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A Close Look at the Galactic Ecosystem: the Canadian Galactic Plane Survey

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Abstract. Energy and mass interchanges in the interstellar medium are driven by the life-cycle of stars. They appear in our own Galaxy over a broad range of scales, from point-like injection from stars to global input on the scale of spiral density waves. Understanding this Galactic Ecosystem requires observations of the different phases of the ISM over this large angular dynamic range. The Canadian Galactic Plane Survey (CGPS) is a project to combine radio, millimeter, and infrared surveys of the Galactic plane, providing arcminute-scale images of all major components of the interstellar medium over a large portion of the Galactic disk.

Keywords. atomic data, magnetic fields, polarization, surveys, ISM general, Galaxy: structure

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The CGPS (Taylor *et al.*, 2003) combines multi-frequency surveys of the Galactic plane providing arcminute scale images of the ionized gas (radio continuum at 408 and 1420 MHz), magnetic fields (polarimetry at 1420 MHz), atomic gas (HI-line), molecular gas (CO(1-0) with the Five College Radio Astronomy Observatory), and dust (re-processed IRAS surveys). The CGPS covers an area of 1260 square degrees within $52^\circ \leqslant \ell \leqslant 192^\circ$ and $-3.5^\circ \leqslant b \leqslant +5.5^\circ$. Final datasets are archived at the Canadian Astronomy Data Centre (webpage: http://www1.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/cgps) and are freely available to the astronomical community.

Recent science highlights include the study of the large scale magnetic field in the Outer Galaxy (Brown *et al.*, 2003) and a new model for the density and velocity field of the Outer Galaxy traced by the distribution of HI, which can be exploited to determine more accurate distances to objects from systemic velocities (Foster & MacWilliams, 2006). The CGPS enabled a thorough study of HI self absorption features, which represent cold HI, recently compressed by the passage of a spiral shock, and on its way to forming molecules, which may be first step in forming stars (Gibson *et al.*, 2005). Normandeau, Taylor, & Dewdney (1996) discovered the "chimney", a conduit of radiation and material into the halo, driven by a cluster of massive stars at its base. Many new supernova remnants (SNRs) have been discovered through the CGPS (e.g. Kothes *et al.*, 2001a, Kothes *et al.*, 2006) and Kothes *et al.* (2001b) found an SNR, which is likely the result of triggered star formation, which closes the cycle and brings us back to the beginning.

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