KECK OBSERVATIONS OF COMPACT GALAXIES IN THE HDF FLANKING FIELDS

D. C. KOO, A. C. PHILLIPS, R. GUZMÁN, & J. GALLEGO
UCO / Lick Observatory, University of California, Santa Cruz, CA, 95064, USA

Keck spectra of faint, compact galaxies in the HDF flanking fields reveal a population dominated by moderately luminous emission line galaxies similar to local H-II galaxies, rather than, e.g., low-luminosity galaxies at low redshifts or AGN's.

The DEEP [a] team has observed a sample of faint, compact galaxies in the HDF flanking fields. Such compact galaxies are particularly relevant for probing the mysterious population of faint blue galaxies, since several popular explanations include significant fractions of low-luminosity dwarfs at low redshifts (Driver & Phillips 1995; Im *et al.* 1995), of bursting dwarfs at high redshifts (Babul & Ferguson 1996), or even of galaxies with AGN (Rola *et al.* 1996). Spectra are critical to reveal the physical properties of such small, high surface brightness objects by yielding luminosities, look-back times, physical sizes, star formation rates, and masses.

The sample of 61 objects was chosen to be relatively faint ($20.6 < I_{814} < 23.7$ mag), to be compact with half-light radii, r_e, less than $0''.5$, and to have I band surface brightnesses brighter than 22.25 mag-arcsec^{-2} within r_e. Except for one AGN and ten galaxies with red colors and with weak if any emission lines (and thus consistent with high redshift early type [E/SO/Sa] galaxies), the remaining vast majority had moderate to strong emission lines.

As can be inferred from Figure 1 (R_e vs M_B) and as will be described in more detail in forthcoming papers by Phillips *et al.* and Guzmán *et al.*, we find that emission line systems smaller than 3 kpc have luminosities, sizes, star formation rates and excitation (based on line ratios) similar to that found in local H-II galaxies. At redshifts $z \sim 0.5$, most have luminosities and sizes consistent with the 1-2 kpc sizes and L* /4 of bursting dwarfs postulated to explain the faint blue galaxies (Babul & Ferguson 1996). Unfortunately, we are unable to sample the same types of objects to much higher redshifts, but near $z \sim 1$, we do find larger (3 kpc) and more luminous (near L*) emission line galaxies. Limited kinematic data suggest that $\sim 60\%$ of these are indeed of low masses (i.e., less than 10^{10} $M_\odot$).

Whether the compact galaxies are some combination of bursting dwarfs and H-II galaxies, we find no evidence for 1) a large fraction of AGN activity

[a] Information about the Deep Extragalactic Evolution Probe project is available on the WWW at URL **http://www.ucolick.org/~deep/home.html**

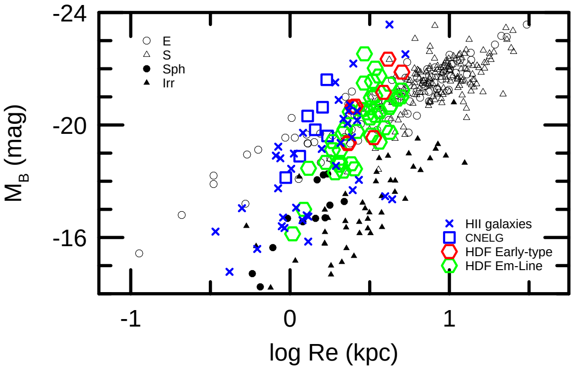

Figure 1: The half-light radius (R_e) vs B absolute magnitude (M_B) for various classes of galaxies (L* is at $M_B \sim$ -21; we use H_0 = 50 km s^{-1} Mpc^{-1} and $q_0 \doteq 0$).

among our faint blue compact galaxies, 2) the domination of the sample by low-luminosity galaxies at low redshifts ($z < 0.3$), or 3) significant numbers of galaxies comparable in surface brightness to the low-mass, compact narrow-emission line galaxies (CNELG) that have been suggested to be progenitors of today's spheroidals (Koo *et al.* 1995; Guzmán *et al.* 1996).

Funding was provided by the NSF Center for Particle Astrophysics grant AST-9120005 and NSF grant AST-9529098; NASA grants AR-5801.0194A, AR-06337.08-94A, and GO-05994.01-94A; and an UCM del Amo Fellowship from Spain for J.G.

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