Neutron star cooling after deep crustal heating in the X-ray transient KS 1731–260

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We simulate the cooling of the neutron star in the X-ray transient KS 1731–260 after the source returned to quiescence in 2001 from a long ($\gtrsim 12.5$ yr) outburst state. We show that the cooling can be explained assuming that the crust underwent deep heating during the outburst stage. In our best theoretical scenario the neutron star has no enhanced neutrino emission in the core, and its crust is thin, superfluid, and has the normal thermal conductivity. The thermal afterburst crust-core relaxation in the star may be not over.

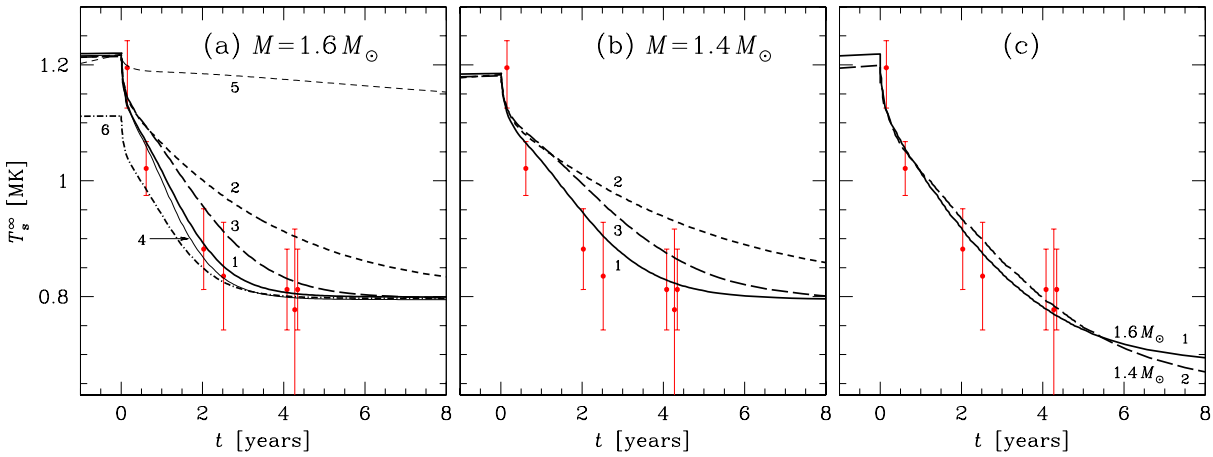

Figure 1: Theoretical cooling curves for (a) $M = 1.6\,M_\odot$ and (b) $1.4\,M_\odot$ neutron stars, and (c) for stars with both M compared with observations. The curves are explained in Ref. [1].

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References

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