Supplementary information

An ultrahot Neptune in the Neptune desert

In the format provided by the authors and unedited
Supplementary Table 1: Stellar properties of LTT 9779

| Alternative Names | TIC 183985250 | TESS |
|-------------------|---------------|------|
|                   | HIP 117883    | HIPPARCOS |
|                   | 2MASS J23544020-3737408 | 2MASS |
|                   | TYC 8015-1162-1 | TYCHO |

Catalogue Data

| RA (J2000) | 23h54m40.60s | TESS |
| DEC (J2000) | -37d37m42.18s | TESS |
| pm^RA (mas yr^-1) | 247.615±0.076 | GAIA |
| pm^DEC (mas yr^-1) | -69.801±0.062 | GAIA |
| π (mas) | 12.403±0.049 | GAIA |

Photometric Data

| T (mag) | 9.10±0.02 | TESS |
| B (mag) | 10.55±0.04 | TYCHO |
| V (mag) | 9.76±0.03 | TYCHO |
| G (mag) | 9.6001±0.0003 | GAIA |
| J (mag) | 8.45±0.02 | 2MASS |
| K (mag) | 8.15±0.02 | 2MASS |
| Ks (mag) | 8.02±0.03 | 2MASS |
| WISE1 (mag) | 7.94±0.02 | WISE |
| WISE2 (mag) | 8.02±0.02 | WISE |
| WISE3 (mag) | 8.00±0.02 | WISE |

Spectroscopic, Photometric and Derived Properties

| T_\text{eff} (K) | 5445±84 | SPECIES |
| log g (dex) | 4.43±0.31 | SPECIES |
| [Fe/H] (dex) | +0.25±0.08 | SPECIES |
| v sin i (km s^-1) | 1.06±0.37 | SPECIES |
| Parameter                          | Species | ZASPE | SPC  | Ariadne | SPECIES + MIST | YY + GAIA | ARIADNE | GAIA + this work | ARIADNE | SPECIES + MIST | YY + GAIA | ARIADNE | SPECIES + MIST | YY + GAIA | ARIADNE | SPECIES + MIST | YY + GAIA | ARIADNE | SPECIES + MIST | YY + GAIA | ARIADNE | SPECIES + MIST | YY + GAIA | ARIADNE |
|-----------------------------------|---------|-------|------|---------|--------------|-----------|---------|----------------|---------|--------------|-----------|---------|--------------|-----------|---------|--------------|-----------|---------|--------------|-----------|---------|--------------|-----------|---------|
| $v_{mac}$ (km s$^{-1}$)           | 1.98±0.29 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $T_{eff}$ (K)                     | 5496±80  |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| log $g$ (dex)                     | 4.51±0.01 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| [Fe/H] (dex)                      | +0.24±0.05 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $v$ sin $i$ (km s$^{-1}$)         | 1.7±0.5  |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $T_{eff}$ (K)                     | 5499±50  |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| log $g$ (dex)                     | 4.47±0.10 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| [m/H] (dex)                       | +0.31±0.08 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $v$ sin $i$ (km s$^{-1}$)         | 2.2±0.5  |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $T_{eff}$ (K)                     | 5443$^{+14}_{-13}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| log $g$ (dex)                     | 4.35$^{+0.16}_{-0.12}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| [Fe/H] (dex)                      | +0.27±0.03 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $M_*$ (M$_\odot$)                | 1.03$^{+0.03}_{-0.04}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $M_*$ (M$_\odot$)                | 1.00$^{+0.02}_{-0.03}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $M_*$ (M$_\odot$)                | 0.77$^{+0.29}_{-0.21}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $R_*$ (M$_\odot$)                | 0.95±0.01 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $R_*$ (M$_\odot$)                | 0.92±0.01 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $R_*$ (M$_\odot$)                | 0.949±0.006 |      |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $L_*$ (M$_\odot$)                | 0.68±0.04 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $L_*$ (M$_\odot$)                | 0.71±0.01 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| MV (mag)                         | 5.30±0.07 |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| Age (Gyr)                         | 2.1$^{+2.2}_{-1.4}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| Age (Gyr)                         | 1.9$^{+1.7}_{-1.2}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $\rho_*$ (g cm$^{-3}$)            | 1.81$^{+0.06}_{-0.07}$ |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| Spectral Type                     | G7V     |       |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $<S_{HARPS}>$                     | 0.148±0.008 |     |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
| $<logR'_{HK,HARPS}>$             | -5.10±0.04 |     |      |         |              |           |         |                |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |              |           |         |
$P_{\text{rot,vsini}}$ (days) & 45 & This work \\

**Supplementary Table 2: Radial velocities of LTT 9779**

| JD - 2450000 | RV (m s$^{-1}$) | Uncertainty (m s$^{-1}$) | Instrument |
|--------------|----------------|--------------------------|------------|
| 8429.51804   | -10.59         | 0.86                     | HARPS      |
| 8430.54022   | -16.91         | 0.74                     | HARPS      |
| 8430.59553   | -9.41          | 0.68                     | HARPS      |
| 8430.67911   | 1.99           | 0.79                     | HARPS      |
| 8430.76201   | 13.40          | 1.21                     | HARPS      |
| 8431.51068   | 6.71           | 0.61                     | HARPS      |
| 8431.64346   | 16.09          | 0.83                     | HARPS      |
| 8431.69130   | 14.98          | 0.87                     | HARPS      |
| 8431.73217   | 8.41           | 0.55                     | HARPS      |
| 8432.50941   | 12.77          | 0.73                     | HARPS      |
| 8432.65689   | -7.23          | 0.94                     | HARPS      |
| 8432.69804   | -13.45         | 1.06                     | HARPS      |
| 8432.72573   | -18.32         | 4.02                     | HARPS      |
| 8464.53817   | -25.17         | 1.02                     | HARPS      |
| 8464.64153   | -16.81         | 1.11                     | HARPS      |
| 8464.68616   | -10.08         | 1.27                     | HARPS      |
| 8465.53024   | 0.00           | 0.85                     | HARPS      |
| 8465.59314   | 10.82          | 0.84                     | HARPS      |
| 8465.64411   | 12.09          | 0.86                     | HARPS      |
| 8465.68104   | 15.61          | 1.12                     | HARPS      |
| 8466.52022   | 14.89          | 1.03                     | HARPS      |
| 8466.58232   | 8.12           | 0.90                     | HARPS      |
| 8466.63157   | 2.49           | 1.09                     | HARPS      |
| Time   | Value 1 | Value 2 | Instrument |
|--------|---------|---------|------------|
| 8466.66865 | -2.85   | 1.10    | HARPS      |
| 8481.53213  | 14.93   | 0.94    | HARPS      |
| 8481.57805  | 12.72   | 0.84    | HARPS      |
| 8482.53643  | -8.75   | 0.74    | HARPS      |
| 8482.57255  | -11.89  | 0.82    | HARPS      |
| 8482.60140  | -16.09  | 0.90    | HARPS      |
| 8483.52686  | -24.82  | 0.80    | HARPS      |
| 8483.59338  | -20.68  | 1.12    | HARPS      |
| 8483.61557  | -18.95  | 0.93    | HARPS      |
| 8438.56440  | -14.80  | 4.50    | CORALIE    |
| 8438.62857  | -7.40   | 4.60    | CORALIE    |
| 8438.72084  | 10.40   | 5.00    | CORALIE    |
| 8439.56828  | 35.30   | 5.60    | CORALIE    |
| 8439.64481  | 3.80    | 4.80    | CORALIE    |
| 8439.70910  | -11.70  | 5.20    | CORALIE    |
| 8440.56824  | 4.90    | 4.70    | CORALIE    |
| 8440.64498  | -13.20  | 4.70    | CORALIE    |
| 8440.70927  | -27.70  | 5.00    | CORALIE    |
| 8441.57027  | -16.30  | 4.20    | CORALIE    |
| 8441.66132  | -17.50  | 4.60    | CORALIE    |
| 8441.74898  | 1.00    | 4.50    | CORALIE    |
| 8442.56932  | -0.60   | 4.50    | CORALIE    |
| 8442.64202  | 11.60   | 4.90    | CORALIE    |
| 8442.70651  | 0.60    | 5.00    | CORALIE    |
| 8443.57400  | 20.10   | 5.00    | CORALIE    |
| 8443.64711  | -0.70   | 4.70    | CORALIE    |
| 8443.71686  | 5.60    | 4.80    | CORALIE    |