

# Appendix

## Symbols

$A$	The radial separation of the two arms adjacent to the point being considered.
$b$	The galactic latitude.
$c$	The speed of light.
$C$	Offset constant.
$C_s$	The sound speed.
$e$	Coulomb constant.
$E$	The energy state of electron.
$f(z)$	Accounts for the variation of compression of the field with distance, $z$ from the plane.
$F$	The ratio of the magnitude of the regular field component to the magnitude of the irregular field component.
$h$	Planck constant.
$H$	The galactic magnetic field.
$H_{reg}$	The regular galactic magnetic field.
$H_{irreg}$	The irregular galactic magnetic field.
$H_{\perp}$	The magnetic field component perpendicular to the line of sight.
$H_{\perp reg}$	The regular magnetic field component perpendicular to the line of sight.

$H_{\perp \text{ irreg}}$	The irregular magnetic field component perpendicular to the line of sight.
$H_{\parallel}$	The magnetic field component parallel to the line of sight.
$k$	Boltzmann constant.
$K_{5/3}(\xi)$	A modified Bessel function.
$\ell$	The galactic longitude.
$m$	Particle mass.
$N_e$	Cosmic ray electron density.
$N(E)$	The distribution of relativistic electrons with energy $E$ .
$p$	The pitch angle of spiral, the angle between the field and the circle around the galactic center.
$P(E)$	The power emitted by particle within a narrow cone with energy $E$ .
$P(\nu)$	The power emitted by particle within a narrow cone at a frequency $\nu$ .
$R$	The distances from the galactic center.
$RM$	Rotation measures of radio sources.
$s$	The distances from the observer.
$S_{\nu}$	The source function, the accumulated intensity of radiation through in the line of sight at frequency $\nu$ .
$T_b$	The observed Brightness Temperature.
$U$	All constant for heights above the plane up to several hundred parsecs.
$v$	The electron velocity.
$V_A$	The Alfvén velocity.
$z$	The distances from galactic plane.

- $\alpha$  The distance to the nearest arm, inner or outer.
- $\gamma$  The Lorentz factor.
- $\epsilon_\nu$  The emission coefficient.
- $\theta$  Azimuth angle around the galactic center.
- $\nu$  The frequency of the electromagnetic wave from synchrotron emission.
- $\nu_c$  The critical frequency.
- $\rho_c$  The ratio of the density of gas at a certain point to the density that it would have in the uncompressed state.

## Curriculum vitae

Name Wichean Kriwattanawong  
Birthday July,15 1968.  
Education Bachelor degree of Engineering (Electrical Engineering)  
Kasetsart University 1990.

มหาวิทยาลัยเชียงใหม่  
Chiang Mai University