# ON THE ANGULAR CORRELATION FUNCTIONS OF THE HUBBLE DEEP FIELD

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Roukema & Valls-Gabaud (1997) reinforce the conclusion of Colley et al. (1996, 1997) that the Hubble Deep Field (HDF) "galaxies" are probably star-forming regions, not "building-blocks".

Consider a "building-block" hypothesis:

(1) all (colour-selected high $z$) HDF galaxy-like objects are galaxies;
(2) these objects have a spatial correlation function $\xi(r,z) = b^2(r_0/r)^\gamma (1+z)^{-(3+\epsilon-\gamma)}$ where $b \gg 1$ is a strong bias factor at high $z$ (e.g., Ogawa et al. 1997; see Groth & Peebles 1977 and Roukema & Valls-Gabaud 1997 for other parameters) and $b \geq 1, \partial b/\partial r < 0 \; \forall r, z$;

such that the projection of $\xi$ (3-D) into $w$ (angular correlation; 2-D), via Limber's equation (Limber 1953), matches Figs 1a,1d of Colley et al. (1996).

Since $w(1'') \gtrsim 1$ in Figs 1a,1d of Colley et al. (1996), at least 50% of the $1''$ object pairs can be considered "excess pairs". Table 1 of Roukema & Valls-Gabaud (1997) therefores shows, *conservatively*, that of all the $1''$ object pairs, and under the above hypotheses, 25% are spatially separated by a median of only $3 - 7h^{-1}$ kpc (proper units), and 45% are spatially separated by a median of $12 - 30h^{-1}$ kpc[1], *taking into account projection effects*. Many excess pairs have $\theta \sim 0.25''$. Hence, for a pure "building-block" model, galaxy formation models (e.g., Roukema et al. 1998) would have to post-dict the existence of *many* $R_{\rm halo} \ll 2$ kpc *(proper units), very highly biased galaxies* at $2.5 \lesssim z \lesssim 5$. This result is not very sensitive to $\epsilon$, $\Omega_0$, $\lambda_0$ or $z_{\rm median}$ (Roukema & Valls-Gabaud 1997).

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