Special Session: The Galactic Plane – in depth and across the spectrum
XXVIth IAU General Assembly, August 2006
A.C. Editor, B.D. Editor & C.E. Editor, eds.

DOI: 00.0000/X000000000000000X

GASKAP: The Galactic ASKAP Survey

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Abstract.
The Galactic Australian Square Kilometre Array Pathfinder (GASKAP) survey is one of several key science projects with ASKAP, a new radio telescope being built in Australia as a technology demonstrator for the Square Kilometer Array (SKA). GASKAP aims to survey about 12,779 square degrees of the Galaxy and the Magellanic System, at high spectral resolution (0.2 km s^{-1}) and using several wavelengths: the λ21-cm HI line, the λ18-cm OH lines, and the comb of recombination lines around λ18-cm. The area covered by GASKAP includes all of the Galactic plane south of declination $+40^\circ$ with $|b| < 10^\circ$, selected areas at higher latitudes covering important interstellar clouds in the disk and halo, the Large and Small Magellanic Clouds, and the Magellanic Bridge and Stream. Compared with previous surveys, GASKAP will achieve an order of magnitude or greater improvement in brightness sensitivity and resolution in various combinations of beam size and mapping speed matched to the astrophysical objectives.

Keywords. ISM: evolution, Galaxy: structure, Galaxy: halo, radio lines: ISM

1. Scientific Motivation

Galaxy evolution begins at home! To make advances in the area of galaxy formation and evolution, GASKAP turns to our home neighborhood (the Galaxy and the Magellanic Clouds), where essential physical processes can be studied in detail. The main scientific questions GASKAP will address are: What physical processes are responsible for converting ionized gas to atomic, then molecular clouds, and ultimately stars? How does the excitation temperature of the interstellar gas vary, and how are different interstellar medium phases mixed in different environments? How do feedback processes affect galaxy evolution? How do galaxies get their gas? What is the large-scale structure of present-day star formation? What can we learn by studying entire galactic systems in action? Being a key step toward the SKA, GASKAP will play an important role in training the scientific community for the future use of the SKA.