

# The Milky Way's plane of satellites is consistent with $\Lambda$ CDM

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**Supplementary Table 1** Derived kinematical quantities and their uncertainties for the Milky Way's 11 brightest satellites, ordered by V-band magnitude,  $M_V$ . The quantity  $r_{GC}$  is the distance to the Galactic Centre,  $r_{||}$  is the distance from the centre of the plane within the plane,  $r_{\perp}$  is the distance from the centre of the plane perpendicular to the plane,  $v_{||}$  is the speed relative to the plane within the plane,  $v_{\perp}$  is the speed relative to the plane perpendicular to it. Positions and velocities are relative to the centre of positions and in the rest frame of the plane. The orbital period,  $\tau$ , and the apocentre radius,  $r_a$ , are in the default potential with a halo mass of  $10^{12}M_{\odot}$ . The errors reflect the observational errors and are estimated using Monte Carlo sampling.

| Name        | $r_{GC}$<br>[kpc] | $r_{  }$<br>[kpc] | $r_{\perp}$<br>[kpc] | $v_{  }$<br>[kms <sup>-1</sup> ] | $v_{\perp}$<br>[kms <sup>-1</sup> ] | $\tau$<br>[Gyr] | $r_a$<br>[kpc] |
|-------------|-------------------|-------------------|----------------------|----------------------------------|-------------------------------------|-----------------|----------------|
| LMC         | 49.1 ± 0.6        | 50.9 ± 1.1        | 16.9 ± 0.3           | 237.1 ± 4.8                      | 82.8 ± 2.0                          | 1.64 ± 0.11     | 106.8 ± 7.7    |
| SMC         | 59.7 ± 0.7        | 71.1 ± 1.3        | 26.8 ± 0.4           | 161.5 ± 4.6                      | 100.7 ± 1.8                         | 1.34 ± 0.07     | 71.4 ± 4.6     |
| Sagittarius | 20.4 ± 0.1        | 59.2 ± 1.1        | 21.7 ± 0.2           | 134.7 ± 2.4                      | 265.4 ± 2.0                         | 0.61 ± 0.01     | 47.2 ± 0.9     |
| Fornax      | 144.5 ± 2.0       | 145.7 ± 2.0       | 37.3 ± 0.5           | 66.0 ± 4.1                       | 57.8 ± 2.5                          | 2.35 ± 0.1      | 149.4 ± 2.4    |
| Leo I       | 262.7 ± 8.9       | 221.0 ± 8.1       | 15.5 ± 0.4           | 108.1 ± 1.9                      | 77.8 ± 1.5                          | 8.57 ± 0.33     | 501.0 ± 18.8   |
| Sculptor    | 84.1 ± 1.5        | 106.5 ± 1.8       | 11.6 ± 0.3           | 227.1 ± 1.9                      | 80.0 ± 1.2                          | 1.51 ± 0.03     | 96.2 ± 1.7     |
| Leo II      | 219.1 ± 10.2      | 187.4 ± 9.3       | 6.8 ± 0.5            | 56.8 ± 5.6                       | 114.7 ± 1.0                         | 3.74 ± 0.2      | 221.8 ± 10.4   |
| Sextans     | 84.3 ± 0.4        | 41.5 ± 1.3        | 8.7 ± 0.2            | 63.9 ± 1.0                       | 205.5 ± 0.8                         | 1.93 ± 0.02     | 112.3 ± 1.1    |
| Carina      | 108.0 ± 5.7       | 86.8 ± 4.9        | 14.0 ± 0.5           | 120.2 ± 12.5                     | 25.5 ± 4.6                          | 2.19 ± 0.39     | 110.0 ± 11.9   |
| Draco       | 70.4 ± 0.6        | 82.3 ± 0.8        | 19.3 ± 0.4           | 228.1 ± 1.4                      | 58.2 ± 1.0                          | 1.11 ± 0.01     | 77.8 ± 0.7     |
| Ursa Minor  | 74.1 ± 0.3        | 97.7 ± 0.7        | 11.3 ± 0.5           | 241.7 ± 1.4                      | 3.9 ± 1.0                           | 1.23 ± 0.01     | 86.1 ± 0.5     |

**Supplementary Table 2** Observed properties and their uncertainties for the Milky Way's 11 brightest satellites, ordered by V-band magnitude,  $M_V$ .  $\mu$  is the distance modulus, RA and Dec are coordinates of right ascension and declination in degrees,  $pm_{RA}$  and  $pm_{Dec}$  are the proper motions in RA and Dec in units of mas yr<sup>-1</sup>. The references are [41] for the sky coordinates, [42, 77] for the proper motions, and [78–83] for the distance moduli.

| Name      | $M_V$ | $\mu$          | RA    | Dec   | $pm_{RA}$      | $pm_{Dec}$     | References   |
|-----------|-------|----------------|-------|-------|----------------|----------------|--------------|
| LMC       | -18.1 | 18.477 ± 0.026 | 80.9  | -69.8 | 1.85 ± 0.03    | 0.234 ± 0.03   | [41, 77, 78] |
| SMC       | -16.5 | 18.977 ± 0.028 | 13.2  | -72.8 | 0.797 ± 0.03   | -1.22 ± 0.03   | [41, 77, 79] |
| Sag.      | -13.5 | 17.25 ± 0.008  | 283.8 | -30.5 | -2.692 ± 0.001 | -1.359 ± 0.001 | [41, 77, 80] |
| Fornax    | -13.4 | 20.77 ± 0.03   | 40.0  | -34.4 | 0.382 ± 0.001  | -0.359 ± 0.002 | [41, 42, 81] |
| Leo I     | -12.0 | 22.07 ± 0.07   | 152.1 | 12.3  | -0.05 ± 0.01   | -0.11 ± 0.01   | [41, 42, 81] |
| Sculptor  | -11.1 | 19.62 ± 0.04   | 15.0  | -33.7 | 0.099 ± 0.002  | -0.16 ± 0.002  | [41, 42, 82] |
| Leo II    | -9.8  | 21.68 ± 0.11   | 168.4 | 22.2  | -0.14 ± 0.02   | -0.12 ± 0.02   | [41, 42, 83] |
| Sextans   | -9.3  | 19.55 ± 0.01   | 153.3 | -1.6  | -0.41 ± 0.01   | 0.04 ± 0.01    | [41, 42, 80] |
| Carina    | -9.1  | 20.12 ± 0.11   | 100.4 | -51.0 | 0.53 ± 0.01    | 0.12 ± 0.01    | [41, 42, 78] |
| Draco     | -8.8  | 19.35 ± 0.01   | 260.1 | 57.9  | 0.042 ± 0.005  | -0.19 ± 0.01   | [41, 42, 80] |
| Ursa Min. | -8.8  | 19.18 ± 0.02   | 227.3 | 67.2  | -0.124 ± 0.004 | 0.078 ± 0.004  | [41, 42, 80] |