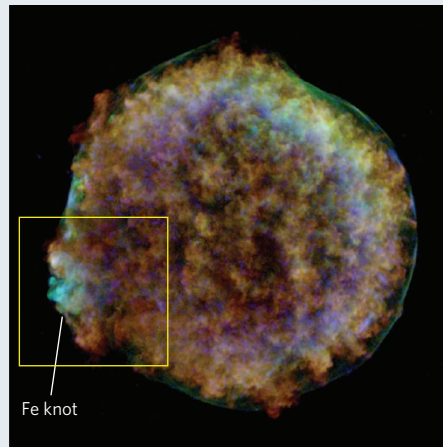


SUPERNOVAE

A knotty issue

An iron-rich region of Tycho's supernova remnant has been investigated by Hiroya Yamaguchi and colleagues (*Astrophys. J.*, in the press; preprint at <https://arxiv.org/abs/1611.06223>) using the Suzaku and Chandra X-ray observatories (the Chandra image is shown here). This remnant is the debris cloud that resulted from a supernova explosion in 1572 — one of only eight or so visible supernovae in historical records — which was studied in depth by Danish astronomer Tycho Brahe.

Chemical inhomogeneities in Tycho's supernova remnant have been well documented, with iron mostly abundant in the central regions, whereas lighter metals such as silicon and calcium populate the outer regions,



in keeping with other type Ia supernova explosions (supernovae that occur due to the thermonuclear explosions of

white dwarf stars). However, it does sport an iron-rich clump (the 'Fe knot' in the image), which was the focus of a detailed study using Suzaku's X-ray Imaging Spectrometers. The X-ray spectra confirm the high abundance of iron, but also expose a significant underabundance of chromium, manganese and nickel — metals that would normally go hand-in-hand with iron in other parts of the remnant.

Yamaguchi *et al.* suggest that the Fe knot is a distinct protrusion from the bulk supernova ejecta, containing roughly ten Jupiters worth of material from the central regions that was forced through a hole in the supernova's constraining shock front.

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