Step closer to birth of the Sun

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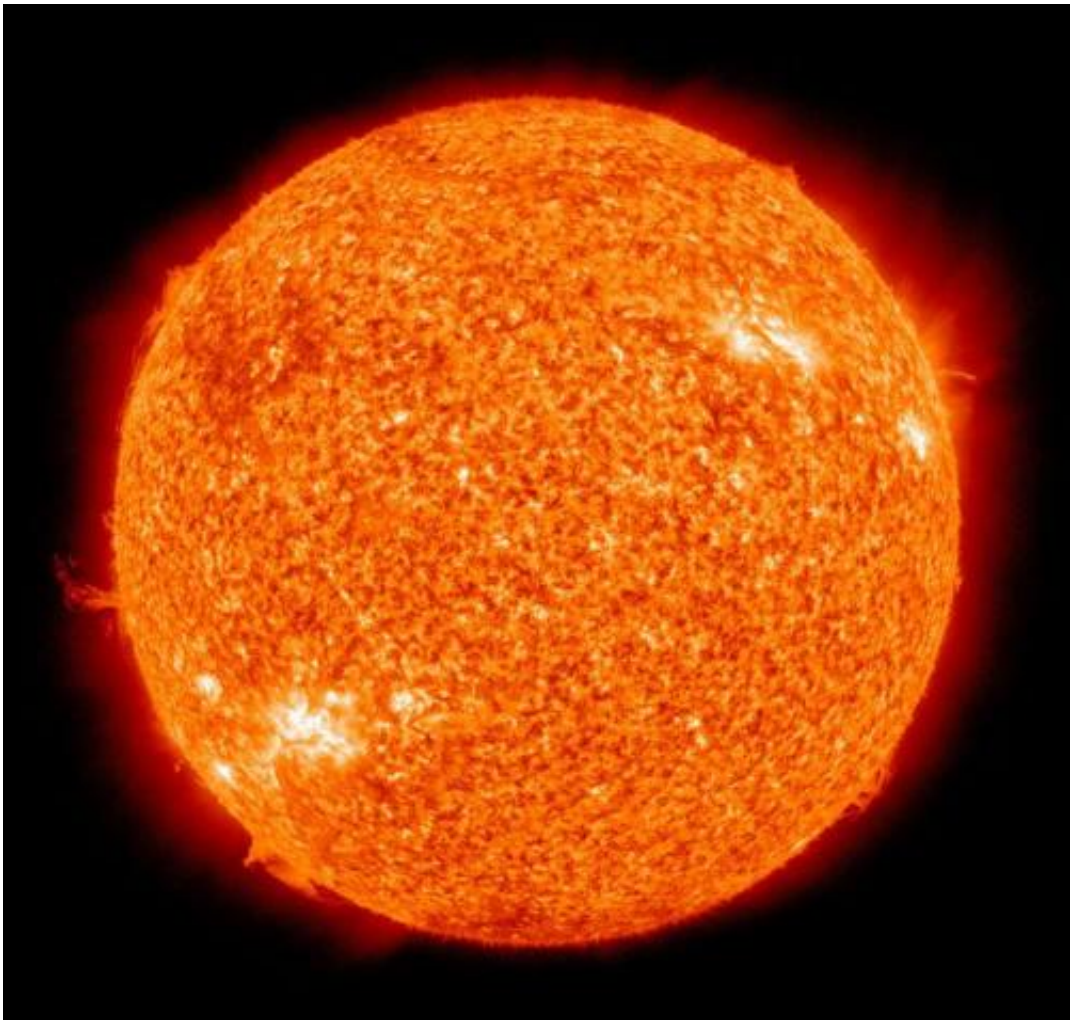

The Sun by the Atmospheric Imaging Assembly of NASA's Solar Dynamics Observatory. Credit: NASA

Researchers are a step closer to understanding the birth of the sun.

Published in *Science*, the team led by Dr Maria Lugaro and Professor Alexander Heger, from Monash University, have investigated the solar system's prehistoric phase and the events that led to the birth of the sun.

Dr Lugaro, from the Monash Centre for Astrophysics, said the team used radioactivity to date the last time that heavy elements such as gold, silver, platinum, lead and rare-earth elements were added to the solar system matter by the stars that produced them.

"Using heavy radioactive nuclei found in meteorites to time these final additions, we have got a clearer understanding of the prehistory of the solar system," Dr Lugaro said.

"We can now tell with confidence the final one per cent of gold, silver and platinum, were added to the solar system matter roughly 100 million years before the birth of the sun.

"The final one per cent of lead and rare-earth elements, such as those that make your smart phone, was added much later - at most, 30 million years before the birth of the sun."

Dr Lugaro said the detailed timing opened up new opportunities to understand the series of events that led to the formation of the sun.

Some time after the last addition of heavy elements the solar system matter went into an 'incubation' period, during which time the stellar nursery formed - where the sun was born together with a number of other stars.

"We now know this incubation period could not have lasted more than 30 million years. This offers us the chance to determine the lifespan of the nursery where the sun was born, how massive it was and how many stars were born there together," Dr Lugaro said.

"Ultimately, we want to have a clear understanding of the circumstances of the birth of our star and the prehistory of the solar system.

"Understanding the timescales and processes leading to the formation of our solar system is key to relate its birth environment with that of other planetary systems in the galaxy."

Dr Lugaro said the research team would now be looking at other heavy radioactive nuclei to get more understanding of the prehistory of the solar system, and improve the accuracy and precision of the timing.

More information: "Stellar origin of the 182Hf cosmochronometer and the presolar history of solar system matter," by M. Lugaro et al. *Science*, www.sciencemag.org/lookup/doi/ … 1126/science.1253338

Provided by Monash University