A curious story of a neutron star in IGR J17480-2446

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Abstract

IGR J17480-2446 is a transiently accreting low-mass X-ray binary (LMXB), harboring an exceptional accreting pulsar (a neutron star, NS) with an unusual spin frequency of 11 Hz and a very slow post-outburst crust cooling. The latter was shown to indicate the presence in the outer crust of a narrow low-thermal-conductivity layer, possibly made of glass. Here we propose an interpretation of these peculiar observational facts in the framework of a natural scenario which explains glass formation in the required density range and does not contradict observations of other transiently accreting NS LMXBs. The scenario allows us to determine the total mass of the accreted material and to constrain NS birth properties, which turn out to be such as commonly associated with recycled NSs. We speculate that such NS birth properties represent the outcome of NS formation in an electron-capture supernova which would confirm the old idea of a non-standard origin of the majority of NSs observed in globular clusters.

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