MODELING FAINT GALAXY COUNTS

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In this paper, we summarize the results of an analysis of faint galaxy counts presented in Guiderdoni and Rocca-Volmerange (1989). We choose to restrict our analysis here to the examination of *pure* luminosity evolution.

The intrinsic evolution can be analyzed by means of a model of spectrophotometric evolution. Such a model allows us to compute evolving synthetic spectra of galaxies from a minimum set of assumptions about star formation history and apparent magnitudes and colors that take into account the entangling of the cosmological and evolutionary effects in a consistent way. In this paper, we use our model of spectrophotometric evolution (Guiderdoni and Rocca-Volmerange 1987; Rocca-Volmerange and Guiderdoni 1988).

Figure 1 shows the influence of varying z_{for} for $q_0 = 0.05$. Large values of z_{for} are required to fit the faint galaxy counts. The value $z_{for} = 5$ predicts a bump around $B_J \equiv J^+ = 24$ (not shown in the data). The value $z_{for} = 2$ does not reproduce the slope fainter than $J^+ = 20$, and the predicted faint-magnitude plateau is strongly discrepant with the data. Figure 2 shows the predictions with various q_0 and $z_{for} = 30$. The various predictions without evolution are shown the predictions with evolution are much more sensitive to q_0 than are the predictions without evolution. The plateau occurs at lower levels for higher q_0, with a factor of ~4 shift in the counts between $q_0 = 0$ and $q_0 = 0.5$. Small values of q_0 are strictly required to fit the counts. The value $q_0 = 0.05$ fits well from the bright end down to $J^+ \approx 27$.

We use our model to compute the extragalactic background light (EBL) produced by galaxies. Figure 3 shows the predictions for various values of z_{for} and q_0 taking into account that evolution increases the EBL by a factor of ~2. With these standard scenarios of galactic evolution, the predicted EBL is clearly well below the observational limits in the visible and the near-IR.

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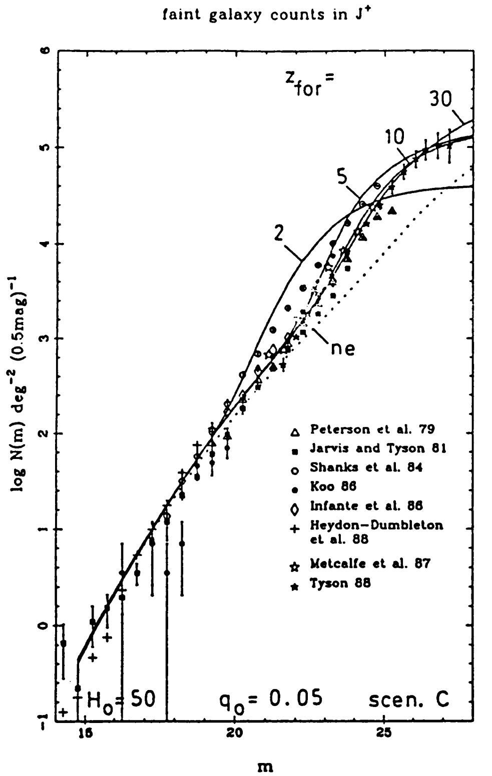

Figure 1. Influence of z_{for} on the faint galaxy counts, q_0 = 0.05. Solid lines: with evolution. Dotted line: without evolution. Large values of z_{for} are required to fit the slope and the plateau when fainter than $B_J \equiv J^+ \approx 25$.

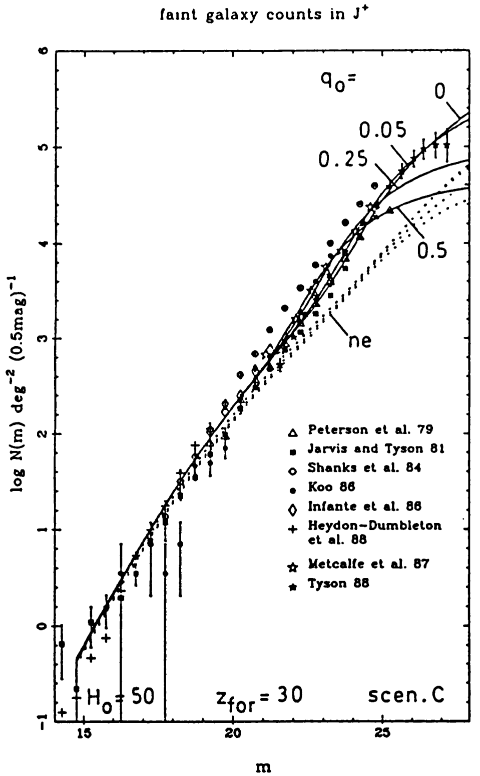

Figure 2. Influence of q_0 on the faint galaxy counts, z_{for} = 30. Solid lines: with evolution. Dotted lines: without evolution. Small values of q_0 are required to fit the slope and the plateau when fainter than $B_J \equiv J^+ \approx 25$.

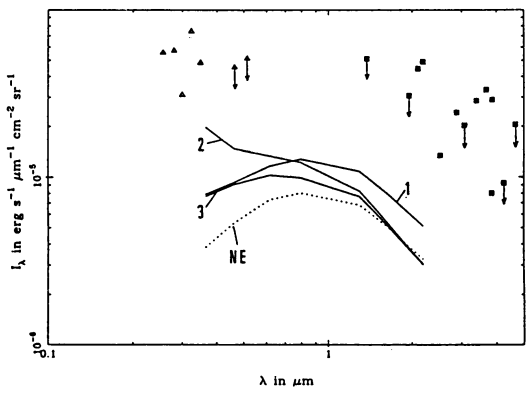

Figure 3. Prediction of the EBL. Solid lines: with evolution. Dotted line: without evolution. (1) q_0 = 0.05 and z_{for} = 30. (2) q_0 = 0.05 and z_{for} = 2. (3) q_0 = 0.5 and z_{for} = 30. Observations: near-IR (black squares), Matsumoto, Akiba, and Murakami (1988); visible (blade triangles), Dube et al. (1977), Toller (1983); near-UV (open triangles), compilation by Paresce and Jakobsen (1980).