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Correction to: On the relative importance of shocks and self-gravity in modifying tidal disruption event debris streams

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This is a correction to Fancher, Coughlin & Nixon (2023), who performed hydrodynamical simulations of tidal disruption events, with the goal of determining the relative importance of shocks and self-gravity in creating 'structure' in the specific energy distribution along the tidally disrupted debris stream. Fig. 2 in the original manuscript compares simulations with (left panel) and without (right panel) self-gravity, with the tacit assumption that pressure was included in both. However, the right panel of fig. 2 depicts a simulation in which–in addition to turning off self-gravity–pressure was artificially reduced post-pericenter.[1] Fig. 1 shown here provides the corrected version of the right panel of fig. 2, in which only self-gravity is turned off.[2] The resulting $\mathrm{d}M/\mathrm{d}\epsilon$ curve is smoother than either the self-gravity included or effectively ballistic (i.e. the right panel of fig. 2 in the original manuscript) curves, and there is no significant additional evolution of $\mathrm{d}M/\mathrm{d}\epsilon$ at times later than those depicted.

Therefore, the statement in the last sentence of paragraph 2 of section 2.2 (and the analogous statement in the Summary and Conclusions), 'Without self-gravity, the $\mathrm{d}M/\mathrm{d}\epsilon$ curve is essentially frozen-in at pericentre, implying that pressure is dynamically insignificant,' ('Therefore, pressure alone is dynamically insignificant–the specific Keplerian energy is a conserved Lagrangian variable') is incorrect. Without self-gravity, but with pressure included, the sharp features in the $\mathrm{d}M/\mathrm{d}\epsilon$ curve are smoothed out by pressure gradients that were otherwise balanced by self-gravity. This reinforces the conclusion that the short-wavelength features present in the $\mathrm{d}M/\mathrm{d}\epsilon$ curve (cf. fig. 8) are caused by self-gravity, in agreement with the original version of the manuscript. The paper is otherwise unaffected.

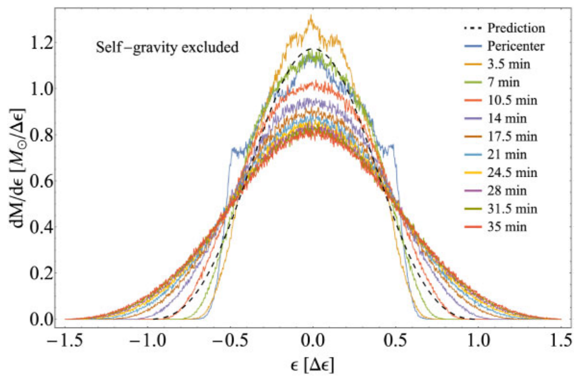

Figure 1. Updated version of the right panel of fig. 2 in Fancher et al. (2023).

REFERENCE

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[2]We thank Ananya Bandopadhyay for making Fig. 1.

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