SUPPLEMENTARY INFORMATION
VOLUME: 1 | ARTICLE NUMBER: 0056

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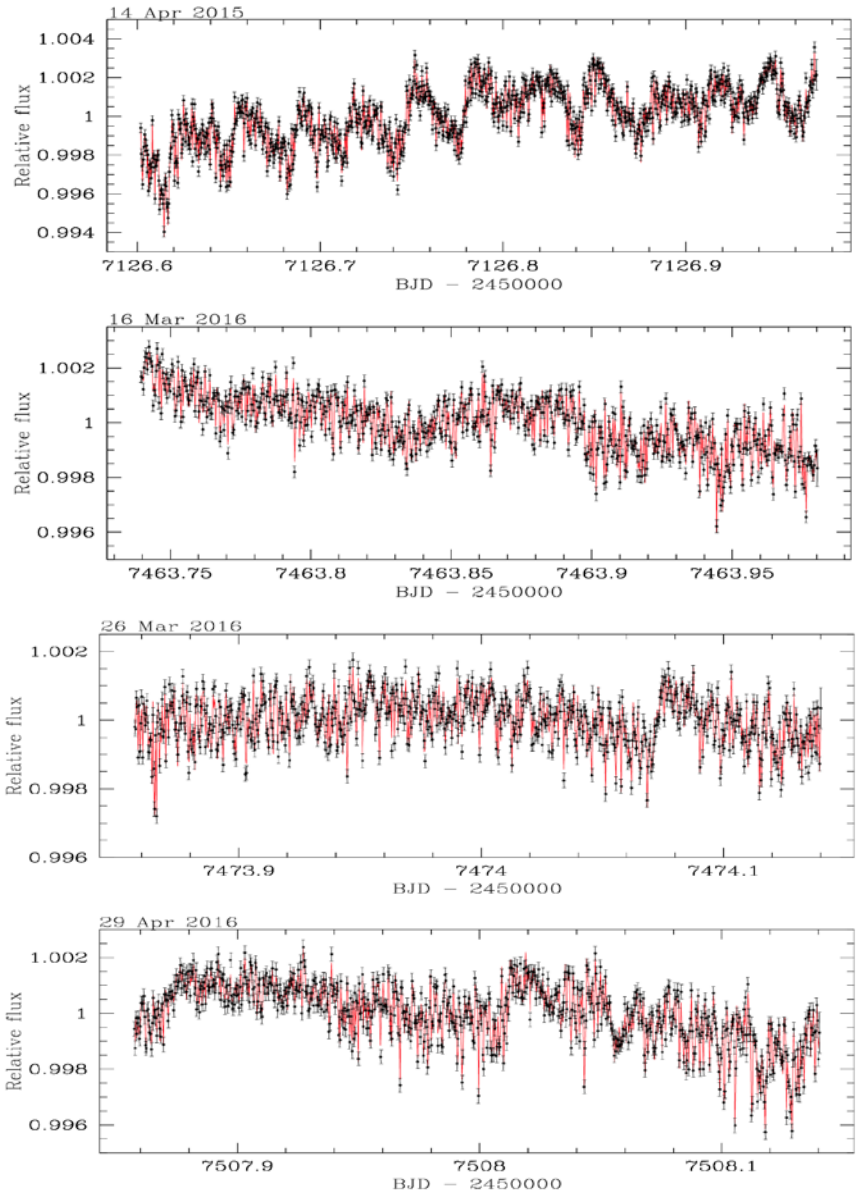
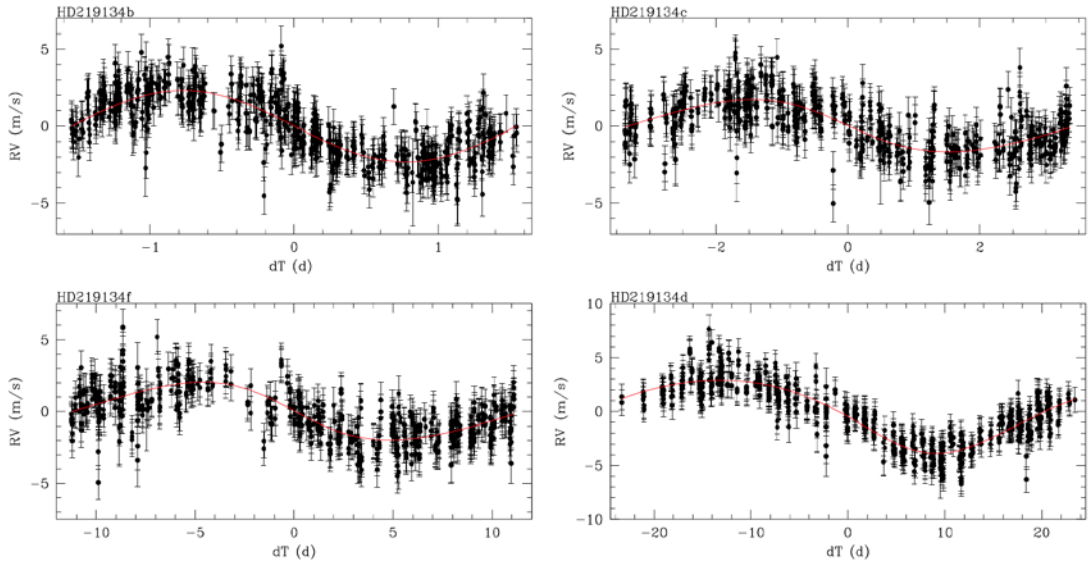
Two massive rocky planets transiting a K-dwarf 6.5 parsecs away

1. Supplementary Figures



Supplementary Figure 1 | Raw Spitzer light curves used in this work. The light curves are shown in chronological order from top to bottom. Each individual measurement correspond to a cube of 64 Spitzer subarray images (see ref. 1 for detail). The measurements and error bars are, respectively, the averages of the 64 subaray flux measurements and their standard errors. The measurement are overplotted on the best-fit transit + baseline models.



Supplementary Figure 2 | Time-folded radial velocity measurements of HD 219134. The measurements are time-folded on the best-fit transit ephemeris (0 = mid-transit) of the four inner planets of the system, after removal of the contributions of the star and the other planets. The corresponding best-fit Keplerian models are shown as red solid lines. The error bars are the quadratic sum of the measurement uncertainties and a 'jitter' noise of 1.1 $m.s^{-1}$ (see Methods).

2. Supplementary Tables

Model	14 Apr 2015	16 Mar 2016	26 Mar 2016	29 Apr 2016
BM	BIC_{nt} = 4410.4 BIC_t = 4265.5 BF_t = 2.9 10^{31}	BIC_{nt} = 5159.3 BIC_t = 5136.7 BF_t = 8.1 10^{4}	BIC_{nt} = 2066.6 BIC_t = 1920.3 BF_t = 5.9 10^{31}	BIC_{nt} = 2154.6 BIC_t = 2089.1 BF_t = 1.7 10^{14}
BM + p(x,y)	BIC_{nt} = 3517.2 BIC_t = 3322.0 BF_t = 2.4 10^{42}	BIC_{nt} = 4547.6 BIC_t = 4515.7 BF_t = 8.4 10^{6}	BIC_{nt} = 1665.9 BIC_t = 1524.7 BF_t = 4.6 10^{30}	BIC_{nt} = 1841.8 BIC_t = 1780.4 BF_t = 2.1 10^{13}
BM + p(x^2,y^2)	BIC_{nt} = 3367.2 BIC_t = 3159.0 BF_t = 1.6 10^{45}	BIC_{nt} = 4510.9 BIC_t = 4474.2 BF_t = 9.3 10^{7}	BIC_{nt} = 1650.1 BIC_t = 1513.8 BF_t = 4.0 10^{29}	BIC_{nt} = 1596.1 BIC_t = 1563.4 BF_t = 1.3 10^{7}
BM + p(x^2,y^2,f_x)	BIC_{nt} = 1601.6 BIC_t = 1345.8 BF_t = 3.5 10^{55}	BIC_{nt} = 964.3 BIC_t = 829.4 BF_t = 2.0 10^{29}	BIC_{nt} = 1067.6 BIC_t = 855.7 BF_t = 1.0 10^{46}	BIC_{nt} = 970.3 BIC_t = 895.4 BF_t = 1.8 10^{16}
BM + p(x^2,y^2,f_x^2)	BIC_{nt} = 1605.5 BIC_t = 1351.5 BF_t = 1.4 10^{55}	BIC_{nt} = 966.4 BIC_t = 832.6 BF_t = 1.1 10^{29}	BIC_{nt} = 1069.1 BIC_t = 863.7 BF_t = 4.0 10^{44}	BIC_{nt} = 974.6 BIC_t = 897.7 BF_t = 5.0 10^{16}
BM + p(x^2,y^2,f_x,f_y)	BIC_{nt} = 1506.3 BIC_t = 1269.9 BF_t = 2.2 10^{51}	BIC_{nt} = 914.2 **BIC_t = 752.6** BF_t = 1.2 10^{35}	BIC_{nt} = 1071.8 **BIC_t = 832.6** BF_t = 8.7 10^{51}	BIC_{nt} = 953.1 **BIC_t = 877.5** BF_t = 2.6 10^{16}
p(x^2,y^2,f_x,f_y)	BIC_{nt} = 1576.5 BIC_t = 1324.3 BF_t = 5.8 10^{54}	BIC_{nt} = 952.0 BIC_t = 782.2 BF_t = 7.4 10^{36}	BIC_{nt} = 1124.6 BIC_t = 871.9 BF_t = 7.5 10^{54}	BIC_{nt} = 1001.3 BIC_t = 909.9 BF_t = 7.0 10^{19}
BM + p(x^2,y^2,f_x,f_y^2)	BIC_{nt} = 1510.2 BIC_t = 1276.2 BF_t = 6.5 10^{50}	BIC_{nt} = 918.4 BIC_t = 758.9 BF_t = 4.3 10^{34}	BIC_{nt} = 1068.2 BIC_t = 837.9 BF_t = 1.0 10^{50}	BIC_{nt} = 960.6 BIC_t = 881.9 BF_t = 1.2 10^{17}
BM + p(x^2,y^2,f_x,f_y,t)	BIC_{nt} = 1510.4 BIC_t = 1267.0 BF_t = 7.1 10^{52}	BIC_{nt} = 916.7 BIC_t = 759.1 BF_t = 1.7 10^{34}	BIC_{nt} = 1007.4 BIC_t = 835.3 BF_t = 2.3 10^{37}	BIC_{nt} = 949.9 BIC_t = 884.8 BF_t = 1.4 10^{14}
BM + p(x^2,y^2,f_x,f_y,t^2)	BIC_{nt} = 1497.1 BIC_t = 1268.0 BF_t = 5.6 10^{49}	BIC_{nt} = 906.7 BIC_t = 764.5 BF_t = 7.6 10^{30}	BIC_{nt} = 1013.0 BIC_t = 841.1 BF_t = 2.1 10^{37}	BIC_{nt} = 936.4 BIC_t = 890.2 BF_t = 1.1 10^{10}
BM + p(x^2,y^2,f_x,f_y,t,l)	BIC_{nt} = 1406.9 BIC_t = 1233.5 BF_t = 4.5 10^{37}	BIC_{nt} = 913.1 BIC_t = 764.9 BF_t = 1.5 10^{32}	BIC_{nt} = 1013.3 BIC_t = 841.6 BF_t = 1.9 10^{37}	BIC_{nt} = 930.4 BIC_t = 889.4 BF_t = 8.0 10^{8}
BM + p(x^2,y^2,f_x,f_y,t,l^2)	BIC_{nt} = 1377.1 **BIC_t = 1207.6** BF_t = 6.4 10^{36}	BIC_{nt} = 909.7 BIC_t = 771.3 BF_t = 1.1 10^{30}	BIC_{nt} = 1016.0 BIC_t = 847.5 BF_t = 3.9 10^{36}	BIC_{nt} = 933.3 BIC_t = 895.2 BF_t = 1.9 10^{8}

Supplementary Table 1 | Models comparison for the Spitzer light curves. For each Spitzer light curve (column 2 to 5) and for each tested baseline model (line 2 to 13), this table shows the BIC computed for the best-fit model assuming (BIC_t) or not (BIC_{nt}) a transit of planet b (two first light curves) or c (two last light curves). It also shows the Bayes factor in favor of the transit model (BF_t) computed as $e^{(BIC_{nt}-BIC_t)/2}$. BM = Bliss-Mapping. p(α^n) denotes a polynomial function of order n of the parameter α, with α that can be t = time, f_x and f_y = the full widths at half-maximum of the stellar image in the x- and y-directions, x and y = x- and y-positions of the stellar image on the detector, and l = logarithm of time. For each light curve, the lowest BIC - corresponding to the selected model - is shown in red.

Input data	Number of points	Assumed model	Error correction
HARPS-N RVs	663	$p(t^4 + CCF_{bis}{}^4 + CCF_{width}{}^3 + \log(R'_{HK})^3$	$\sigma_{jitter} = 1.1 m.s^{-1}$
Spitzer 14 Apr 2015	1044	$p(x^2,y^2,f_x,f_y,t,l^2)$ + BM	CF = 1.29
Spitzer 16 Mar 2016	680	$p(x^2,y^2,f_x,f_y)$ + BM	CF = 1.09
Spitzer 26 Mar 2016	799	$p(x^2,y^2,f_x,f_y)$ + BM	CF = 1.01
Spitzer 29 Apr 2016	799	$p(x^2,y^2,f_x,f_y)$ + BM	CF = 1.25

Supplementary Table 2 | Data used in the global MCMC analysis. For each dataset is given the number of measurements, and the assumed model and error correction. $p(\alpha^n)$ denotes a polynomial function of order n of the parameter α, with α that can be t = time, CCF_{bis} and CCF_{width} = the bisector and full-width at half maximum of the CCF of the spectrum, $\log(R'_{HK})$ = the logarithm of the spectroscopic activity index R'_{HK}, f_x and f_y = the full widths at half-maximum of the stellar image in the x- and y-directions, x and y = x- and y-positions of the stellar image on the detector, and l = logarithm of time. BM = Bliss-Mapping, CF = Correction Factor. See text and references therein for detail.

Signal	HD 219134 b	HD 219134 c
Transmission (H_2 atmosphere)	75 ppm	55 ppm
Transmission (H_2O atmosphere)	8 ppm	6 ppm
Transmission (CO_2 atmosphere)	3.5 ppm	2.5 ppm
Emission 1.5 μm	0.1 - 0.8 ppm	0 - 0.1 ppm
Emission 5 μm	15 - 30 ppm	5 - 13 ppm
Emission 10 μm	35 - 55 ppm	18 - 30 ppm
Emission 15 μm	46 - 66 ppm	26 - 40 ppm
Emission 20 μm	51- 72 ppm	31 - 45 ppm

Supplementary Table 3 | Transmission and emission signal estimates for planets b and c. Estimates of the signal amplitudes in transit transmission and occultation emission spectroscopy for planets HD 219134 b and c. For the emission estimates, the two values correspond to heat distribution factors f' = 1/4 and 2/3 (see Methods).