

APPENDICES

Physical Constants

| | | | |
|--|--|---|---|
| Light speed (in vacuo) | $c = 2.997925 \times 10^{10} \text{ cm/sec}$ $= 2.997925 \times 10^8 \text{ m/sec}$ | Planck's constant | $\frac{m_H}{m} = 1836.12$ $h = 6.62618 \times 10^{-27} \text{ erg} \cdot \text{sec}$ $= 6.62618 \times 10^{-34} \text{ J} \cdot \text{sec}$ |
| Gravitational constant | $6.672 \times 10^{-8} \text{ dyn} \cdot \text{cm}^2 / \text{g}^2$ | | $\hbar = \frac{h}{2\pi} = 1.055 \times 10^{-27} \text{ erg/sec}$ $= 1.055 \times 10^{-34} \text{ J/sec}$ |
| Avogadro's number (mole) | $= 6.672 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2$ $N_0 = 6.022 \times 10^{23}$ | Bohr radius | $a_0 = \frac{\hbar^2}{me^2} = 5.2918 \times 10^{-9} \text{ cm}$ $= 5.2918 \times 10^{-11} \text{ m}$ |
| Loschmidt number, air molecules in 1 cm ³ (0°C, 1 atm.) | $n = 2.687 \times 10^{19} / \text{cm}^3$ | Bohr magneton | $\mu_B = \frac{he}{4\pi mc}$ $= 0.92741 \times 10^{-20} \text{ erg/gauss}$ $= 0.92741 \times 10^{-27} \text{ J/gauss}$ |
| Air volume of 1 mole at 0°C, 1 atm. | 22.41 l | Magnetic moment of proton | $1.41061 \times 10^{-23} \text{ erg/gauss}$ |
| Gas constant | $R = 8.314 \times 10^7 \text{ erg/K}$ $= 8.314 \text{ J/K}$ $= 1.986 \text{ cal/K}$ | Rydberg constant (Nucleus of infinite mass) | $R_\infty = 1.09737 \times 10^5 / \text{cm}$ $= 1.09737 \times 10^7 / \text{m}$ |
| Boltzmann constant | $k = \frac{R}{N_0} = 1.381 \times 10^{-16} \text{ erg/K}$ $= 1.381 \times 10^{-23} \text{ J/K}$ | electron volt | $1 \text{ eV} = 1.60219 \times 10^{-12} \text{ erg}$ $= 1.60219 \times 10^{-19} \text{ J}$ |
| Mechanical equivalent of heat | $J = 4.186 \times 10^7 \text{ erg/K}$ $= 4.186 \text{ J/K}$ | Wavelength of a spectral line from ⁸⁶ Kr | $1 \text{ m} = 1650763.73 \lambda_{\text{Kr}}$ |
| Absolute 0°K | 0°K = -273.15°C | Standard acceleration of gravity | $g_n = 980.665 \text{ cm/sec}^2$ $= 9.80665 \text{ m/sec}^2$ |
| Faraday's constant | $eN_0 = 96484.6 \text{ C/mol}$ | Standard pressure (760mmHg) | $1.013250 \times 10^6 \text{ dyn/cm}^2$ $= 1.013250 \times 10^5 \text{ N/m}^2$ |
| Electronic charge -e | $e = 1.60219 \times 10^{-19} \text{ C}$ $= 4.803242 \times 10^{-10} \text{ esu}$ | | |
| Electronic mass | $m_e = 9.1095 \times 10^{-10} \text{ g}$ $= 9.1095 \times 10^{-31} \text{ kg}$ | | |
| Hydrogen mass | $m_H = 1.6733 \times 10^{-24} \text{ g}$ $= 1.6733 \times 10^{-27} \text{ kg}$ | | |

Astronomical Constants

| | |
|--|--|
| Astronomical Unit (AU) | $1.496 \times 10^{13} \text{ cm}$ |
| Parsec (pc) | $3.085 \times 10^{18} \text{ cm} = 206\,265 \text{ AU} = 3.26 \text{ light years}$ |
| Sidereal year | $365.256 \text{ day} = 3.1558 \times 10^7 \text{ sec}$ |
| Earth | |
| Equatorial radius | $6.378 \times 10^8 \text{ cm}$ |
| Mass | $5.977 \times 10^{27} \text{ g}$ |
| Sun | |
| Radius R_\odot | $6.96 \times 10^{10} \text{ cm}$ |
| Mass M_\odot | $1.989 \times 10^{33} \text{ g}$ |
| Surface gravity g_\odot | $2.736 \times 10^4 \text{ cm} \cdot \text{sec}^{-2}$ |
| Luminosity L_\odot | $4\pi R_\odot^2 \cdot \pi F_\odot = 3.90 \times 10^{33} \text{ erg} \cdot \text{sec}^{-1}$ |
| Effective temperature T_{eff} | 5780°K |
| A magnitude corresponds to the change of brightness by 2.5125 times. | |
| Absolute magnitude is determined in reference to the distance of 10 pc from the Sun. | |

Masses and the relative abundances of nuclei

| atomic number | mass ¹⁾ | relative abundance (%) | cosmic abundances ²⁾ | | atomic number | mass ¹⁾ | relative abundance (%) | cosmic abundances ²⁾ | |
|---------------|--------------------|------------------------|---------------------------------|-------|---------------|--------------------|------------------------|---------------------------------|------|
| | | | number | mass | | | | number | mass |
| 1 | ¹ H | 1.0078252 | 99.985 | 12.00 | 22 | ⁴⁶ Ti | 45.952631 | 7.99 | 4.82 |
| | ² H | 2.0141022 | 0.015 | | | ⁴⁷ Ti | 46.951768 | 7.32 | |
| 2 | ³ He | 3.0160296 | 1.3 × 10 ⁻⁴ | 11.16 | | ⁴⁸ Ti | 47.947951 | 73.99 | |
| | ⁴ He | 4.0026032 | 100 | | | ⁴⁹ Ti | 48.947870 | 5.46 | |
| 3 | ⁶ Li | 6.015124 | 7.42 | 4 | | ⁵⁰ Ti | 49.944786 | 5.25 | |
| | ⁷ Li | 7.016004 | 92.58 | | 23 | ⁵⁰ V | 49.947164 | 0.25 | 3.78 |
| 4 | ⁹ Be | 9.012186 | 100 | 2.4 | | ⁵¹ V | 50.943961 | 99.75 | 5.48 |
| 5 | ¹⁰ B | 10.012939 | 19.6—19.8 | 2.8 | 24 | ⁵⁰ Cr | 49.946055 | 4.31 | 5.38 |
| | ¹¹ B | 11.0093053 | 80.2—80.4 | | | ⁵² Cr | 51.940481 | 83.76 | 7.09 |
| 6 | ¹² C | 12.0000000 | 98.892 | 8.48 | | ⁵³ Cr | 52.940653 | 9.55 | |
| | ¹³ C | 13.003355 | 1.108 | | | ⁵⁴ Cr | 53.938881 | 2.38 | |
| 7 | ¹⁴ N | 14.0030744 | 99.635 | 7.96 | 25 | ⁵⁵ Mn | 54.938050 | 100 | 5.10 |
| | ¹⁵ N | 15.000107 | 0.365 | | | ⁵⁴ Fe | 53.939617 | 5.84 | 6.84 |
| 8 | ¹⁶ O | 15.9949150 | 99.759 | 8.83 | 26 | ⁵⁶ Fe | 55.934937 | 91.68 | 6.90 |
| | ¹⁷ O | 16.999133 | 0.037 | | | ⁵⁷ Fe | 56.935397 | 2.17 | 8.65 |
| | ¹⁸ O | 17.9991601 | 0.204 | | | ⁵⁸ Fe | 57.933281 | 0.31 | |
| 9 | ¹⁹ F | 18.998415 | 100 | 5.4 | 27 | ⁵⁹ Co | 58.933189 | 100 | 4.72 |
| 10 | ²⁰ Ne | 19.992440 | 90.92 | 8.44 | 28 | ⁵⁸ Ni | 57.93534 | 67.76 | 5.93 |
| | ²¹ Ne | 20.993849 | 0.257 | | | ⁶⁰ Ni | 59.930787 | 26.16 | 7.70 |
| | ²² Ne | 21.9913847 | 8.82 | | | ⁶¹ Ni | 60.93106 | 1.25 | |
| 11 | ²³ Na | 22.98977 | 100 | 6.22 | | ⁶² Ni | 61.92834 | 3.66 | |

| | | | | | | | | | |
|----|------------------|-----------|--------|------|------|------------------|-----------|-------|-----------|
| 12 | ²⁴ Mg | 23.985042 | 78.60 | 7.46 | 8.84 | ⁶⁴ Ni | 63.92795 | 1.16 | |
| | ²⁵ Mg | 24.985839 | 10.11 | | | 29 | 62.929593 | 69.1 | 4.65 6.45 |
| | ²⁶ Mg | 25.982593 | 11.29 | | | | 64.92778 | 30.9 | |
| 13 | ²⁷ Al | 26.981539 | 100 | 6.28 | 7.71 | 30 | 63.92915 | 48.89 | 4.28 6.09 |
| 14 | ²⁸ Si | 27.976929 | 92.18 | 7.47 | 8.92 | | 65.92695 | 27.81 | |
| | ²⁹ Si | 28.976495 | 4.71 | | | | 66.92715 | 4.11 | |
| | ³⁰ Si | 29.973763 | 3.12 | | | | 67.92486 | 18.56 | |
| 15 | ³¹ P | 30.973764 | 100 | 5.53 | 7.02 | | 69.92533 | 0.62 | |
| 16 | ³² S | 31.972073 | 95.0 | 7.22 | 8.72 | 31 | 68.92574 | 60.2 | 2.45 4.29 |
| | ³³ S | 32.971462 | 0.76 | | | | 70.924706 | 39.8 | |
| | ³⁴ S | 33.967864 | 4.22 | | | 32 | 69.924252 | 20.55 | 3.18 5.04 |
| | ³⁶ S | 35.96708 | 0.014 | | | | 71.922082 | 27.37 | |
| 17 | ³⁵ Cl | 34.968851 | 75.53 | 5.4 | 6.9 | | 72.923463 | 7.67 | |
| | ³⁷ Cl | 36.965898 | 24.47 | | | | 73.921180 | 36.74 | |
| 18 | ³⁶ Ar | 35.967544 | 0.337 | 6.62 | 8.22 | | 75.921406 | 7.67 | |
| | ³⁸ Ar | 37.962728 | 0.063 | | | 33 | 74.921597 | 100 | 2.3 4.2 |
| | ⁴⁰ Ar | 39.962385 | 99.600 | | | 34 | 73.922476 | 0.87 | 3.2 5.1 |
| 19 | ³⁹ K | 38.963710 | 93.22 | 4.88 | 6.47 | | 75.91920 | 9.02 | |
| | ⁴⁰ K | 39.964000 | 0.0118 | | | | 76.91991 | 7.58 | |
| | ⁴¹ K | 40.961833 | 6.77 | | | | 77.917313 | 23.52 | |
| 20 | ⁴⁰ Ca | 39.962589 | 96.97 | 6.22 | 7.82 | | 79.916528 | 49.82 | |
| | ⁴² Ca | 41.958625 | 0.64 | | | | 81.91670 | 9.19 | |
| | ⁴³ Ca | 42.958780 | 0.145 | | | 35 | 78.918329 | 50.52 | 2.6 4.5 |
| | ⁴⁴ Ca | 43.955490 | 2.06 | | | | 80.91629 | 49.48 | |
| | ⁴⁶ Ca | 45.95370 | 0.0033 | | | 36 | 77.92041 | 0.354 | 3.2 5.1 |
| | ⁴⁸ Ca | 47.95253 | 0.185 | | | | 79.91638 | 2.27 | |
| 21 | ⁴⁵ Sc | 44.955919 | 100 | 2.91 | 4.56 | | 81.913483 | 11.56 | |

| atomic number | mass ¹⁾ | relative abundance (%) | cosmic abundances ²⁾ | | atomic number | mass ¹⁾ | relative abundance (%) | cosmic abundances ²⁾ | | |
|---------------|--------------------|------------------------|---------------------------------|-------|---------------|--------------------|------------------------|---------------------------------|-------|-----|
| | | | number | mass | | | | number | mass | |
| 83 | Kr | 82.914131 | 11.55 | | 114 | Sn | 113.902768 | 0.65 | | |
| 84 | Kr | 83.911503 | 56.90 | | 115 | Sn | 114.90335 | 0.34 | | |
| 86 | Kr | 85.910616 | 17.37 | | 116 | Sn | 115.901746 | 14.24 | | |
| 37 | 86 | Rb | 84.91180 | 72.15 | 2.35 | 117 | Sn | 116.902959 | 7.57 | |
| 87 | Rb | 86.909186 | 27.85 | | 118 | Sn | 117.901606 | 24.01 | | |
| 38 | 84 | Sr | 83.913430 | 0.56 | 2.75 | 119 | Sn | 118.903313 | 8.58 | |
| 86 | Sr | 85.909285 | 9.86 | | 120 | Sn | 119.902199 | 32.97 | | |
| 87 | Sr | 86.908892 | 7.02 | | 122 | Sn | 121.903441 | 4.71 | | |
| 88 | Sr | 87.90564 | 82.56 | | 124 | Sn | 123.905272 | 5.98 | | |
| 39 | 89 | Y | 88.905872 | 100 | 2.40 | 121 | Sb | 120.903817 | 57.25 | 1.6 |
| 40 | 90 | Zr | 89.904700 | 51.46 | 2.4 | 123 | Sb | 122.904213 | 42.75 | 3.7 |
| 91 | Zr | 90.905642 | 11.23 | | 52 | 120 | Te | 119.90402 | 0.089 | 2.0 |
| 92 | Zr | 91.905031 | 17.11 | | 122 | Te | 121.90307 | 2.46 | | |
| 94 | Zr | 93.906314 | 17.40 | | 123 | Te | 122.90428 | 0.87 | | |
| 96 | Zr | 95.908286 | 2.80 | | 124 | Te | 123.90284 | 4.61 | | |
| 41 | 93 | Nb | 92.906381 | 100 | 1.7 | 125 | Te | 124.90442 | 6.99 | |
| 42 | 92 | Mo | 91.906811 | 15.86 | 1.92 | 126 | Te | 125.90333 | 18.71 | |
| 94 | Mo | 93.905090 | 9.12 | | 128 | Te | 127.90447 | 31.79 | | |
| 95 | Mo | 94.905839 | 15.70 | | 130 | Te | 129.90624 | 34.49 | | |
| 96 | Mo | 95.904674 | 16.50 | | 53 | 121 | I | 126.904470 | 100 | 1.4 |
| 97 | Mo | 96.906022 | 9.45 | | 54 | 124 | Xe | 123.9061 | 0.096 | 2.0 |
| 98 | Mo | 97.905409 | 23.75 | | 125 | Xe | 125.90429 | 0.090 | | |
| 100 | Mo | 99.907475 | 9.62 | | 128 | Xe | 127.90354 | 1.919 | | |

| | | | | | | | | |
|----|-------------------|------------|-------|------|------|----------------------|------------|--------|
| 44 | ⁸⁶ Ru | 95.90760 | 5.46 | 1.52 | 3.52 | (¹²⁹ Xe) | 128.904784 | 26.44 |
| | ⁸⁸ Ru | 97.905288 | 1.868 | | | ¹³⁰ Xe | 129.90351 | 4.08 |
| | ⁸⁹ Ru | 98.905936 | 12.63 | | | ¹³¹ Xe | 130.905085 | 21.18 |
| | ¹⁰⁰ Ru | 99.904218 | 12.53 | | | ¹³² Xe | 131.904161 | 26.89 |
| | ¹⁰¹ Ru | 100.905577 | 17.02 | | | ¹³⁴ Xe | 133.905397 | 10.4 |
| | ¹⁰² Ru | 101.904348 | 31.6 | | | ¹³⁶ Xe | 135.90722 | 8.87 |
| | ¹⁰⁴ Ru | 103.905430 | 18.87 | | | ¹³³ Cs | 132.90535 | 100 |
| 45 | ¹⁰³ Rh | 102.905512 | 100 | 0.78 | 2.79 | ¹³⁰ Ba | 129.90625 | 0.101 |
| 46 | ¹⁰² Pd | 101.90561 | 0.96 | 1.25 | 3.28 | ¹³² Ba | 131.9051 | 0.097 |
| | ¹⁰⁴ Pd | 103.90401 | 10.97 | | | ¹³⁴ Ba | 133.90461 | 2.42 |
| | ¹⁰⁵ Pd | 104.90507 | 22.2 | | | ¹³⁵ Ba | 134.9055 | 6.59 |
| | ¹⁰⁶ Pd | 105.90348 | 27.3 | | | ¹³⁶ Ba | 135.9043 | 7.81 |
| | ¹⁰⁸ Pd | 107.90389 | 26.7 | | | ¹³⁷ Ba | 136.9055 | 11.32 |
| | ¹¹⁰ Pd | 109.90516 | 11.8 | | | ¹³⁸ Ba | 137.9050 | 71.66 |
| 47 | ¹⁰⁷ Ag | 106.905094 | 51.35 | 0.7 | 2.7 | ¹³⁸ La | 137.9069 | 0.089 |
| | ¹⁰⁹ Ag | 108.904757 | 48.65 | | | ¹³⁹ La | 138.90614 | 99.911 |
| 48 | ¹⁰⁶ Cd | 105.906463 | 1.22 | 1.50 | 3.55 | ¹³⁶ Ce | 135.9070 | 0.193 |
| | ¹⁰⁸ Cd | 107.904187 | 0.88 | | | ¹³⁸ Ce | 137.9058 | 0.250 |
| | ¹¹⁰ Cd | 109.903012 | 12.39 | | | ¹⁴⁰ Ce | 139.90539 | 88.48 |
| | ¹¹¹ Cd | 110.904189 | 12.75 | | | ¹⁴² Ce | 141.90914 | 11.07 |
| | ¹¹² Cd | 111.902762 | 24.07 | | | ¹⁴¹ Pr | 140.90760 | 100 |
| | ¹¹³ Cd | 112.904409 | 12.26 | | | ¹⁴² Nd | 141.90766 | 27.13 |
| | ¹¹⁴ Cd | 113.903360 | 28.86 | | | ¹⁴³ Nd | 142.90978 | 12.20 |
| | ¹¹⁶ Cd | 115.904762 | 7.58 | | | ¹⁴⁴ Nd | 143.91004 | 23.87 |
| 49 | ¹¹³ In | 112.90409 | 4.23 | 0.9 | 3.0 | ¹⁴⁵ Nd | 144.91254 | 8.29 |
| | ¹¹⁵ In | 114.90387 | 95.77 | | | ¹⁴⁶ Nd | 145.91308 | 17.18 |
| 50 | ¹¹² Sn | 111.90484 | 0.95 | 1.55 | 3.62 | ¹⁴⁶ Nd | 147.91686 | 5.72 |

| atomic number | atomic number | mass ¹⁾ | relative abundance (%) | cosmic abundances ²⁾ | | atomic number | mass ¹⁾ | relative abundance (%) | cosmic abundances ²⁾ | |
|---------------|-------------------|--------------------|------------------------|---------------------------------|------|-------------------|--------------------|------------------------|---------------------------------|------|
| | | | | number | mass | | | | number | mass |
| | ¹⁵⁰ Nd | 149.92091 | 5.60 | | | ¹⁷⁹ Hf | 178.9460 | 13.75 | | |
| 62 | ¹⁴⁴ Sm | 143.91199 | 3.16 | 1.0 | 3.2 | ¹⁸⁰ Hf | 179.9469 | 35.22 | | |
| | ¹⁴⁷ Sm | 146.91487 | 15.07 | | | ¹⁸⁰ Ta | 179.94755 | 0.0123 | 0.3 | 2.6 |
| | ¹⁴⁸ Sm | 147.91479 | 11.27 | | | ¹⁸¹ Ta | 180.94801 | 99.9877 | | |
| | ¹⁴⁹ Sm | 148.91718 | 13.82 | | | ¹⁸⁶ W | 179.94700 | 0.135 | 1.1 | 3.4 |
| | ¹⁵⁰ Sm | 149.91727 | 7.47 | | | ¹⁸² W | 181.94830 | 26.4 | | |
| | ¹⁸² Sm | 151.91975 | 26.63 | | | ¹⁸³ W | 182.95033 | 14.4 | | |
| | ¹⁸⁴ Sm | 153.92228 | 22.53 | | | ¹⁸⁴ W | 183.95102 | 30.6 | | |
| 63 | ¹⁵¹ Eu | 150.91984 | 47.77 | 0.7 | 2.9 | ¹⁸⁶ W | 185.95444 | 28.4 | | |
| | ¹⁵³ Eu | 152.92124 | 52.23 | | | ¹⁸⁵ Re | 184.95305 | 37.07 | 0.6 | 2.9 |
| 64 | ¹⁵² Gd | 151.91979 | 0.20 | 1.1 | 3.3 | ¹⁸⁷ Re | 186.95583 | 62.93 | | |
| | ¹⁵⁴ Gd | 153.92093 | 2.15 | | | ¹⁸⁴ Os | 183.9528 | 0.018 | 1.3 | 3.6 |
| | ¹⁵⁵ Gd | 154.92266 | 14.7 | | | ¹⁸⁶ Os | 185.9538 | 1.59 | | |
| | ¹⁵⁶ Gd | 155.92218 | 20.47 | | | ¹⁸⁷ Os | 186.95583 | 1.64 | | |
| | ¹⁵⁷ Gd | 156.92402 | 15.68 | | | ¹⁸⁸ Os | 187.95608 | 13.3 | | |
| | ¹⁵⁸ Gd | 157.92417 | 24.9 | | | ¹⁸⁹ Os | 188.9583 | 16.1 | | |
| | ¹⁶⁰ Gd | 159.92712 | 21.9 | | | ¹⁹⁰ Os | 189.9587 | 26.4 | | |
| 65 | ¹⁵⁸ Tb | 158.92536 | 100. | 0.4 | 2.6 | ¹⁹² Os | 191.9615 | 41.0 | 1.2 | 3.5 |
| 66 | ¹⁵⁶ Dy | 155.9239 | 0.0524 | 1.2 | 3.4 | ¹⁹¹ Ir | 190.9606 | 38.5 | | |
| | ¹⁵⁸ Dy | 157.92445 | 0.0902 | | | ¹⁹³ Ir | 192.96302 | 61.5 | | |
| | ¹⁶⁰ Dy | 159.92521 | 2.294 | | | ¹⁹⁰ Pt | 189.9600 | 0.0127 | 1.2 | 3.9 |
| | ¹⁶¹ Dy | 160.92694 | 18.88 | | | ¹⁹² Pt | 191.9611 | 0.78 | 1.6 | 3.9 |
| | ¹⁶² Dy | 161.92680 | 25.53 | | | ¹⁹⁴ Pt | 193.96273 | 32.9 | | |
| | ¹⁶³ Dy | 162.92876 | 24.97 | | | ¹⁹⁵ Pt | 194.96481 | 33.8 | | |
| | ¹⁶⁴ Dy | 163.92920 | 28.18 | | | ¹⁹⁶ Pt | 195.96497 | 25.2 | | |

Properties of particles

| | | Symbol | Spin (\hbar) | Magnetic moment (unit: $e\hbar/2m_p c$ for heavy particle) | Mass (MeV) | Mean life (sec) | | | |
|----------------|--------------------|----------------------------|--|---|--------------------------------------|--|-------------------|---------------------|-------------------------|
| | | particle composition | anti-particle | γ , ν , $\bar{\nu}$ | | | | | |
| Photon | | γ | 1 | 0 | 0 | stable | | | |
| Lepton | neutrino | ν_e, ν_μ, ν_τ | | | | | | | |
| | electron | e^- | $\bar{\nu}_e, \bar{\nu}_\mu, \bar{\nu}_\tau$ | \bar{e}^+ | ~ 0 | stable | | | |
| | μ particle | μ^- | | μ^+ | $1.0011596524 \times e\hbar/2m_e c$ | stable | | | |
| | τ particle | τ^- | | τ^+ | $1.001165922 \times e\hbar/2m_\mu c$ | 2.1971×10^{-6} $< 10^{-11}$ | | | |
| Meson | π meson | π^0 | π^0 | π^0 | 0 | 0.83×10^{-16} | | | |
| | | π^+ | π^- | π^- | 0 | 2.6030×10^{-8} | | | |
| | | K^+ | K^- | K^- | 0 | 1.2371×10^{-8} | | | |
| | K meson | K^0 | \bar{K}^0 | \bar{K}^0 | 0 | $\left\{ \begin{array}{l} K_S^0 : 0.892 \times 10^{-10} \\ K_L^0 : 5.183 \times 10^{-8} \end{array} \right.$ | | | |
| Heavy particle | Nucleon | proton | p | \bar{p} | $1/2$ | 2.7928456 ± 0.0000011 | 938.2796 | stable | |
| | | neutron | n | \bar{n} | $1/2$ | -1.913042 ± 0.000001 | 939.5731 | 0.918×10^3 | |
| | Λ particle | Λ particle | Λ | $\bar{\Lambda}$ | Λ | $1/2$ | -0.606 ± 0.03 | 1115.60 | 2.632×10^{-10} |
| | | Σ particle | Σ^+ | Σ^- | Σ^+ | $1/2$ | 2.33 ± 0.13 | 1189.37 | 0.802×10^{-10} |
| | Heavy nucleon Y | Σ particle | Σ^0 | Σ^- | Σ^0 | $1/2$ | | 1192.47 | 5.8×10^{-20} |
| | | Ξ particle | Ξ^0 | Ξ^- | Ξ^0 | $1/2$ | -1.48 ± 0.37 | 1197.35 | 1.483×10^{-10} |
| | Heavy nucleon Y | Ξ particle | Ξ^0 | Ξ^- | Ξ^0 | $1/2$ | -1.24 ± 0.01 | 1314.9 | 2.90×10^{-10} |
| | | Ξ particle | Ξ^- | Ξ^- | Ξ^- | $1/2$ | -1.85 ± 0.75 | 1321.32 | 1.654×10^{-10} |
| | Ω particle | Ω^- | Ω^- | Ω^- | Ω^- | $3/2$ | | 1672.2 | 1.1×10^{-10} |

Decay patterns of unstable particles

| Particles | Decay mode | Q Value (MeV) | Splitting ratio (%) | |
|--|---|---|---|--|
| μ^- | $\rightarrow e^- + \nu_\mu + \bar{\nu}_e$ | 105.15 | 100 | |
| π^+ | $\rightarrow \begin{cases} \mu^+ + \nu_\mu & 33.94 \\ e^+ + \nu_e & 139.09 \end{cases}$ | | 99.99 $(1.27 \pm 0.03) \times 10^{-4}$ | |
| π^0 | $\rightarrow 2\gamma$ | 134.96 | 99 | |
| K^+ | $\begin{cases} K_{\mu 2}^+ \\ K_{\pi 2}^+, \theta^+ \end{cases}$ | $\begin{cases} \mu^+ + \nu_\mu & 388.1 \\ \pi^+ + \pi^0 & 219.2 \end{cases}$ | $\begin{cases} 63.5 \pm 0.2 \\ 21.1 \pm 0.2 \end{cases}$ | |
| | τ^+ | $\rightarrow 2\pi^+ + \pi^-$ | 75.0 | 5.6 ± 0.03 |
| | $\tau^{+\prime}$ | $\rightarrow \pi^+ + 2\pi^0$ | 84.2 | 1.7 ± 0.5 |
| | $K_{e 3}^+$ | $\rightarrow e^+ + \nu_e + \pi^0$ | 358.3 | 4.8 ± 0.1 |
| | $K_{\mu 3}^+$ | $\rightarrow \mu^+ + \nu_\mu + \pi^0$ | 253.1 | 3.2 ± 0.1 |
| | K_S^0 | $\rightarrow \begin{cases} \pi^+ + \pi^- & 218.8 \\ 2\pi^0 & 228.0 \end{cases}$ | | $\begin{cases} 68.7 \pm 0.3 \\ 31.3 \pm 0.3 \end{cases}$ |
| $\begin{cases} e^\pm + \{\nu_e, \bar{\nu}_e\} + \pi^\mp \\ \mu^\pm + \{\nu_\mu, \bar{\nu}_\mu\} + \pi^\mp \end{cases}$ | | $\begin{cases} 357.9 \\ 252.7 \end{cases}$ | $\begin{cases} \\ \sim 0.1 \end{cases}$ | |
| $\begin{cases} e^\pm + \{\nu_e, \bar{\nu}_e\} + \pi^\mp \\ \mu^\pm + \{\nu_\mu, \bar{\nu}_\mu\} + \pi^\mp \end{cases}$ | | $\begin{cases} 357.9 \\ 252.7 \end{cases}$ | $\begin{cases} 39.0 \pm 0.6 \\ 27.1 \pm 0.6 \end{cases}$ | |
| $\begin{cases} \pi^+ + \pi^- + \pi^0 \\ 3\pi^0 \end{cases}$ | | $\begin{cases} 83.8 \\ 93.0 \end{cases}$ | $\begin{cases} 12.3 \pm 0.3 \\ 21.4 \pm 0.8 \end{cases}$ | |
| n | $\rightarrow p + e^- + \bar{\nu}_e$ | 0.78 | 100 | |
| Λ | $\rightarrow \begin{cases} p + \pi^- \\ n + \pi^0 \end{cases}$ | $\begin{cases} 37.56 \\ 40.85 \end{cases}$ | $\begin{cases} 64.2 \pm 0.5 \\ 35.8 \pm 0.5 \end{cases}$ | |
| | $\rightarrow p + e^- + \bar{\nu}_e$ | 176.64 | ~ 0.1 | |
| | $\rightarrow \begin{cases} p + \pi^0 \\ n + \pi^+ \end{cases}$ | $\begin{cases} 116.1 \\ 110.3 \end{cases}$ | $\begin{cases} 51.6 \pm 0.7 \\ 48.4 \pm 0.7 \end{cases}$ | |
| Σ^+ | $\rightarrow \begin{cases} p + \pi^0 \\ n + \pi^+ \\ p + \gamma \end{cases}$ | $\begin{cases} 251.1 \\ 116.1 \\ 110.3 \end{cases}$ | $\begin{cases} \\ 51.6 \pm 0.7 \\ 48.4 \pm 0.7 \\ \sim 0.1 \end{cases}$ | |
| Σ^0 | $\rightarrow \Lambda + \gamma$ | 76.9 | 100 | |
| Σ^- | $\rightarrow n + \pi^-$ | 118.2 | 100 | |
| Ξ^- | $\rightarrow \Lambda + \pi^-$ | 66.1 | ~ 100 | |
| Ξ^0 | $\rightarrow \Lambda + \pi^0$ | 64.3 | ~ 100 | |

K^+ is occasionally expressed as $K_{\mu 2}^+$ or θ^+ in accordance with the decay modes.

Resonant states of hadrons

| Symbol | composition | Charge (e) | Spin (\hbar) | Mass (MeV) | Equivalent width (MeV) |
|---------------|------------------------|-------------------|---------------------|---------------|------------------------------|
| η | } $k\bar{k}, s\bar{s}$ | 0 | 0 | 549 | 0.001 |
| η' | | 0 | 0 | 958 | <1 |
| D | $c\bar{k}, k\bar{c}$ | $\pm 1, 0, 0$ | 0 | 1866 | $\sim 0^{1)}$ |
| F | $c\bar{s}, s\bar{c}$ | ± 1 | 0 | 2030 | $\sim 0^{1)}$ |
| ρ | $k\bar{k}$ | $\pm 1, 0$ | 1 | 776 | 155 |
| ω | $u\bar{u} + d\bar{d}$ | 0 | 1 | 783 | 10 |
| K^* | $s\bar{k}, k\bar{s}$ | $\pm 1, 0, 0$ | 1 | 892 | 50 |
| ϕ | $s\bar{s}$ | 0 | 1 | 1020 | 4 |
| D^* | $c\bar{k}, k\bar{c}$ | $\pm 1, 0, 0$ | 1 | 2007 | <2 |
| F^* | $c\bar{s}, s\bar{c}$ | ± 1 | 1 | 2140 | ? |
| J/ψ | $c\bar{c}$ | 0 | 1 | 3097 | 0.07 |
| ψ' | $c\bar{c}$ | 0 | 1 | 3686 | 0.23 |
| ψ'' | $c\bar{c}$ | 0 | 1 | 3772 | 28 |
| Υ | $b\bar{b}$ | 0 | 1 | 9450 | 0.04 |
| Υ' | $b\bar{b}$ | 0 | 1 | 10010 | <0.01 |
| f | $u\bar{u} + d\bar{d}$ | 0 | 2 | 1271 | 180 |
| A_2 | $k\bar{k}$ | $\pm 1, 0$ | 2 | 1312 | 102 |
| K_2 | $s\bar{k}, k\bar{s}$ | $\pm 1, 0, 0$ | 2 | 1434 | 100 |
| f' | $s\bar{s}$ | 0 | 2 | 1516 | 65 |
| χ_2 | $c\bar{c}$ | 0 | 2 | 3554 | ? |
| χ_1 | $c\bar{c}$ | 0 | 1 | 3508 | ? |
| χ_0 | $c\bar{c}$ | 0 | 0 | 3413 | ? |
| $\Delta^{2)}$ | kkk | 2, 1, 0, -1 | 3/2 | 1232 | 115 |
| Σ^* | kks | 1, 0, -1 | 3/2 | 1384 | 38 |
| Ξ^* | kss | 0, -1 | 3/2 | 1533 | 10 |

1) Given here for our convenience.

2) Other anti-particles exist in addition to those for spin 3/2.

Supernova remnants (SNR)

| Name | 1950.0 | | gal. long. | gal. lat. | radio intensity (1 GHz) S | spectral index a^1 | seeing dia- meter | dia- meter | expand- ing speed | distance | remark |
|-------------|--------------------|------------------|------------|-----------|---------------------------------|-------------------------|-------------------------|---------------|-----------------------------------|--------------------|--------------------------------|
| | right ascension | declina- tion | | | | | | | | | |
| Kepler | h | m | ° | ° | Jy | | | l.y. | $\text{km} \cdot \text{sec}^{-1}$ | $\times 10^4$ l.y. | |
| W 44 | 17 | 27.7 | 5 | -7 | 20 | 0.58 | 3.0 | 16-30 | 200-300 | 1.9-3.3 | 1604 explosion |
| W 49 B | 18 | 53.7 | 35 | -1 | 190 | 0.40 | 31 | 90 | | 1.0 | |
| Cygnus Loop | 19 | 08.7 | 43 | -0 | 39 | 0.33 | 4.8 | 45 | | 3.3 | |
| | 22 | 47.6 | 18 | -9 | 160 | 0.45 | 180 | 140 | | 0.3 | Loop nebula, NGC 6992/95 |
| Cas A | 23 | 21.2 | 112 | -2 | 3100 | 0.77 | 4.3 | 12 | 7400 | 1.0 | |
| Tycho | 00 | 22.6 | 52 | +1 | 52 | 0.74 | 8.1 | 40 | 4700 | 1.6 | 1572 explosion |
| Tau A | 05 | 31.5 | 21 | -6 | 1000 | 0.25 | 3.6 | 7 | 1500 | 0.7 | Crab nebula M1, 1054 explosion |
| IC 443 | 06 | 13.8 | 29 | +3 | 180 | 0.45 | 40 | 40-80 | | | |
| Vela XYZ | 08 | 32.2 | 263 | -3 | 1800 | 0.30 | 200 | 95 | | 0.3-0.7 | |
| | | | | | | | | | | 0.16 | |

¹) spectral index when expressed as $S_{\alpha} \nu^{-\beta}$

Catalogue for 98 supernova remnants

| Supernova position | Name | Luminosity at 408 MHz (Jy) | Luminosity at 5000 MHz (Jy) | Spectral index (α 5000 408) | Angular diameter (min.) | Surface brightness Σ_{408} ($W \cdot m^{-2} \cdot Hz^{-1} \cdot sr^{-1}$) |
|--------------------|-------------------|----------------------------------|-----------------------------------|---|-------------------------------|--|
| G193.3-1.5 | PKS 0607+17 | 42 | | | 80 | 0.984E-21 |
| G205.5+0.2 | Monoceros | 180 | | (-0.5) | 253 | 0.412E-21 |
| G208.9+2.3 | PKS 0646+06 | 8 | | | 80 | 0.187E-21 |
| G260.4-3.4 | Puppis A | 198 | 59 | -0.48 | 47 | 0.134E-19 |
| G261.9+5.5 | PKS 0902-38 | 12 | | | 40 | 0.112E-20 |
| G263.9-3.3 | Vela X, Y, Z | 2300 | | (-0.5) | 256 | 0.526E-20 |
| G287.8-0.5 | | | | | <42 | |
| G290.1-0.8 | MSH 11-61A | 112 | 28 | -0.55 | 12.6 | 0.106E-18 |
| G291.0-0.1 | MSH 11-62 | 22 | 9.2 | -0.35 | 10.0 | 0.330E-19 |
| G292.0+1.8 | MSH 11-54 | 21 | 7.6 | -0.41 | 5.4 | 0.108E-18 |
| G293.8+0.6 | | 9.0 | 2.1 | -0.58 | 9.0 | 0.730E-20 |
| G296.1-0.7 | | 6.9 | | -0.7 | 16.0 | 0.404E-20 |
| G296.5+10.0 | PKS 1209-51 | 85 | 30 | -0.45 | 81.9 | 0.194E-20 |
| G296.8-0.3 | | 15.0 | 3.2 | -0.62 | 14.9 | 0.101E-19 |
| G298.5-0.3 | | (7.4) | | -0.36 | 3.7 | 0.793E-19 |
| G298.6+0.0 | | (5.6) | | -0.30 | 8.3 | 0.121E-19 |
| G299.0+0.2 | | 12.6 | 4.7 | -0.39 | 10.5 | 0.171E-19 |
| G302.3+0.7 | | 7.5 | 3.0 | -0.36 | 16.5 | 0.143E-20 |
| G304.6+0.1 | Kes 17 | 22 | 6.7 | -0.48 | 6.9 | 0.693E-19 |
| G308.7+0.0 | | 16.7 | 7.0 | -0.35 | 7.3 | 0.470E-19 |
| G309.2+0.6 | | 10 | 3.9 | -0.37 | 12.6 | 0.945E-20 |
| G309.8+0.0 | | 26.4 | 7.4 | -0.51 | 19.2 | 0.107E-19 |
| G311.9-0.3 | | (5.7) | (1.7) | -0.48 | 3.9 | 0.548E-19 |
| G315.4-0.3 | | 15.9 | 4.9 | -0.47 | 16.0 | 0.933E-20 |
| G315.4-2.3 | | 86 | | -0.62 | 39 | 0.846E-20 |
| G316.3-0.0 | RCW 86 | 37 | 18.2 | -0.32 | 17.1 | 0.189E-19 |
| G320.0-1.2 | MSH 14-57 | 16.7 | 16.7 | -0.32 | 25.8 | 0.212E-19 |
| G321.9-0.3 | RCW 89, MSH 15-52 | 94 | 40 | -0.34 | 24.2 | 0.469E-20 |
| G322.3-1.2 | Kes 24 | 18.3 | 7.8 | -0.34 | 5.8 | 0.553E-19 |
| G323.5+0.1 | | 12.4 | 1.3 | -0.90 | 24.2 | 0.540E-20 |
| G326.3-1.8 | | 4.2 | 1.5 | -0.41 | 10.8 | 0.540E-20 |
| G327.1-1.1 | MSH 15-56 | 180 | 98 | -0.24 | 36 | 0.208E-19 |
| G327.4+0.4 | | 10.6 | 4.3 | -0.36 | 14.2 | 0.788E-20 |
| G327.6+14.5 | Kes 27 | 58 | 12.4 | -0.61 | 21.0 | 0.197E-19 |
| G328.0+0.3 | SN 1006 A.D. | 32.3 | 7.7 | -0.57 | 34 | 0.419E-20 |
| G328.4+0.2 | | 4.5 | 1 | -0.55 | 6.4 | 0.165E-19 |
| G330.0+15.0 | MSH 15-57 | 20 | 11 | -0.24 | 4.0 | 0.186E-18 |
| G330.2+1.0 | Lupus Loop | 445 | | | 368 | 0.493E-21 |
| G332.0+0.2 | | 14.1 | 4.0 | -0.30 | 8.3 | 0.187E-19 |
| G332.4+0.1 | MSH 16-51 | 40 | 11 | (-0.44) | 12.0 | 0.147E-19 |
| G332.4-0.4 | RCW 103 | 44 | 11 | -0.51 | 13.2 | 0.344E-19 |
| G335.2+0.1 | | 27.1 | 8.6 | -0.55 | 9.4 | 0.747E-19 |
| G336.7+0.5 | | 9.7 | | -0.46 | 18.6 | 0.117E-19 |
| G337.0-0.1 | CTB 33 | 26 | (14.4) | -0.37 | 9.9 | 0.145E-19 |
| G337.2-0.7 | | 3.8 | 0.7 | -0.47 | 7.6 | 0.673E-19 |
| | | | | -0.67 | 3.9 | 0.375E-19 |

| | | | | | |
|-----------------|--------|--------|---------|------|-----------|
| C337.3+1.0 | 24.6 | 7.2 | -0.49 | 11.8 | 0.265E-19 |
| Kes 40 | 26 | (7.2) | -0.51 | 10.6 | 0.347E-19 |
| Kes 41 | (2.3) | (0.8) | -0.42 | 11.7 | 0.252E-20 |
| C338.2+0.4 | (12.5) | (2.4) | -0.66 | 8.2 | 0.279E-19 |
| C338.3-0.1 | (36.8) | (16.1) | -0.33 | 12.4 | 0.359E-19 |
| C338.5+0.1 | 7.5 | 4.5 | -0.20 | 2.9 | 0.115E-19 |
| C339.2-0.4 | 8.2 | 2.9 | -0.41 | 6.4 | 0.295E-19 |
| C340.4+0.4 | 7.0 | 2.8 | -0.36 | 4.9 | 0.437E-19 |
| C340.6+0.3 | 7.4 | 1.7 | -0.59 | 6.1 | 0.300E-19 |
| C341.9-0.3 | 4.7 | 1.3 | -0.51 | 7.8 | 0.116E-19 |
| C344.7-0.1 | 7.4 | 4.3 | -0.49 | 8.0 | 0.349E-19 |
| C346.6-0.2 | 14.9 | 39 | (-0.33) | 8.0 | 0.228E-18 |
| C348.5+0.1 | 34 | 22 | (-0.30) | 5.1 | 0.196E-18 |
| C348.7+0.3 | 31 | 9.1 | -0.49 | 1.7 | 0.156E-17 |
| C349.7+0.2 | 49.5 | 13.6 | -0.51 | 28.9 | 0.889E-20 |
| C350.0-1.8 | 10.7 | 1.7 | -0.73 | 4.1 | 0.964E-19 |
| C350.1-0.3 | 8.1 | 3.1 | -0.38 | 6.2 | 0.316E-19 |
| C351.2+0.1 | 9.6 | 2.3 | -0.57 | 6.4 | 0.347E-19 |
| C352.7-0.1 | 12.3 | 3.4 | -0.51 | 11.2 | 0.147E-19 |
| C355.9-2.5 | 54.2 | 18.5 | -0.43 | 5.2 | 0.301E-18 |
| C357.7-0.1 | 33 | 7.1 | -0.58 | 3.2 | 0.498E-18 |
| C4.5+6.8 | 38 | 27 | -0.2 | 15.0 | 0.253E-19 |
| C5.3-1.0 | 460 | 179 | -0.38 | 49 | 0.292E-19 |
| C6.4-0.1 | 12.2 | 6.7 | -0.25 | 19.5 | 0.481E-20 |
| C7.7-3.7 | 1.9 | (0.8) | -0.34 | 6.0 | 0.793E-20 |
| C10.0-0.3 | 36 | 8.9 | -0.56 | 4.2 | 0.306E-18 |
| G11.2-0.3 | 9.4 | 2.8 | -0.48 | 7.0 | 0.288E-19 |
| G11.4-0.1 | 6.6 | 1.1 | -0.71 | 5.4 | 0.339E-19 |
| G12.0-0.1 | 7.7 | 1.9 | -0.56 | 5.0 | 0.462E-19 |
| G15.9+0.2 | 38 | 15 | -0.36 | 15.0 | 0.213E-19 |
| G18.8+0.3 | 110 | 28 | -0.54 | 22.8 | 0.317E-19 |
| C21.8-0.6 | 54 | 28 | -0.57 | 24.6 | 0.134E-19 |
| C22.7-0.2 | 92 | 28 | -0.50 | 21.0 | 0.313E-19 |
| C23.3-0.3 | 8.3 | 3.6 | (-0.59) | 7.2 | 0.240E-19 |
| C23.6+0.3 | 27 | 14.0 | -0.49 | 14.0 | 0.207E-19 |
| C24.7+0.6 | 12.3 | 3.6 | -0.49 | 14.6 | 0.865E-20 |
| G24.7-0.6 | 4.4 | 1.4 | -0.45 | 4.4 | 0.341E-19 |
| G27.4+0.0 | 19.5 | 3.3 | -0.71 | 2.4 | 0.512E-18 |
| G29.7-0.2 | 34.4 | 9.8 | -0.57 | 4.8 | 0.224E-18 |
| C31.9+0.0 | 34.4 | 9.8 | -0.57 | 4.8 | 0.224E-18 |
| C32.0-4.9 | 12.8 | 7.7 | -0.20 | 17.2 | 0.166E-19 |
| C32.8-0.1 | 35.5 | 7.8 | -0.60 | 9.2 | 0.629E-19 |
| C33.6+0.1 | 44 | 149 | -0.28 | 27.2 | 0.606E-19 |
| 4C00.70 | 299 | 8.8 | -0.49 | 6.6 | 0.103E-18 |
| W 44 | > 40 | > 30 | -0.49 | > 30 | 0.103E-18 |
| 3C 396 | 30 | 8.8 | -0.49 | 6.6 | 0.103E-18 |
| W 50 | > 40 | > 30 | -0.49 | > 30 | 0.103E-18 |
| C39.7-2.0 | 29.8 | 8.7 | -0.49 | 3.6 | 0.341E-18 |
| C39.7-2.0 | 29.8 | 8.7 | -0.49 | 3.6 | 0.341E-18 |
| G41.1-0.3 | 53 | 16 | (-0.5) | 164 | 0.169E-20 |
| G41.9-4.1 | 20.2 | 7.1 | -0.47 | 4.2 | 0.450E-18 |
| G43.3-0.2 | 20.2 | 7.1 | -0.42 | 15.6 | 0.124E-19 |
| G46.8-0.3 | 200 | 26.6 | -0.25 | 83.4 | 0.124E-19 |
| G47.6+6.1 | 11.7 | 26.6 | (-0.32) | 26.6 | 0.424E-19 |
| G49.2-0.5 | 11.7 | 26.6 | (-0.32) | 26.6 | 0.424E-19 |
| G53.7-2.2 | 11.7 | 26.6 | (-0.32) | 26.6 | 0.424E-19 |
| C337.3+1.0 | 24.6 | 7.2 | -0.49 | 11.8 | 0.265E-19 |
| Kes 40 | 26 | (7.2) | -0.51 | 10.6 | 0.347E-19 |
| Kes 41 | (2.3) | (0.8) | -0.42 | 11.7 | 0.252E-20 |
| C338.2+0.4 | (12.5) | (2.4) | -0.66 | 8.2 | 0.279E-19 |
| C338.3-0.1 | (36.8) | (16.1) | -0.33 | 12.4 | 0.359E-19 |
| C338.5+0.1 | 7.5 | 4.5 | -0.20 | 2.9 | 0.115E-19 |
| C339.2-0.4 | 8.2 | 2.9 | -0.41 | 6.4 | 0.295E-19 |
| C340.4+0.4 | 7.0 | 2.8 | -0.36 | 4.9 | 0.437E-19 |
| C340.6+0.3 | 7.4 | 1.7 | -0.59 | 6.1 | 0.300E-19 |
| C341.9-0.3 | 4.7 | 1.3 | -0.51 | 7.8 | 0.116E-19 |
| C344.7-0.1 | 7.4 | 4.3 | -0.49 | 8.0 | 0.349E-19 |
| C346.6-0.2 | 14.9 | 39 | (-0.33) | 8.0 | 0.228E-18 |
| C348.5+0.1 | 34 | 22 | (-0.30) | 5.1 | 0.196E-18 |
| C348.7+0.3 | 31 | 9.1 | -0.49 | 1.7 | 0.156E-17 |
| C349.7+0.2 | 49.5 | 13.6 | -0.51 | 28.9 | 0.889E-20 |
| C350.0-1.8 | 10.7 | 1.7 | -0.73 | 4.1 | 0.964E-19 |
| C350.1-0.3 | 8.1 | 3.1 | -0.38 | 6.2 | 0.316E-19 |
| C351.2+0.1 | 9.6 | 2.3 | -0.57 | 6.4 | 0.347E-19 |
| C352.7-0.1 | 12.3 | 3.4 | -0.51 | 11.2 | 0.147E-19 |
| C355.9-2.5 | 54.2 | 18.5 | -0.43 | 5.2 | 0.301E-18 |
| C357.7-0.1 | 33 | 7.1 | -0.58 | 3.2 | 0.498E-18 |
| C4.5+6.8 | 38 | 27 | -0.2 | 15.0 | 0.253E-19 |
| C5.3-1.0 | 460 | 179 | -0.38 | 49 | 0.292E-19 |
| C6.4-0.1 | 12.2 | 6.7 | -0.25 | 19.5 | 0.481E-20 |
| C7.7-3.7 | 1.9 | (0.8) | -0.34 | 6.0 | 0.793E-20 |
| C10.0-0.3 | 36 | 8.9 | -0.56 | 4.2 | 0.306E-18 |
| G11.2-0.3 | 9.4 | 2.8 | -0.48 | 7.0 | 0.288E-19 |
| G11.4-0.1 | 6.6 | 1.1 | -0.71 | 5.4 | 0.339E-19 |
| G12.0-0.1 | 7.7 | 1.9 | -0.56 | 5.0 | 0.462E-19 |
| G15.9+0.2 | 38 | 15 | -0.36 | 15.0 | 0.213E-19 |
| G18.8+0.3 | 110 | 28 | -0.54 | 22.8 | 0.317E-19 |
| C21.8-0.6 | 54 | 28 | -0.57 | 24.6 | 0.134E-19 |
| C22.7-0.2 | 92 | 28 | -0.50 | 21.0 | 0.313E-19 |
| C23.3-0.3 | 8.3 | 3.6 | (-0.59) | 7.2 | 0.240E-19 |
| C23.6+0.3 | 27 | 14.0 | -0.49 | 14.0 | 0.207E-19 |
| C24.7+0.6 | 12.3 | 3.6 | -0.49 | 14.6 | 0.865E-20 |
| G24.7-0.6 | 4.4 | 1.4 | -0.45 | 4.4 | 0.341E-19 |
| G27.4+0.0 | 19.5 | 3.3 | -0.71 | 2.4 | 0.512E-18 |
| G29.7-0.2 | 34.4 | 9.8 | -0.57 | 4.8 | 0.224E-18 |
| C31.9+0.0 | 34.4 | 9.8 | -0.57 | 4.8 | 0.224E-18 |
| C32.0-4.9 | 12.8 | 7.7 | -0.20 | 17.2 | 0.166E-19 |
| C32.8-0.1 | 35.5 | 7.8 | -0.60 | 9.2 | 0.629E-19 |
| C33.6+0.1 | 44 | 149 | -0.28 | 27.2 | 0.606E-19 |
| 4C00.70 | 299 | 8.8 | -0.49 | 6.6 | 0.103E-18 |
| W 44 | > 40 | > 30 | -0.49 | > 30 | 0.103E-18 |
| 3C 396 | 30 | 8.8 | -0.49 | 6.6 | 0.103E-18 |
| W 50 | > 40 | > 30 | -0.49 | > 30 | 0.103E-18 |
| C39.7-2.0 | 29.8 | 8.7 | -0.49 | 3.6 | 0.341E-18 |
| C39.7-2.0 | 29.8 | 8.7 | -0.49 | 3.6 | 0.341E-18 |
| G41.1-0.3 | 53 | 16 | (-0.5) | 164 | 0.169E-20 |
| G41.9-4.1 | 20.2 | 7.1 | -0.47 | 4.2 | 0.450E-18 |
| G43.3-0.2 | 20.2 | 7.1 | -0.42 | 15.6 | 0.124E-19 |
| G46.8-0.3 | 200 | 26.6 | -0.25 | 83.4 | 0.124E-19 |
| G47.6+6.1 | 11.7 | 26.6 | (-0.32) | 26.6 | 0.424E-19 |
| G49.2-0.5 | 11.7 | 26.6 | (-0.32) | 26.6 | 0.424E-19 |
| G53.7-2.2 | 11.7 | 26.6 | (-0.32) | 26.6 | 0.424E-19 |
| MSH 16-48 | | | | | |
| CTB 37A | | | | | |
| CTB 37B | | | | | |
| MSH 17-39 | | | | | |
| Kepler's SN A 4 | | | | | |
| W 28 | | | | | |
| Kes 67 | | | | | |
| Kes 69 | | | | | |
| W 41, Kes 70 | | | | | |
| Kes 72 | | | | | |
| Kes 75 | | | | | |
| 3C 391 | | | | | |
| 3C 396.1 | | | | | |
| Kes 78 | | | | | |
| 4C 00.70 | | | | | |
| W 44 | | | | | |
| 3C 396 | | | | | |
| W 50 | | | | | |
| 3C 397 | | | | | |
| PKS 1920+06 | | | | | |
| W 49 B | | | | | |
| CTB 63 | | | | | |
| W 51 | | | | | |

Pulsars

| Name (PSR) | 1950.0 | | gal. long. | gal. lat. | radio intensity (400 MHz) S_{400} | equivalent pulse width ²⁾ msec | period P sec | slow-down of period dP/dt 10^{-15} sec/sec | dis- tance | Remark | | |
|---------------|--------------------|------------------|---------------|--------------|--|--|----------------------|---|---------------|--------|----------------------|--------------------------------|
| | Right ascension | Declina- tion | | | | | | | | | | |
| 0329+54 | 03 | 29.2 | +54 | 25 | 145 | -1 | 2.27 | 8.7 | 0.7145 | 2.05 | 10 ⁴ l.y. | |
| 0525+21 | 05 | 25.9 | +21 | 58 | 184 | -7 | 0.09 | 75 | 3.7454 | 40.06 | 0.62 | S at maximum longest period |
| 0531+21 | 05 | 31.5 | +21 | 59 | 185 | -6 | 0.48 | 1.9 | 0.0331 | 422.69 | 0.65 | Crab pulsar |
| 0833-45 | 08 | 33.7 | -45 | 00 | 264 | -3 | 2.8 | 1.71 | 0.0892 | 125.03 | 0.16 | Vela pulsar |
| 1641-45 | 16 | 41.2 | -45 | 54 | 339 | -0 | 1.3 | 9 | 0.4550 | 20.10 | 1.60 | |
| 1749-28 | 17 | 49.8 | -28 | 06 | 2 | -1 | 1.07 | 7 | 0.5625 | 8.15 | 0.33 | |
| 1919+21 | 19 | 19.6 | +21 | 47 | 56 | +4 | 0.06 | 25 | 1.3373 | 1.34 | 0.13 | first discovered |

1) Radio intensity averaged over a period.

2) Equivalent pulse width is derived by dividing the pulse energy for the period by the peak flux.

γ -ray point sources

| l^{II} (deg.) | b^{II} (deg.) | Error range ¹⁾ (deg.) | Flux ²⁾ > 100 MeV (photon-cm ⁻² -sec ⁻¹) | l^{II} (deg.) | Error range ¹⁾ (deg.) | Flux ²⁾ > 100 MeV (photon-cm ⁻² -sec ⁻¹) |
|---------------------------|---------------------------|-------------------------------------|--|---------------------------|-------------------------------------|--|
| 6.7 | -0.5 | 1.0 | 2.4×10^{-6} | 235.5 | 1.5 | 1.0×10^{-6} |
| 10.5 | -31.5 | 1.5 | 1. | 263.6 | -2.5 | 13.2 |
| 13.5 | 0.5 | 1.0 | 1.0 | 284.0 | 1.0 | 2.7 |
| 36.5 | 1.5 | 1.0 | 1.9 | 288.5 | -0.5 | 1.6 |
| 54.2 | 1.7 | 1.0 | 1.3 | 289.3 | 64.6 | 0.6 |
| 66.0 | 0.0 | 0.8 | 1.2 | 295.5 | 0.8 | 1.3 |
| 75.0 | -0.5 | 1.0 | 1.3 | 312.0 | -1.3 | 2.1 |
| 77.8 | 1.5 | 1.0 | 2.5 | 321.0 | -1.2 | 1.3 |
| 95.5 | 4.0 | 1.5 | 1.1 | 327.5 | -0.5 | 2.2 |
| 106.0 | 1.5 | 1.5 | 1.0 | 333.5 | 1.0 | 3.8 |
| 121.0 | 4.0 | 1.0 | 1.0 | 342.5 | -1.5 | 2.0 |
| 135.0 | 1.5 | 1.0 | 1.0 | 353.0 | 16.0 | 1.1 |
| 184.5 | -5.8 | 0.4 | 3.7 | 356.5 | 1.0 | 2.6 |
| 195.1 | 4.5 | 0.4 | 4.8 | 359.5 | 1.0 | 1.8 |
| 218.5 | -0.5 | 1.3 | 1.0 | | -0.5 | |

1) Error range indicates the range of 90% reliability.

2) Flux is derived from the approximation as E^{-2} for spectral distributions.