COURSE: Celestial Mechanics (ESC0259), Spring, 2009
FINAL ORAL PRESENTATIONS

Pan, Wei-Hsiang <696440181@ntnu.edu.tw>

Title: CHEMICAL COMPOSITION DIVERSITY AMONG 24 COMETS OBSERVED AT RADIOWAVELENGTHS

Abstract:
We present a comparative study on molecular abundances in comets based on millimetre/submillimetre observations made with the IRAM 30-m, JCMT, CSO and SEST telescopes. This study concerns a sample of 24 comets (6 Jupiter-family, 3 Halley-family, 15 long-period) observed from 1986 to 2001 and 8 molecular species (HCN, HNC, CH3CN, CH3OH, H2CO, CO, CS, H2S). HCN was detected in all comets, while at least 2 molecules were detected in 19 comets. From the sub-sample of comets for which contemporary H2O production rates are available, we infer that the HCN abundance relative to water varies from 0.08% to 0.25%. With respect to other species, HCN is the molecule which exhibits the lowest abundance variation from comet to comet. Therefore, production rates relative to that of HCN can be used for a comparative study of molecular abundances in the 19 comets. It is found that: CH3OH/HCN varies from 9 to 64; CO/HCN varies from 24 to 180; H2CO/HCN varies between 1.6 and 10; and H2S/HCN varies between 1.5 and 7.6.

This study does not show any clear correlation between the relative abundances and the dynamical origins of the comets, or their dust-to-gas ratios.

Yan, Chi-Hung <chyan@asiaa.sinica.edu.tw>

Title: The dynamics of cluster formation

Abstract:
The observational evidence shows that most of the embedded star clusters do not evolve into long-lived bound clusters. This phenomena is called “infant mortality” of young (few Myrs) clusters. The process is caused by the expulsion of natal gas from stellar winds and/or supernovae, which perturbs the clusters’ potential and leaves up to 90% of them unbound. The mortality will be effected by the initial condition and the star formation history. Both factors limit the maximum age of young embedded cluster to several tens Myrs. In this presentation, I will start from the observational phenomena. Then show how initial mass function, star formation rate and gas expulsion effect the stellar cluster.

Tsai, An-Li <altsai@asiaa.sinica.edu.tw>
Title: Molecular gas in Nuclei of Galaxies -- Gravitational torques and AGN feeding

Abstract:
The stellar gravity torque is a mechanism to account for the feeding of the central engines of four low luminosity AGNs. From calculations we can derive the characteristic time-scales for gas flows and discuss whether torques from the stellar potentials are efficient enough to drain the gas angular momentum in the inner 1 kpc of these galaxies. Results indicate that feeding should be thwarted close to the AGNs. Alternatively, the gravity torque barrier associated with the Inner Lindblad Resonance of the bars in these galaxies could be overcome by other mechanisms that become competitive in due time against gravity torques.

Ho, Pei-Li <hopeili@cwb.gov.tw>
Title: The formation and dynamical state of the Brightest cluster galaxies

Abstract:
The brightest cluster galaxies (BCGs) are the most massive and luminous galaxies in the Universe. They are typically located in the very centers of clusters of galaxies which indicates that their formation is closely linked to that of the clusters themselves. Their formation history is therefore distinct from typical elliptical galaxies. The following theories have been proposed to explain the origin of BCGs (1) star formation from cooling flows; (2) galactic cannibalism or the accretion of the existing galaxy populations due to dynamical friction and tidal stripping; and (3) galaxy merging (also driven by dynamical friction) in the early history of the formation of the cluster as expected in hierarchical cosmological models.

In this final oral presentation, I'll introduce the dynamical state of BCGs and the formation scenarios through N-body simulations by Dubinski (1998) and De Lucia & Blaizot (2007).