

Radio Images of the Fastest Classical Nova

Montana N. Williams¹

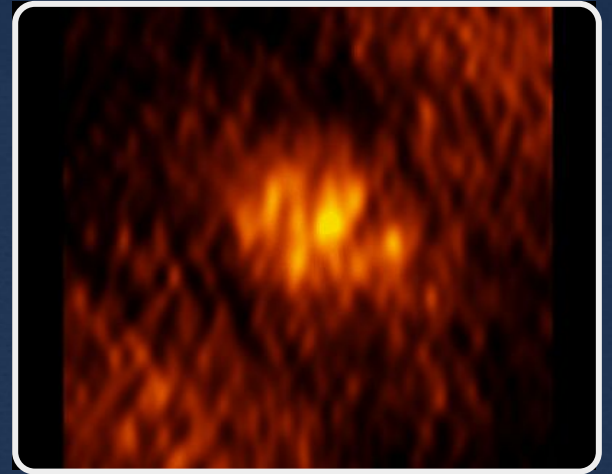
Justin Linford², Kirill Sokolovsky³, Laura Chomiuk⁴, Elias Aydi⁴, Jennifer Sokoloski⁵, Koji Mukai⁶, Adam Kawash⁴, Amy Mioduszewski⁷, Michael Rupen⁸

¹New Mexico Tech, Socorro, NM, ²National Radio Astronomy Observatory, Socorro, NM, ³University of Illinois at Urbana-Champaign, Urbana, IL, ⁴Michigan State University, East Lansing, MI, ⁵Columbia Astrophysics Lab., New York, NY, ⁶UMBC and NASA/GSFC/CRESST, Greenbelt, MD, ⁷NRAO, Socorro, NM, ⁸National Research Council, Penticton, BC, Canada



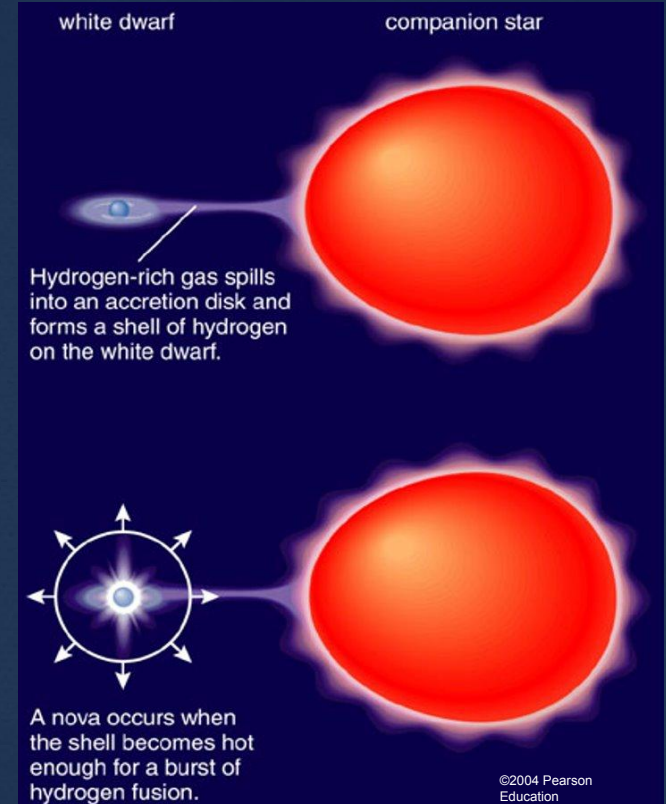
Radio Images of V1674Her

- Using “new” techniques to image classical novae
- V1674Her is an unusual nova: incredibly fast and second system of its kind to be imaged
- By watching the change in the structure, we can see the change in the dynamics of the system
- Most of the radio emission comes from the interactions in the ejected material



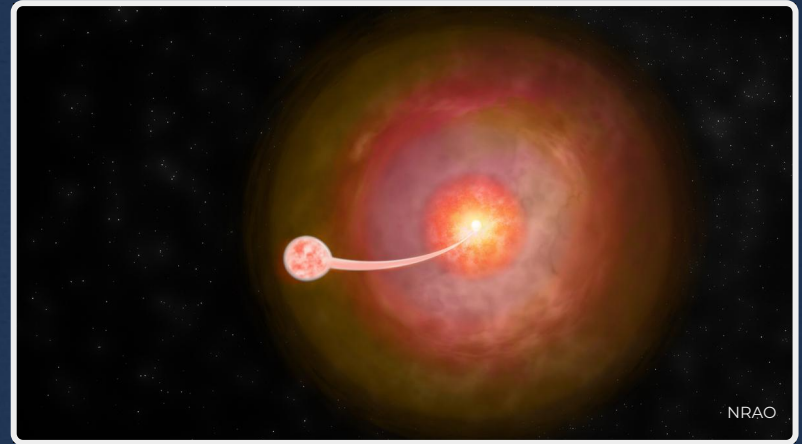
Cute Star Explosions - Classical Novae

- Occurs in a binary system with a white dwarf
- As the companion loses mass, it falls onto the white dwarf
- When this becomes hot enough, **a burst of hydrogen fusion occurs**
- This **burst is what we observe as a classical nova**



V1674 Herculis (V1674Her)

- Eruption date of **June 12, 2021**
- Host system of white dwarf and main sequence companion
- Faded two magnitudes in optical from peak in **~1.1 days**
- Detected in X-rays with NuSTAR & Swift, in gamma-rays with Fermi-LAT, and radio with VLA.

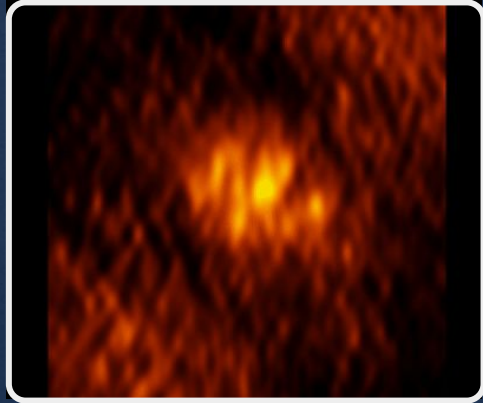


Very Long Baseline Array (VLBA)

- 10 antennas from Mauna Kea, Hawai'i to Saint Croix, U.S. Virgin Islands
- Since V1674Her was first detected by Fermi, we knew it to be a **source of non-thermal radio emission**
 - This indicated it would be a good candidate for VLBA observations

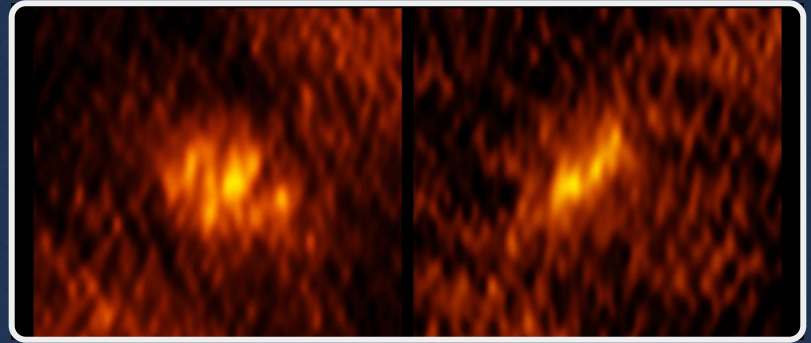


Cute VLBA Images



July 2, 2021

July 6, 2021



Key Takeaways:

- Fast change in structure of the ejecta
- Non-thermal emission dominates early
 - Shows the interaction between the ejected material
- Classical novae are extra cute in radio

Recap of V1674Her Images

- Used “new” techniques to image classical novae
- V1674Her is an unusual nova: incredibly fast and second system of its kind to be imaged with VLBA
- The images show the change in the dynamics of the system
- Most of the radio emission comes from the interactions in the ejected material, instead of the white dwarf

