

Table 1: Interstellar Clouds

Cloud Type	Tracer	Scale Size (pc)	Density (cm <sup>-3</sup> )	Line FWHM (km s <sup>-1</sup> )	Mean Free Path <sup>1</sup> (km)	Observed B-Field Strength <sup>2</sup> (μG)	Larmor Radius of Typical Ion <sup>3</sup> (km)
Atomic Interstellar Clouds	HI	> 100	~ 10	≈ 10	~ 10 <sup>10</sup>	~ 3 to 5 <sup>a,b</sup>	~ 10 <sup>2</sup>
Giant or Large Scale Molecular Clouds	<sup>12</sup> CO	~ 10 to 100	~ 10 <sup>1-2</sup>	~ 5 to 10	~ 10 <sup>9</sup>	~ 10 to 15 <sup>a</sup>	~ 10 <sup>2</sup>
* "Dark Clouds"	<sup>13</sup> CO, OH	~ 1 to 10	~ 10 <sup>3-4</sup>	~ 1 to 3	~ 10 <sup>6</sup>	~ 10 to 30 <sup>c</sup>	~ 10 <sup>1</sup>
* Low- to Intermediate-Mass Cores	NH <sub>3</sub>	~ 0.05 to 0.2	~ 10 <sup>4-5</sup>	~ 0.2 to 0.6	~ 10 <sup>4</sup>	~ 30 <sup>c</sup>	~ 1
Massive Cores	NH <sub>3</sub>	~ 0.2 to 0.8	~ 10 <sup>4-5</sup>	~ 1 to 3	~ 10 <sup>5</sup>	~ 100 <sup>c</sup>	~ 1
OH Maser Regions Associated with HII Regions	Continuum, Recomb. Lines, OH, NH <sub>3</sub>	~ 0.01 to 0.05	~ 10 <sup>6-7</sup>	~ 2 to 8	~ 10 <sup>4</sup>	~ 5 × 10 <sup>3 d</sup>	~ 10 <sup>-1</sup>
H <sub>2</sub> O Maser Regions Associated with HII Regions	Continuum, Recomb. Lines, OH, NH <sub>3</sub>	≤ 0.01	~ 10 <sup>8-10</sup>	~ 2 to 8	~ 10 <sup>1</sup>	~ 5 × 10 <sup>4 e</sup>	~ 10 <sup>-2</sup>

$m.f.p. \approx \frac{\Delta v}{f}$  }  $f = m_n n \gamma = \text{frequency of ion-neutral collisions}$

$L.R. \approx \frac{2m_i c}{eB} \Delta v \propto \frac{\Delta v}{B}$  }

→  $\frac{mfp}{L.R.} \propto \frac{B}{n}$   $\propto \frac{1}{n^{1/2}}$   
 if  $B \propto n^{1/2}$

Handout