Galaxy Evolution at the Keck Diffraction Limit

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An important goal of current astrophysical research is to understand the creation and star forming history of galaxies. To achieve this goal, it is necessary to study galaxies at many wavelengths and at high resolution to observe galaxy substructure. This project attempts to combine data retrieved from two different surveys looking at the same field of view, the Chandra Deep Field South (CDFS). The COMBO-17 survey uses traditional ground based images using 17 different optical filters acquired with the Wide Field Imager (WFI) at the MPG/ESO 2.2m telescope located on La Silla, Chile. The COMBO-17 public catalog of 63,501 objects does not resolve internal structure, but it does allow us to estimate the redshift (which gives distance and age), types and ages of stars, and total luminosity for each galaxy. The Center for Adaptive Optics Treasury Survey (CATS), by means of the Keck adaptive optics (AO) system on Manna Kea, Hawaii, is able to achieve 10 times the angular resolution of the COMBO-17 images, but only at one infrared wavelength. In this project, we've produced a database containing all of the COMBO-17 information but also combining the high resolution images of the CATS survey. In this way, we can observe the morphology (sizes, shapes, internal components) of galaxies as a function of cosmic time and star formation activity. Only with this combined information can we investigate the growth of galaxies, the role of galaxy mergers, and therefore directly observe the evolution of galaxies.

Rima Fata is a Computer Engineering major at the University of California, Riverside. In 2001 she transferred from the American University of Beirut Lebanon, where she was studying electrical engineering. Introduction to coding lead Rima in a different direction and now she is pursuing a bachelors degree in Computer Engineering. She will be the first woman in her family to graduate with an engineering degree. Rima hopes to graduate by the fall of 2005 and continue on to graduate school.