CORRECTIONS & AMENDMENTS

CORRIGENDUM

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Corrigendum: Slowly fading super-luminous supernovae that are not pair-instability explosions

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In this Letter, we have identified an important error affecting Fig. 4 and Extended Data Fig. 6, as well as the values of some parameters derived from our model fits. We stress that this error in no way affects the discussion or the conclusions. In building the bolometric light curve of the superluminous supernova PTF 12dam, our code assumed that photometry from the Swift satellite was calibrated in the Vega magnitude system. However, our photometry was actually calibrated to the AB magnitude system (and published in the AB system in the original paper). This led to an underestimate of approximately 50% in the measured peak luminosity of PTF 12dam.

Here we present updated figures and model fits with the correct bolometric luminosity. To construct the bolometric light curve, we transformed the Swift data into Vega magnitudes, and then converted all photometry to fluxes. At epochs with the full range of UVW2 to K band, we simply integrated over the observed spectral energy distribution. At epochs with missing filters, we accounted for the unobserved flux by fitting blackbodies to the available data. We also compared our blackbody extrapolations against polynomial fits to the ultraviolet and near-infrared light curves, finding consistent results.

This should be more reliable than our previous extrapolation method, which assumed linear colour evolution over 40 days. If anything, the improved bolometric light curve strengthens our main conclusion—that PTF 12dam was not a pair-instability supernova—because the brighter light curve peak results in an even steeper rise to maximum. It is important to note that the large discrepancy compared to pair-instability models does not rely solely on bolometric comparisons: the difference was clearly apparent in the *r*-band light curves in our original Fig. 1. Therefore this is a robust result independent of any time-varying bolometric correction.

Our secondary conclusion—that spin-down of a nascent magnetar can satisfactorily explain the observed properties—also remains intact. The parameters of our magnetar-powered fit to the corrected bolometric light curve shown in Fig. 1 of this Corrigendum (the corrected original Fig. 4) remain within a sensible range and are as follows: magnetic field $B = 5 \times 10^{13}$ G; spin period $P = 2.3$ ms; and ejecta mass $M_{ej} = 7M_{\odot}$ (where $M_{\odot}$ is the solar mass) for an opacity $\kappa = 0.1\ \mathrm{cm}^2\ \mathrm{g}^{-1}$ and explosion energy $E = 10^{51}$ erg. Our suggestion that a relatively lower spin period and larger ejected mass can explain the existence of these long-duration superluminous supernovae is unchanged.

In Extended Data Fig. 6, we showed that decay of radioactive nickel-56 could not explain the observed light curve. This remains true for the corrected light curve, which is shown in the Supplementary Information to the Corrigendum. The unrealistic parameters required to model the data with nickel as the power source are listed below the figure.

We thank P. Vreeswijk for initially pointing out a discrepancy between our light curve and his own results. M.N. identified the source of the discrepancy. The original Letter has not been corrected.

Supplementary Information is available in the online version of the Corrigendum.

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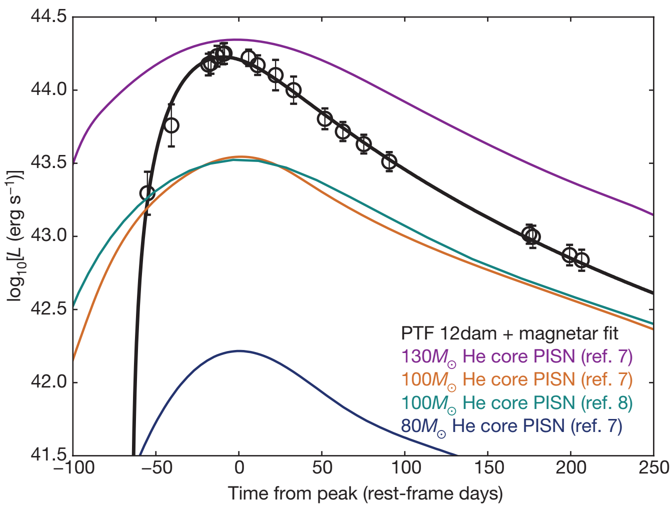

Figure 1 | This is the corrected Fig. 4 of the original Letter. PISN, pair-instability supernova. Error bars are 1σ, as in the original Letter.