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NGTS-EB-7: One of the longest period EBLM systems ever found

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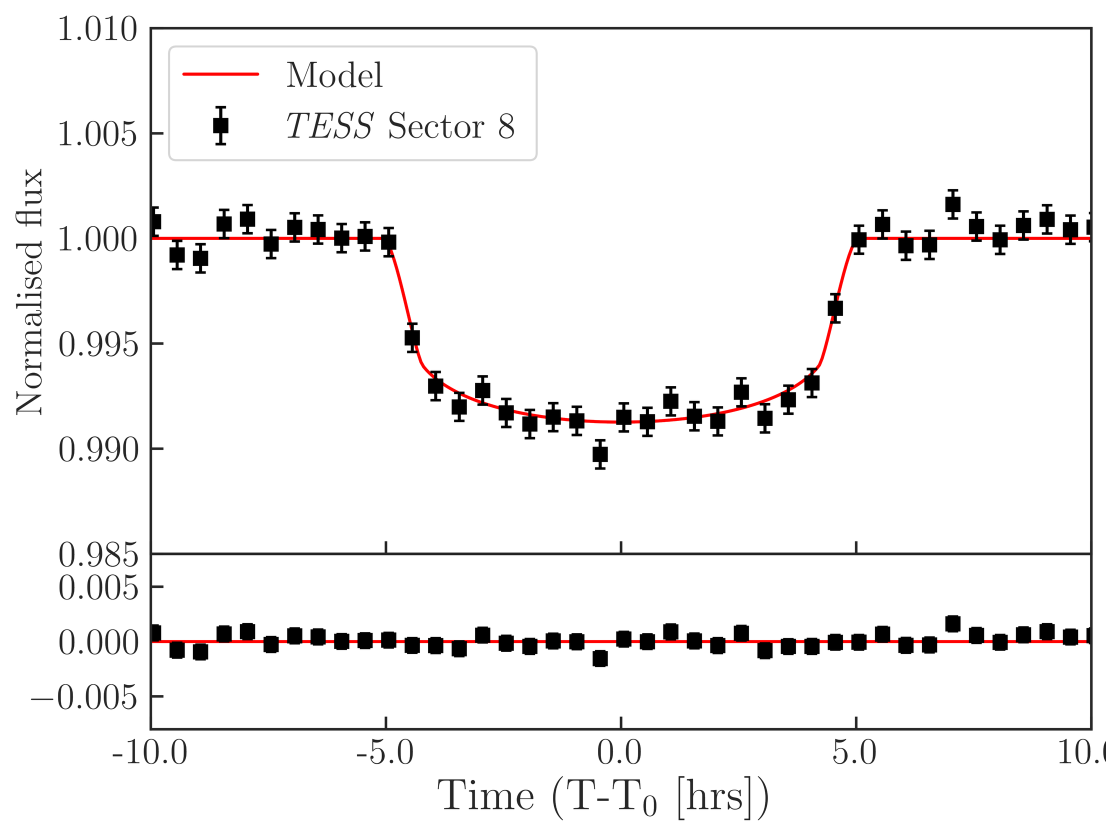
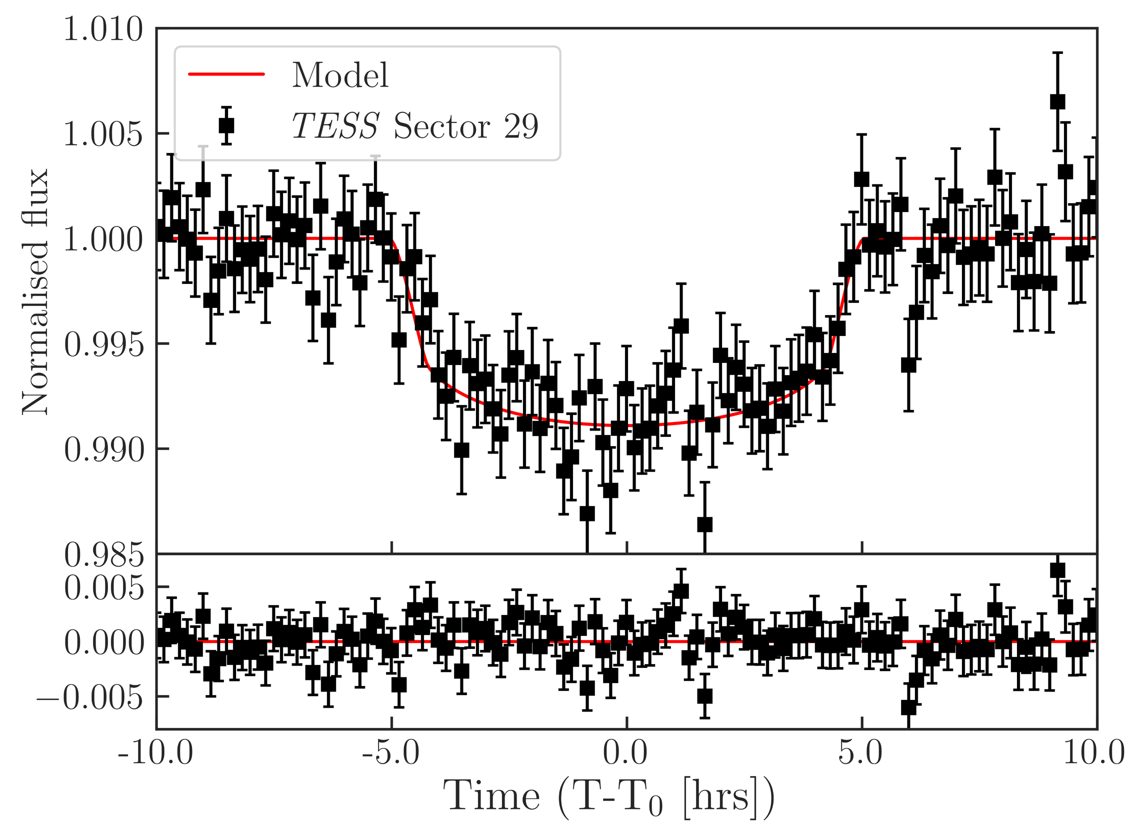
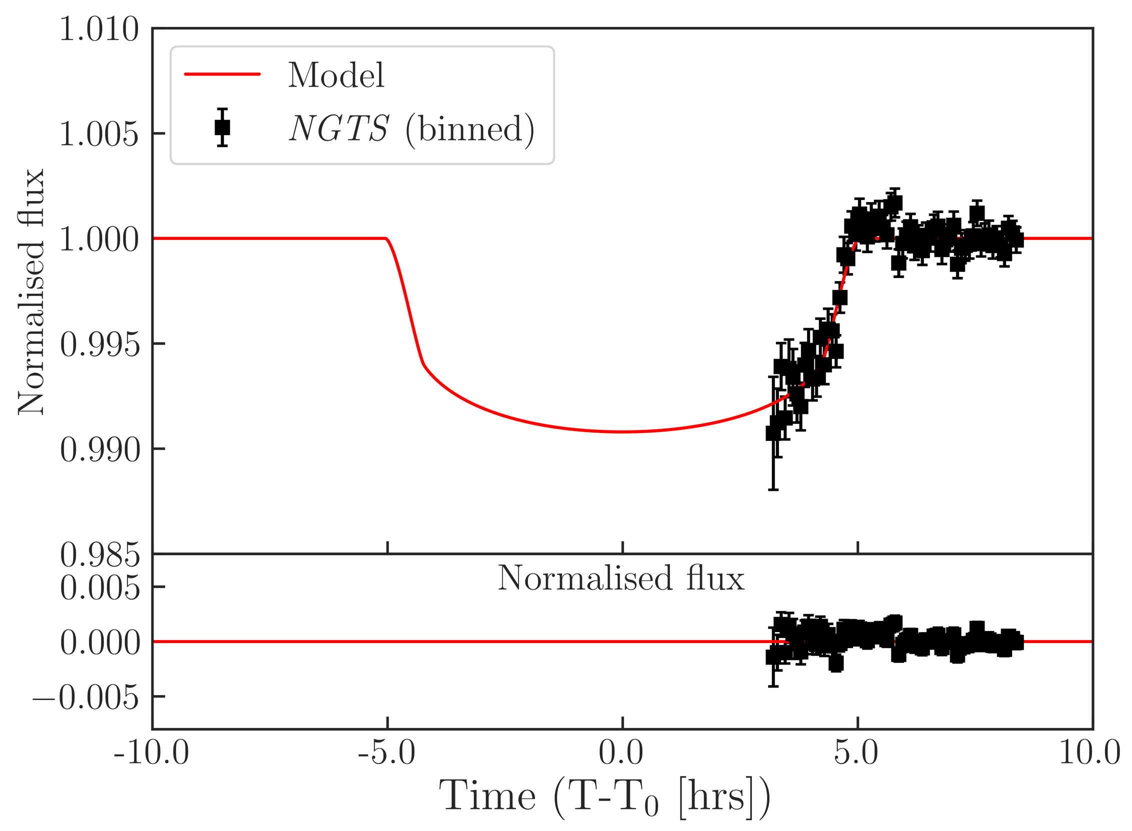
We present the discovery of the NGTS-EB-7 AB system, a low-mass eclipsing binary (EBLM) system containing an evolved G-type primary star and a fully convective late M dwarf secondary similar to the planet host TRAPPIST-1. The secondary star has a radius of 0.125±0.006R⊙, a mass of 0.096±0.004M⊙ and follows a highly eccentric (e=0.71436±0.00085) orbit every 193.35875±0.00034 days. The large separation between the stars means interaction will be minimal, making them a good benchmark for testing stellar evolution models for single M dwarf planet hosts. PLATO will observe the system with 26 cameras, allowing for more precise characterisation.







A companion to TIC 238060327 (later NGTS-EB-7) was discovered from a single transit in TESS[1] sector 8. An additional transit was found in the scattered light portion of Sector 29. The period of 193 days was later found through alias chasing with an egress observation from NGTS[2].

NGTS-EB-7 A

Evolved G type primary

$R_\star = 1.45^{+0.07}_{-0.06} R_{Sun}$

$M_\star = 1.13^{+0.06}_{-0.07} M_{Sun}$

$T_{eff} = 5770 \pm 110\,K$

$\log g = 4.17 \pm 0.15$

$[M/H] = 0.26 \pm 0.12$

$Age = 10 \pm 1\,Gyr$

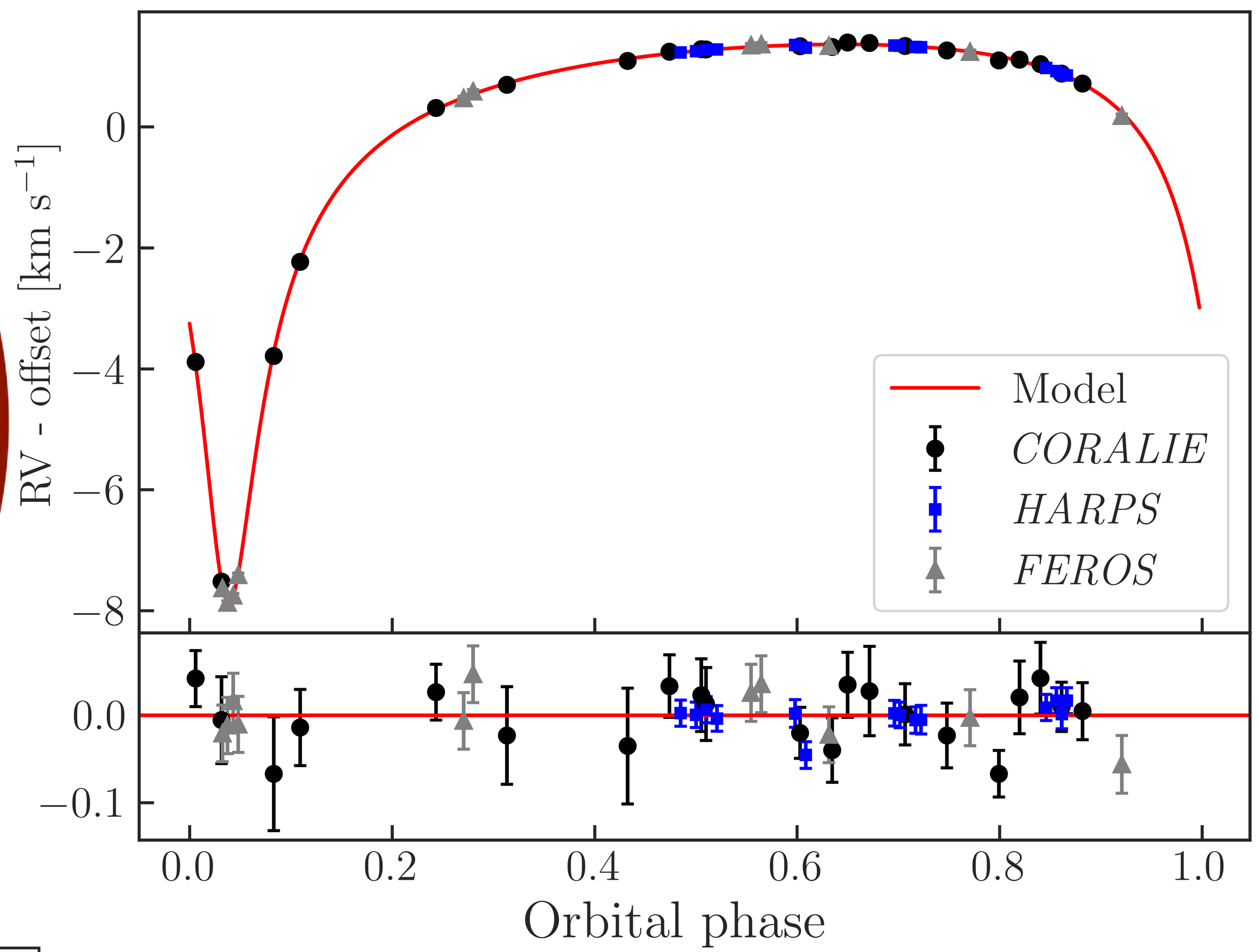
Spectral Parameters from Alix Freckelton's PAWS[3] pipeline. Check out her poster!

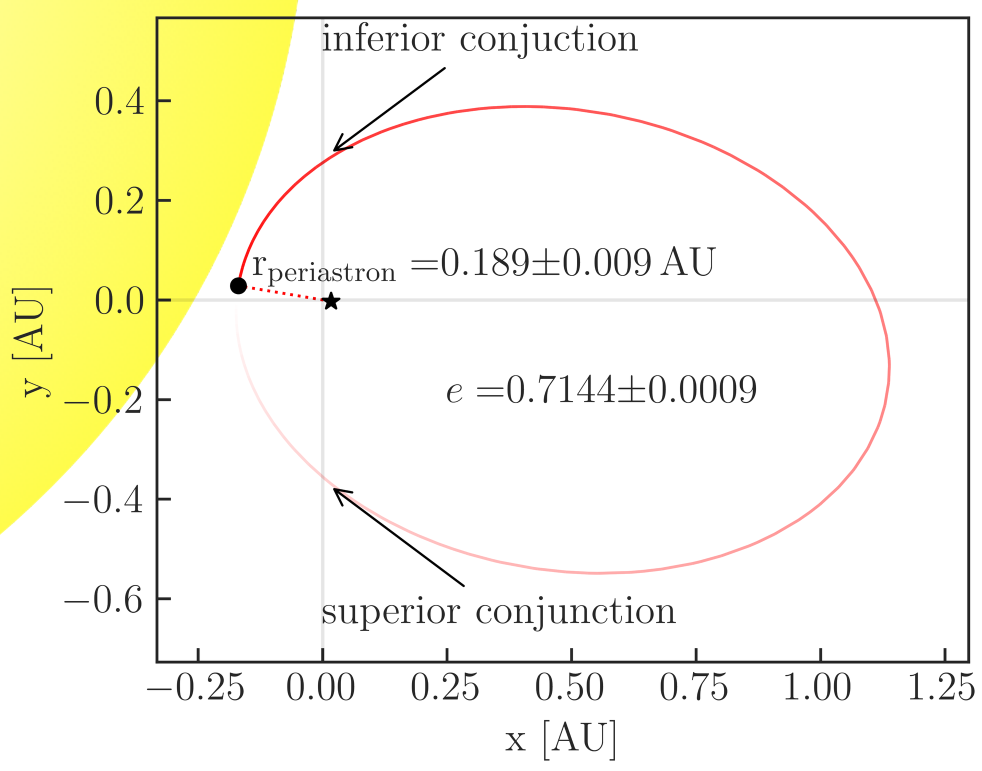
NGTS-EB-7 B

Late M dwarf secondary

$R_\star = 1.219 \pm 0.058\,R_{Jup}$

$M_\star = 102^{+4}_{-5}\,M_{Jup}$

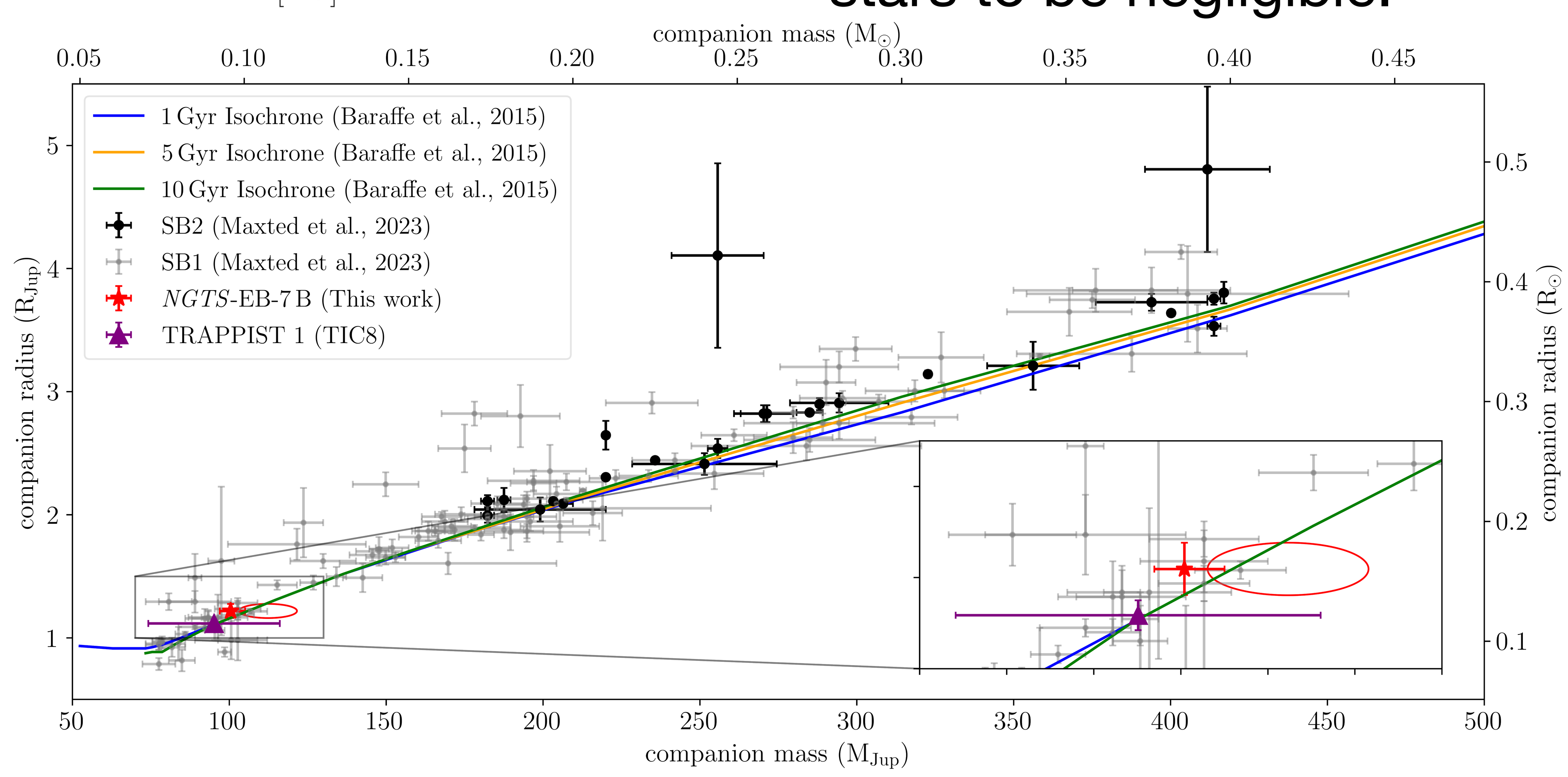




Radial Velocity observations with CORALIE[4], HARPS[5] and FEROS[6] later revealed the companion was of stellar mass and on a highly eccentric (e~0.7) orbit.

The binary separation is wide enough for interaction between the stars to be negligible.

The system shows no significant radius inflation, which - given the relatively wide separation of the system, aligns with models explaining the M-dwarf radius inflation problem[7,8,9] using close binary induced magnetic effects[10,11,12,13].



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