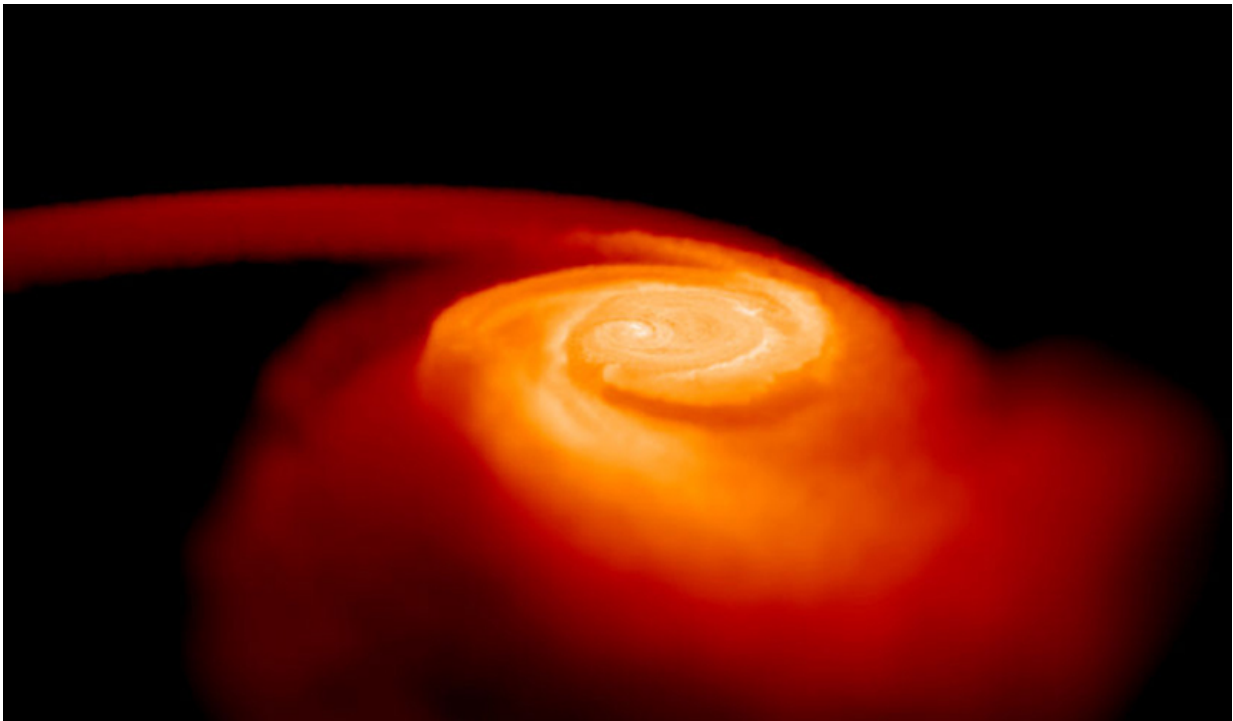


# Gold star: Seeking the origin of gold in the universe

March 30 2016

---



This illustration depicts two neutron stars colliding. As they merge, the stars eject material into space at 10 to 50 percent the speed of light. Mergers of these kinds of stars are thought to be the source of gold and other heavy metals found throughout the universe. Credit: Stephan Rosswog, Jacobs University Bremen.

So you think the gold in your ring or watch came from a mine in Africa or Australia? Well, think farther away. Much, much farther.

Michigan State University researchers, working with colleagues from Technical University Darmstadt in Germany, are zeroing in on the answer to one of science's most puzzling questions: Where did heavy elements, such as gold, originate?

Currently there are two candidates, neither of which are located on Earth - a supernova, a massive star that, in its old age, collapsed and then catastrophically exploded under its own weight; or a neutron-star merger, in which two of these small yet incredibly massive stars come together and spew out huge amounts of stellar debris.

In a recently published paper in the journal *Physical Review Letters*, the researchers detail how they are using computer models to come closer to an answer.

"At this time, no one knows the answer," said Witold Nazarewicz, a professor at the MSU-based Facility for Rare Isotope Beams and one of the co-authors of the paper. "But this work will help guide future experiments and theoretical developments."

By using existing data, often obtained by means of high-performance computing, the researchers were able to simulate production of heavy elements in both supernovae and neutron-star mergers.

"Our work shows regions of elements where the models provide a good prediction," said Nazarewicz, a Hannah Distinguished Professor of Physics who also serves as FRIB's chief scientist. "What we can do is identify the critical areas where future experiments, which will be conducted at FRIB, will work to reduce uncertainties of nuclear models."

Other researchers included Dirk Martin and Almudena Arcones from Technical University Darmstadt and Erik Olsen of MSU.

MSU is establishing FRIB as a new scientific user facility for the Office of Nuclear Physics in the U.S. Department of Energy Office of Science.

**More information:** D. Martin et al. Impact of Nuclear Mass Uncertainties on the Process , *Physical Review Letters* (2016). [DOI: 10.1103/PhysRevLett.116.121101](https://doi.org/10.1103/PhysRevLett.116.121101)

Provided by Michigan State University

Citation: Gold star: Seeking the origin of gold in the universe (2016, March 30) retrieved 16 August 2024 from <https://phys.org/news/2016-03-international-team-explores-elements.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.