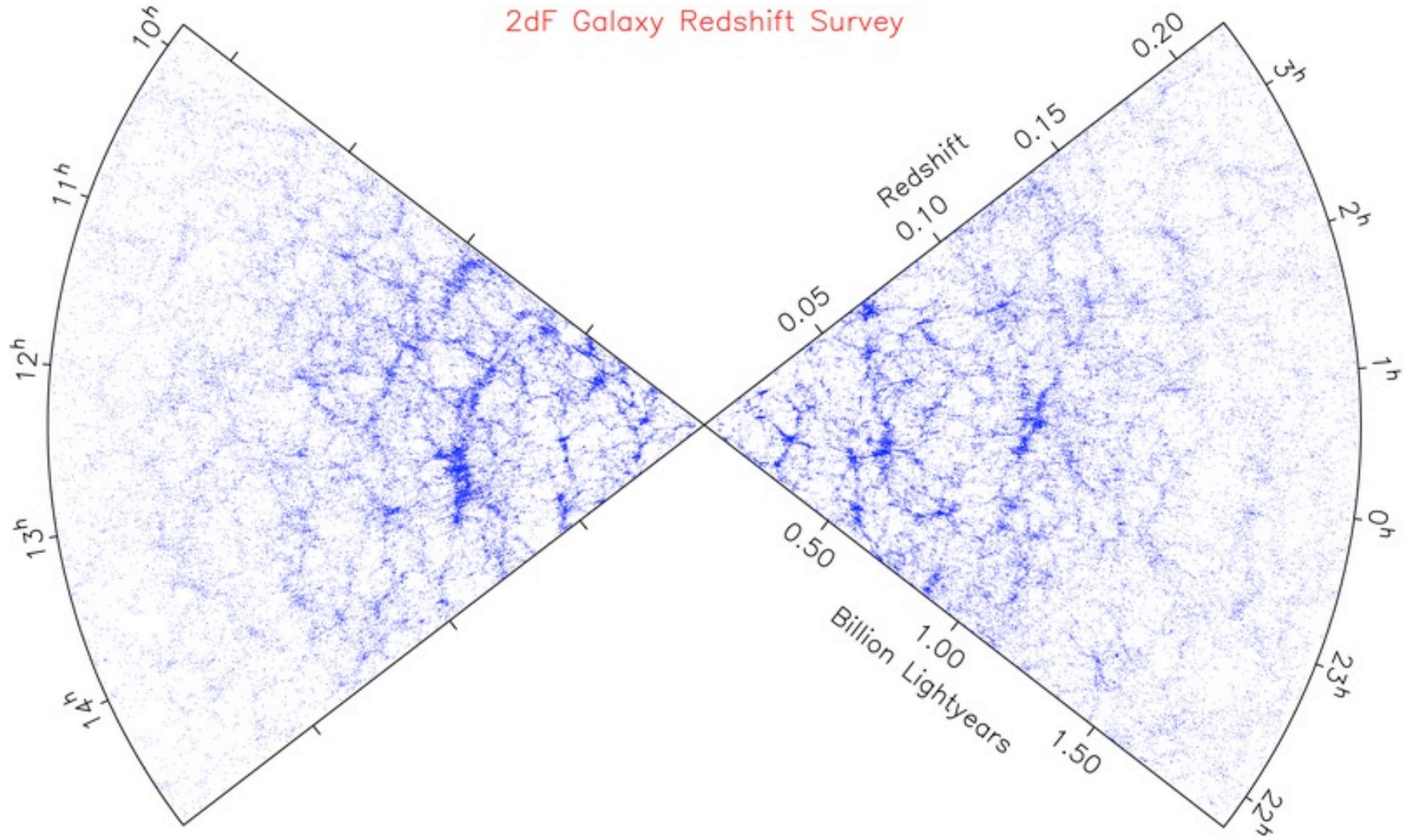


I 3. Inhomogeneties in the Universe

- Introduction (Sect. 7.1)
- Gravitational instability (Sect 7.2)
 - Overview (Sect 7.2.1)
 - Linear Perturbation Theory (Concepts only, Sect 7.2.2)
- Description of density fluctuations (Sect 7.3)
 - Correlation functions (Sect 7.3.1)
 - The Power spectrum (Section 7.3.2)
- Evolution of the Density fluctuation (Sect. 7.4)
 - Initial Power spectrum (Sect 7.4.1, only the Harrison-Zeldovich Spectrum)
- Non-linear Structure Evolution (concepts only, Sect. 7.5)
 - Model of Spherical collapse (Sect 7.5.1)
 - Number density of dark matter halos (Press-Schechter model, mass spectrum) (Sect. 7.5.2)

2dF Galaxy Redshift Survey



<http://www.mso.anu.edu.au/2dFGRS/>

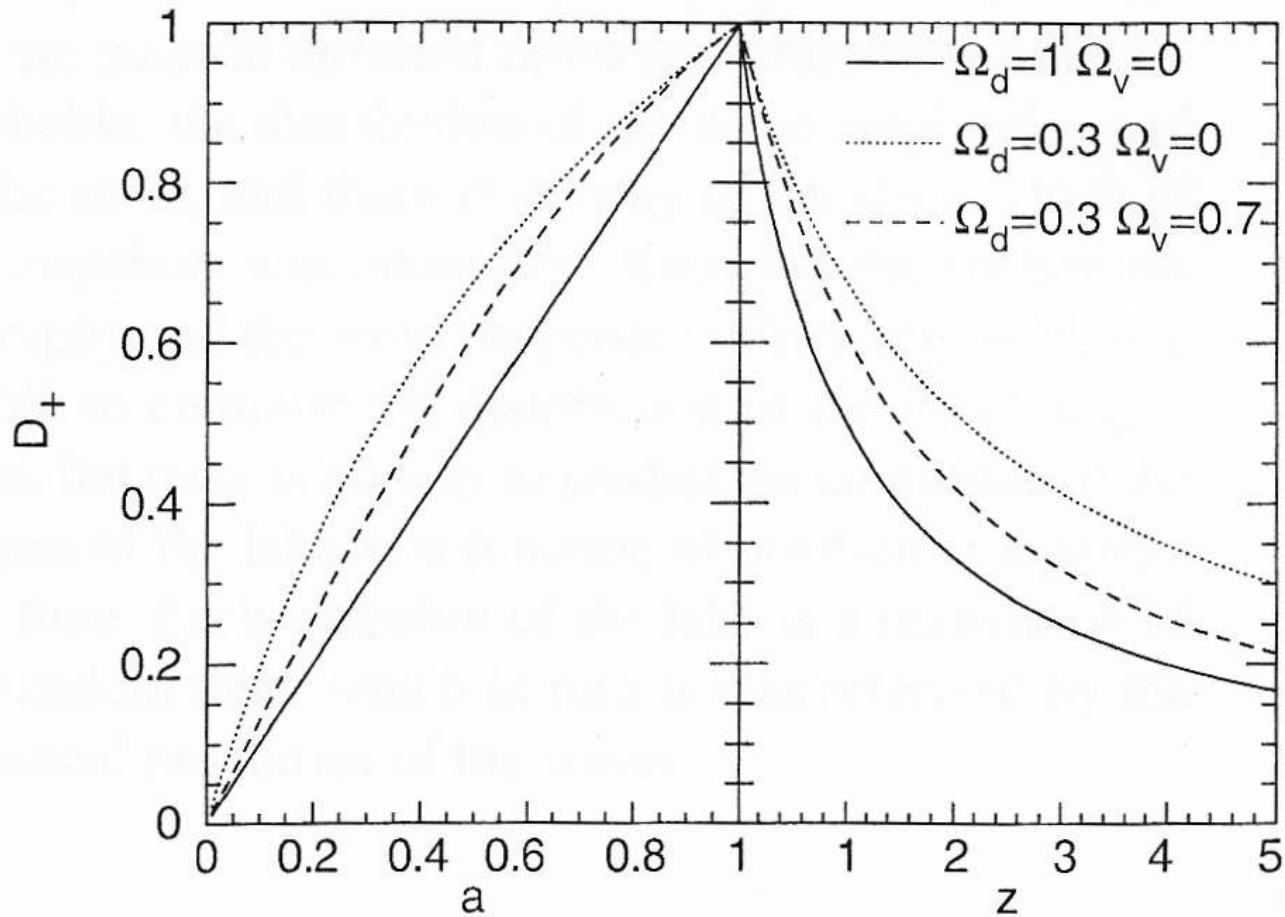


Fig. 7.3. Growth factor D_+ for three different cosmological models, as a function of the scale factor a (left panel) and of redshift (right panel). It is clearly visible how quickly D_+ decreases with increasing redshift in the EdS model, in comparison to the models of lower density

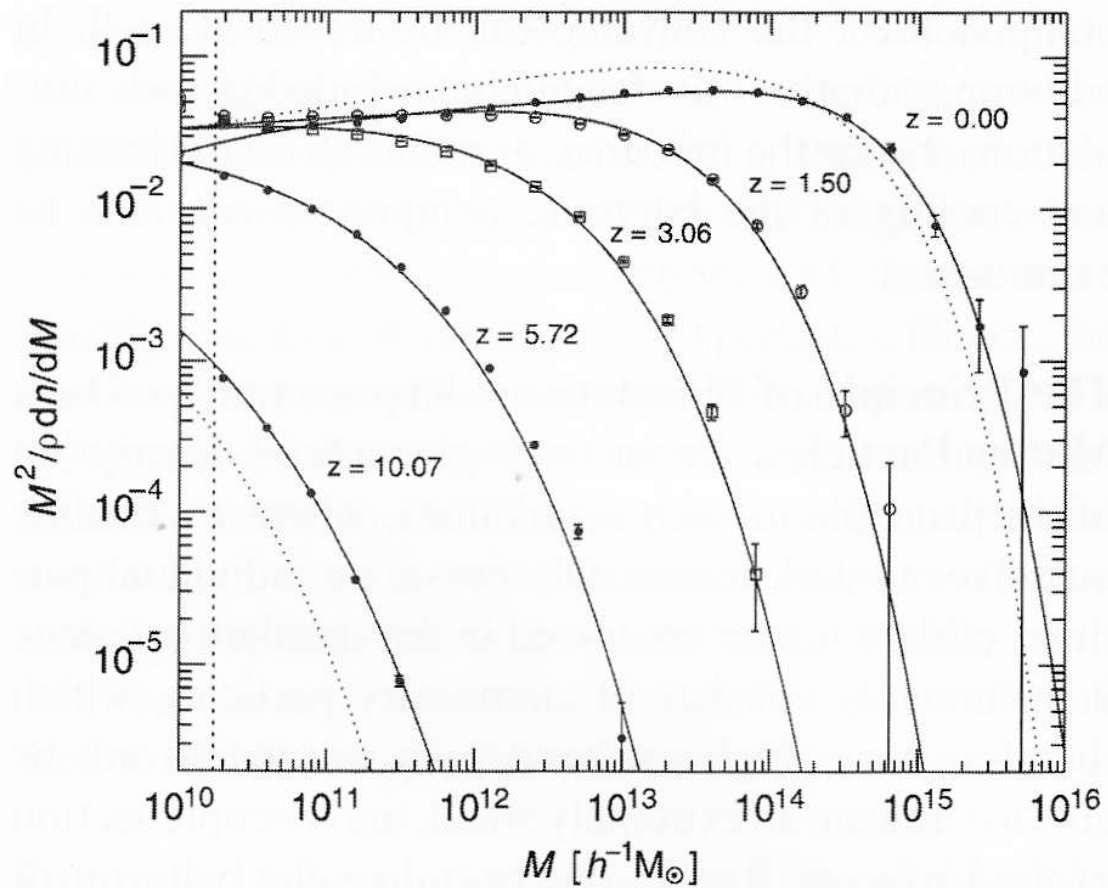


Fig. 7.9. The mass spectrum of dark matter halos is plotted for five different redshifts (data points with error bars), as determined in the Millennium simulation (which we will discuss more extensively below – see Fig. 7.12). The solid curves describe an approximation for the mass spectrum, which has been obtained from *different* simulations, and which obviously provides an excellent description of the simulation results. For $z = 0$ and $z = 10$, the prediction of the Press–Schechter model is indicated by the dotted curves, underestimating the abundance of very massive halos and overestimating the density of lower-mass halos. The vertical dotted line indicates the lowest halo mass which can still be resolved in these simulations

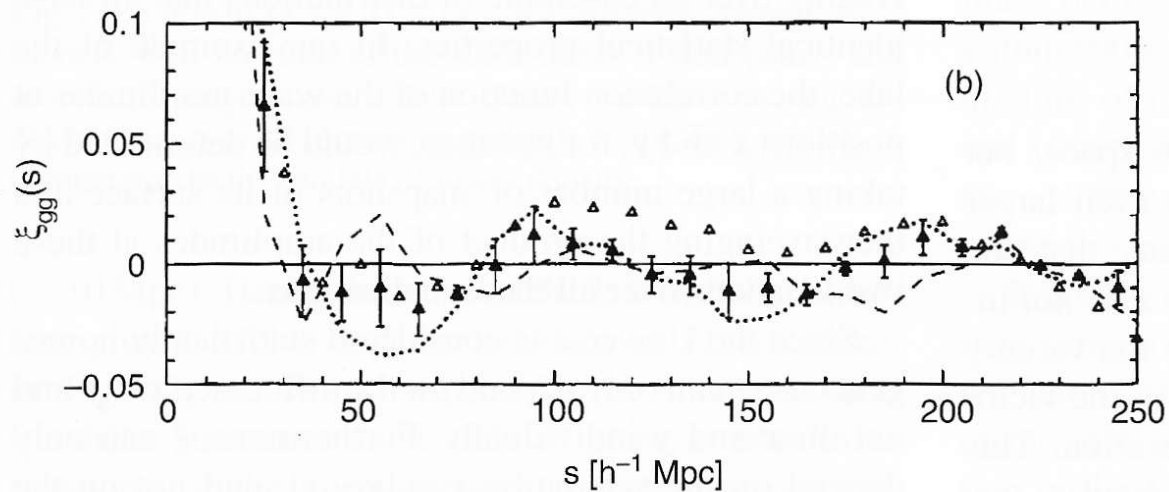
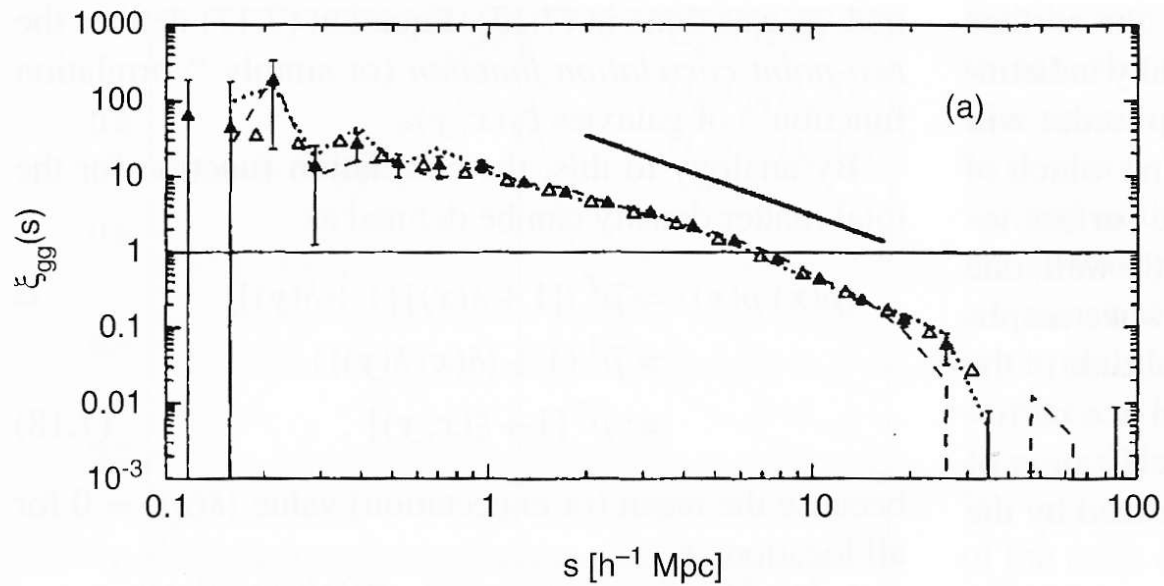


Fig. 7.4. The correlation function ξ_g of galaxies, as it was determined from the Las Campanas Redshift Survey. In the top panel, ξ_g is shown for small and intermediate separations, whereas the bottom panel shows it for large separations. Dashed and dotted lines indicate the northern and southern part, respectively, of the survey, and the solid triangles denote the correlation function obtained from combining both. A power law with slope $\gamma = 1.52$ is plotted for comparison (bold solid curve)