61.02

The Formation of the Local Group and the High Velocity Clouds

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We simulate the formation and evolution of the Local Group. The dynamics of the Local Group is governed primarily by the its two largest members, Andromeda (M31) and the Galaxy (M0) and seconarily by the tidal effects of neighboring galaxies. In the simulation, a long filament forms which contains M31 and M0. While the gas near M31 and M0 is likely shock heated, we expect that much of the gas in the filament is cold. The kinematics of this gas in the simulation is remarkably similar to the kinematics of the High Velocity Clouds (HVCs). This similarity suggests reinterpreting the HVCs as primarily extragalactic.

In this model, the HVCs are similar to the Lyman alpha clouds. Recent work (Hernquist *et al.* 996) suggests that the Lyman alpha clouds are primarily condensations in the filaments between galaxies. We suggest a similar picture for most of the HVCs: they are gravitationally confined, rather than pressure confined, clouds infalling into the Local Group and are likely associated with a substantial amount of dark matter. In this picture, the two phase structure seen in some of the HVCs (Wakker & Schwarz 1991) would be due to self shielding that arises in gas clouds ionized by external UV (Murakami & Ikeuchi 1990). This model suggests that there is a substantial amount of gas in the HVCs: $\sim 1\times 10^{10} M_\odot$. This gas is and was a reservoir of relatively unprocessed gas for both M31 and our Galaxy and likely plays an important role in the evolution of both galaxies.

Hernquist, L, Katz, N., Weinberg, D. & Miralda-Escude, J. 1996, ApJ L 457, 51

Murakami, I. & Ikeuchi, S. 1990 PASJ, 41 , L11.

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61.03D

Galactic Structure from the APS Catalog of POSS I

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Recent studies have shown that the halo is not a dynamically relaxed system. It is now likely that the origins and evolution of the Galaxy have been influenced if not entirely governed by the accretion of other stellar systems. This accretion causes structure likely to remain for extended lengths of time (1 Gyr) and so the phase space structure of the halo could be quite rich. Understanding such a chaotic structure will require access to all-sky surveys such as that of the Minnesota Automated Plate Scanner Catalog of POSS I.

We summarize our results for the structure of the halo and thick disk based on our analysis of star counts over large areas of the sky. These include the axial ratio of the halo and our recent discovery of a large asymmetry in the halo/thick disk star counts on either side of the galactic bulge at high latitudes. We also present a galactic model derived from star counts on large areas selected over the entire galactic sky covered by POSS I.

61.04

Preliminary Results from the MSX Satellite: Infrared Observations of the Galactic Plane

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We present preliminary results from observations of two regions in the Galactic plane from the mid-infrared radiometer aboard the Midcource Space Experiment (MSX). The observations cover a $1°\times 3°$ field of the Galactic center and a similar field at $l=28°$. The radiometer abord MSX simultaneously observes 5 pass bands ranging from 4 to 25 μm with a spatial resolution of 18" . We present results for the MSX Band A detectors ($6-11$ μm) and compare the results with IRAS 12 μm ISSA images and full resolution IRAS images from the Galactic Plane Supplement (GPS).

The higher resolution of MSX clearly resolves the regions that were confused to IRAS. We compare the extracted source density as a function of galatic lattitude with current IRAS data and models.

61.05

Where is the Galactic Center?

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The compact nonthermal radio source, Sgr A*, is thought to be at the dynamical center of the Galaxy. However, determining the location of SgrA* on infrared images of the Galactic Center region has been a problem for over two decades. Previous attempts at aligning the radio and infrared reference frames in this region have been limited to accuracies of about 0.3 arcseconds. We present a new approach to this long-standing problem, which improves the alignment by about an order of magnitude.

We present detections of SiO masers from the inner circumstellar envelopes of giant and supergiant stars, that are seen in diffraction-limited infrared images of the Galactic Center region. The radio data allow measurements of the maser positions, relative to Sgr A*, with accuracies approaching milli-arcseconds. Since these masers trace their host stars to within a few milli-arcseconds, these relative positions can be used to calibrate the plate scale and rotation of the infrared images and, thus, to locate accurately the infrared position of Sgr A*. With current data we can align the radio and infrared reference frames in the Galactic Center region and locate the infrared position of Sgr A* to an accuracy of 0.03 arcseconds.

61.06D

Infrared Imaging of the Galactic Center

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We present images of the Galactic Center at 31.5 and 37.7 microns obtained with the Kuiper Widefield Infrared Camera (KWIC) on the KAO. These images cover the circumnuclear ring and the galactic center arches. The thermal arches have a uniform color temperature and are well aligned with the radio continuum arches. This suggests internal heating of the arches, and we calculate a uniform distribution of B0 stars would produce the observed fluxes. These conclusions are supported by our [NeII] (12.81 micron) spectra taken in this region. The mini-spiral is clearly visible in our images as is the entire cicumnuclear ring. Our color temperature map shows this region to be mainly centrally heated, but localized temperature peaks are scattered throughout the map. Comparison with our recently obtained 12.5 micron map of the same area suggests these are embedded sources. Using the KWIC data, we have developed a model of the dust distribution and source luminosity in the inner few parsecs which provides a simple explanation for the appearance of the ring and mini-spiral.

61.07

A new Supernova Remnant over the Galactic Center

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We have reprocessed archival 333 MHz VLA data with wide-field imaging software and uncovered the meter wavelength counterpart to the Northern Galactic Lobe first identified by LaRosa and Kassim at 80 MHz. With its morphology much better defined on the VLA 333 MHz image we have been able to follow the source in emission from 57.5 MHz to 15 GHz and construct a new spectrum with power law index -0.56. This is a significantly flatter spectrum than the $\alpha \leqslant -1$ originally estimated using only the very low frequency maps and poorly constrained upper limit flux densities from single-dish, centimeter wavelength maps. The revised spectrum and far better delineated shell-like morphology now favor re-interpretation of the Northern Galactic Lobe as the supernova remnant G0.33+0.04. Furthermore the low frequency turnover in the continuum spectrum implies that the source is located physically close to the Galactic Center. Though it is larger and thus presumably older than Sgr A East, the commonly derived physical properties of G0.33+0.04, including its continuum spectrum, surface bright-