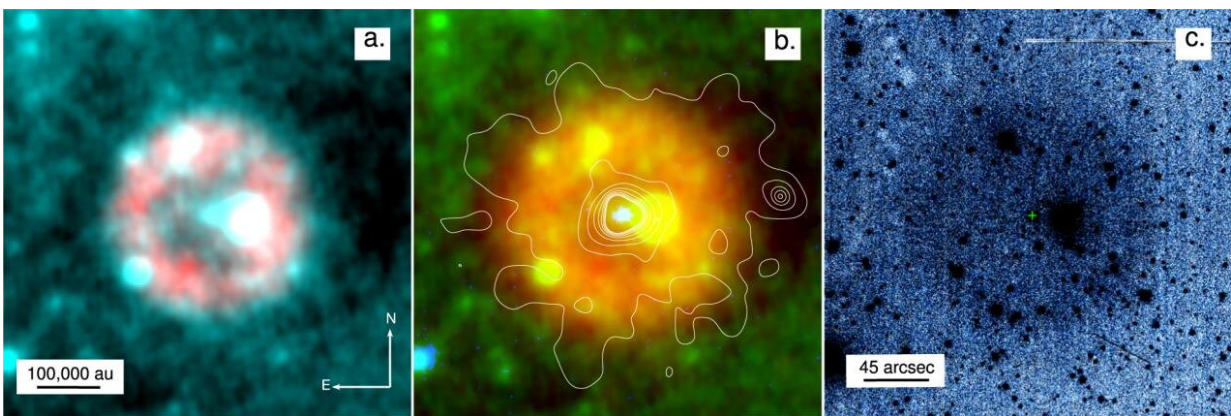


# Astronomers solve 900-year-old cosmic mystery surrounding Chinese supernova of 1181AD

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Credit: University of Manchester

A 900-year-old cosmic mystery surrounding the origins of a famous supernova first spotted over China in 1181 AD has finally been solved, according to an international team of astronomers.

New research published today (September 15, 2021) says that a faint, fast expanding cloud (or [nebula](#)), called Pa30, surrounding one of the hottest stars in the Milky Way, known as Parker's Star, fits the profile, location and age of the historic supernova.

There have only been five bright supernovae in the Milky Way in the last millennium (starting in 1006). Of these, the Chinese supernova, which is also known as the "Chinese Guest Star" of 1181 AD has remained a mystery. It was originally seen and documented by Chinese and Japanese astronomers in the 12th century who said it was as bright as the planet Saturn and remained visible for six months. They also recorded an approximate location in the sky of the sighting, but no confirmed remnant of the explosion has even been identified by modern astronomers. The other four supernovae are all now well known to modern day science and include the famous Crab nebula.

The source of this 12th century explosion remained a mystery until this latest discovery made by a team of international astronomers from Hong Kong, the UK, Spain, Hungary and France, including Professor Albert Zijlstra from The University of Manchester. In the new paper, the astronomers found that the Pa 30 nebula is expanding at an extreme velocity of more than 1,100 km per second (at this speed, traveling from the Earth to the moon would take only five minutes). They use this velocity to derive an age at around 1,000 years, which would coincide with the events of 1181 AD.

Prof Zijlstra (Professor in Astrophysics at the University of Manchester) explains: "The historical reports place the guest star between two Chinese constellations, Chuanshe and Huagai. Parker's Star fits the position well. That means both the age and location fit with the events of 1181."

Pa 30 and Parker's Star have previously been proposed as the result of a merger of two White Dwarfs. Such events are thought to lead to a rare and relatively faint type of supernova, called a Type Iax supernova.

Prof Zijlstra added: "Only around 10% of supernovae are of this type and they are not well understood. The fact that SN1181 was faint but

faded very slowly fits this type. It is the only such event where we can study both the remnant nebula and the merged star, and also have a description of the explosion itself."

The merging of remnant [stars](#), white dwarfs and [neutron stars](#), give rise to extreme nuclear reactions and form heavy, highly neutron-rich elements such as gold and platinum. Prof. Zijlstra said: "Combining all this information such as the age, location, event brightness and historically recorded 185-day duration, indicates that Parker's star and Pa30 are the counterparts of SN 1181. This is the only Type Iax [supernova](#) where detailed studies of the remnant star and nebula are possible. It is nice to be able to solve both a historical and an astronomical mystery."

**More information:** Andreas Ritter et al, The Remnant and Origin of the Historical Supernova 1181 AD, *The Astrophysical Journal Letters* (2021). [DOI: 10.3847/2041-8213/ac2253](https://doi.org/10.3847/2041-8213/ac2253)

Provided by University of Manchester

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