<u>Assumed Power Law</u>
<u>3-D Correlation Function</u>

Proper Correlation distance

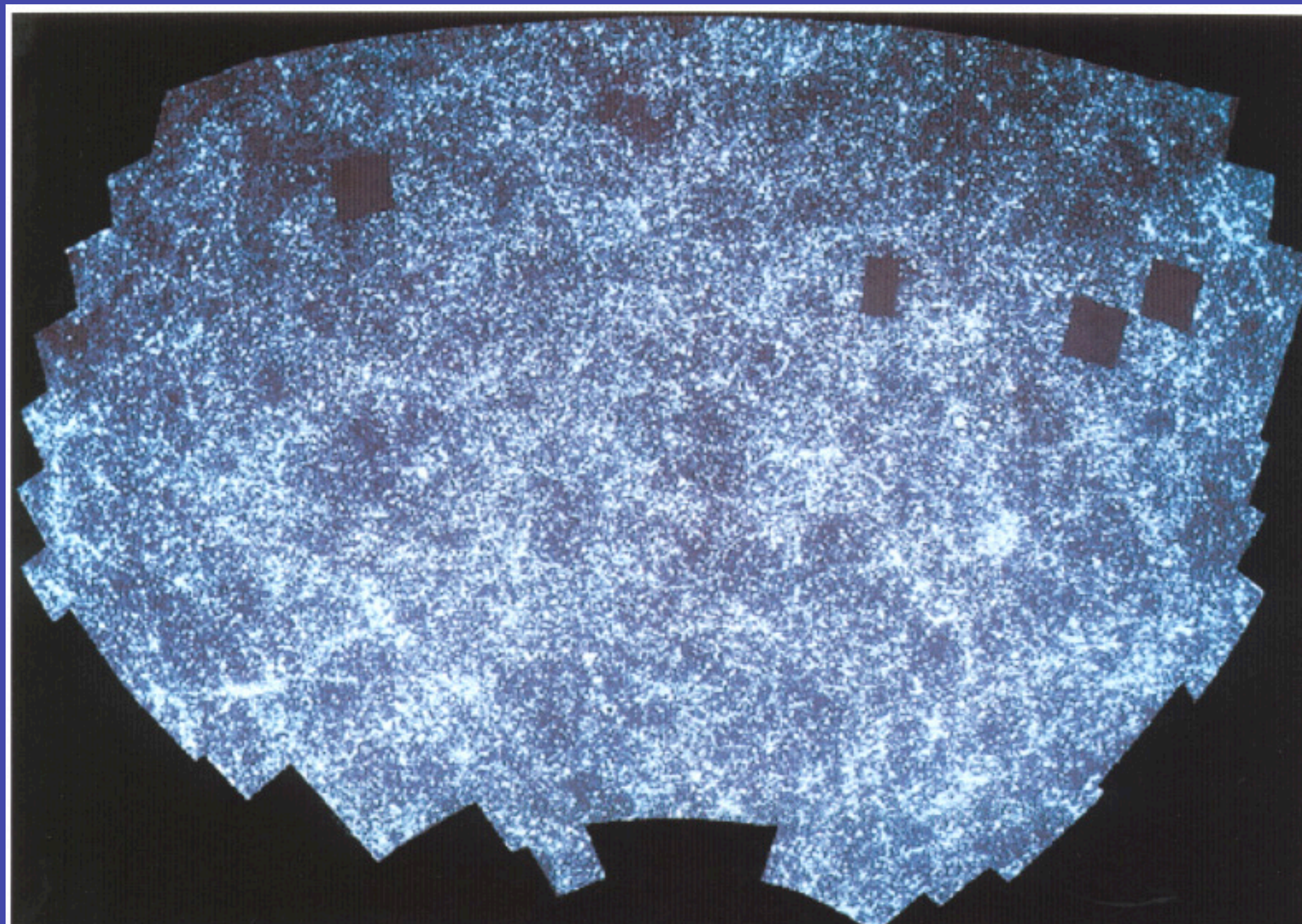
$$\xi(r,z) = \left(\frac{r}{r_0}\right)^{-\gamma} (1+z)^{-(3+\epsilon)}$$

Proper Correlation length

Clustering evolution index

<u>Assumed Power Law</u>
<u>Angular Correlation Function</u>

$$\omega(\theta) = A_\omega \theta^{(1-\gamma)}$$



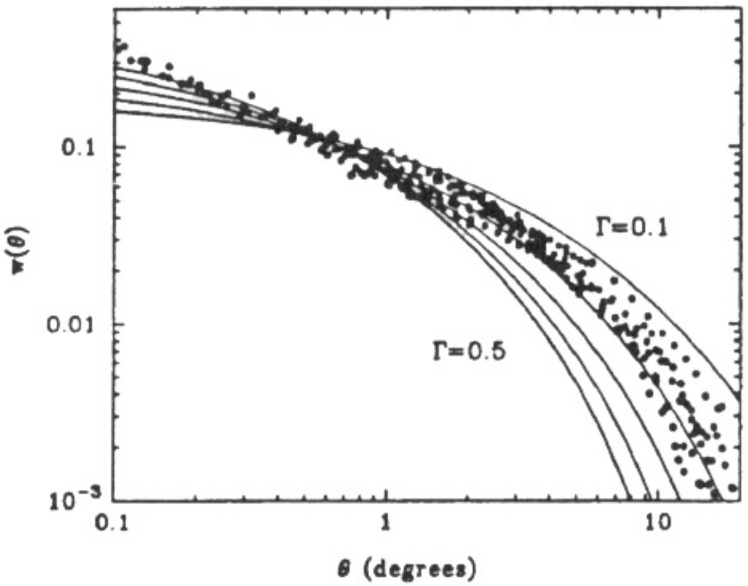


Figure 4.4: The scaled angular correlation function of galaxies measured from the APM survey plotted against linear theory predictions for CDM models (normalized to $\sigma_8 = 1$ on $8h^{-1}$ Mpc scale) with $\Gamma \equiv \Omega_m h = 0.5, 0.4, 0.3, 0.2$ and 0.1 [23].

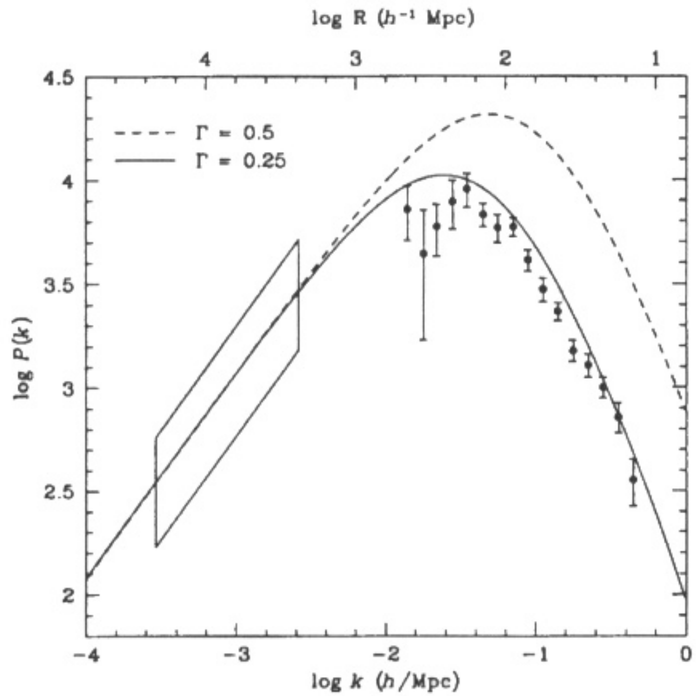
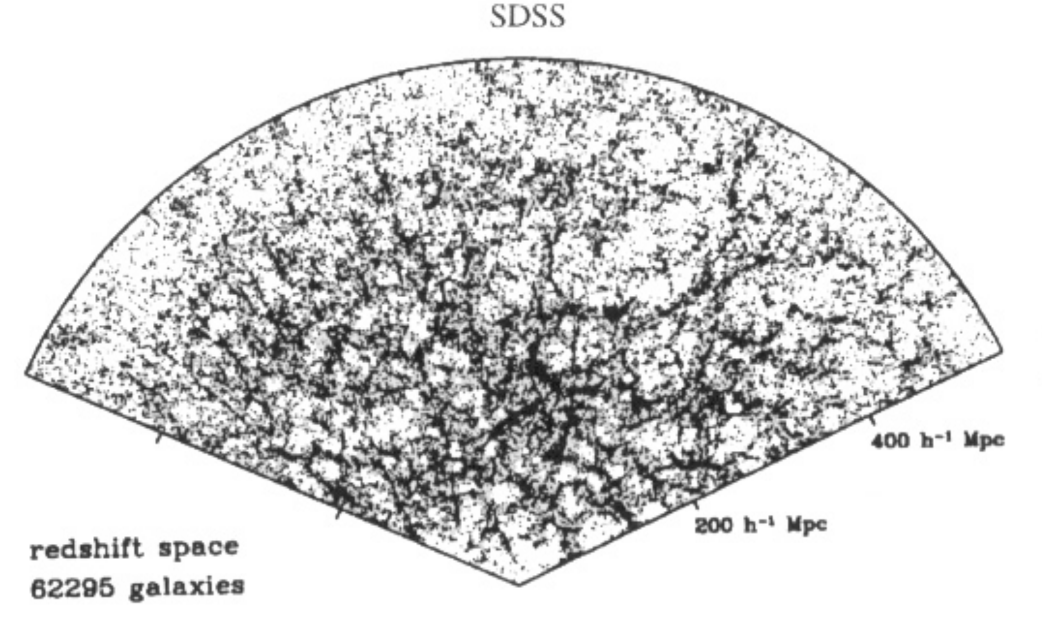


Figure 4.5: The power spectrum as derived from a variety of tracers and redshift surveys, after correction for non-linear effects, redshift distortions, and relative biases; from [42]. The two curves show the Standard CDM power spectrum ($\Gamma = 0.5$), and that of CDM with $\Gamma = 0.25$. Both are normalized to the COBE fluctuations, shown as the box on the left-hand side of the figure.



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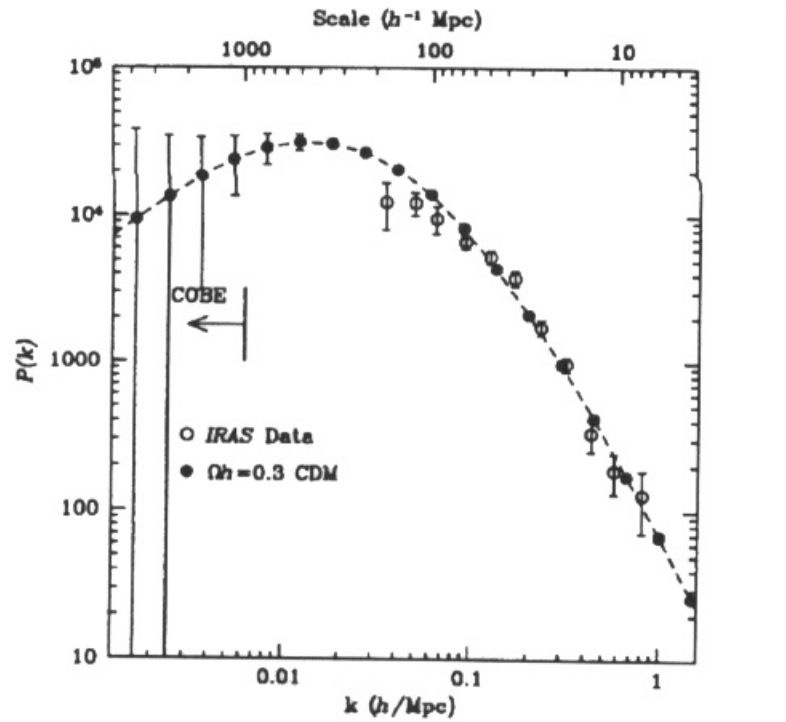

Figure 4.6: Estimate of the galaxy power spectrum that can be obtained with the Sloan Survey. The solid points and dashed line show the linear theory power spectrum of $\Omega_m h = 0.3$ CDM, with error bar estimates appropriate for the Sloan Survey. Open points are from [24]. The scales probed by COBE are shown.

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