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OBSERVING SIMULATED GALAXIES

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The increasing complexity and resolution of cosmological simulations allows for increasingly detailed comparisons between model and observed galaxies. To facilitate these comparisons, as well as remove some systematic biases, I am creating images of simulated galaxies as if they had been viewed through a telescope.

Initially, the simulated data consists of mass, position, and age information for both stars and gas (i.e., Navarro & Steinmetz 2000), which is piped through a spectral synthesis code (Bruzual & Charlot 1993) to generate wavelength dependent luminosity. This information is then used by a radiative transfer code (Trewhella et al. 1999) along with dust properties (Pei 1992) to determine the 2-D images of the galaxy. These images are then modified according to the telescope properties (background level, psf, Q.E., noise) to create pictures which can be compared on the same basis as observations.

The following figure shows the same galaxy as it evolves from $z = 3$ to $z = 0.5$. The images were generated using simulated HST cameras and filters, under the conditions of the Hubble Deep Field observations. Each filter was chosen to be as close to rest frame B-band as possible. Thus high redshift galaxies are at the lower NICMOS resolution, compared to the nearer WFPC2 images.

Quantitative data are now being compiled using the automated morphology classification method described by Abraham et al. (1996) to compare images of these kind to HDF results. Our goal is to probe morphology as a function of evolution, star formation, galaxy dynamics, etc. One particularly topical question we are pursuing is the duty cycle of peculiar galaxies compared with the percentage of mid to high redshift galaxies which look odd.

Fig. 1. Position of stars (left) and gas (right) in simulated galaxy at z=1 (from an unpublished J. Navarro simulation).

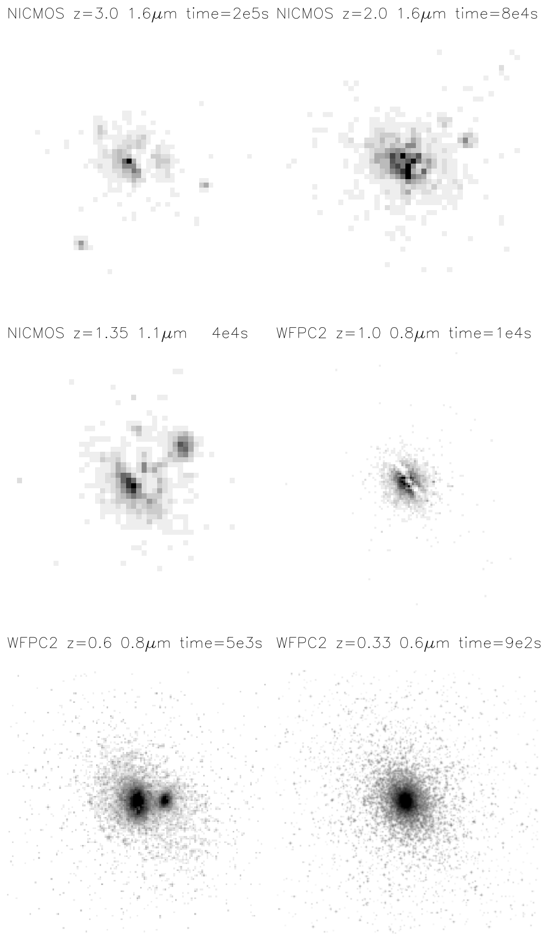

Fig. 2. The same simulated galaxy as it evolves in time viewed though HST cameras. Camera, redshift, viewed wavelength, and exposure time as indicated above images.

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