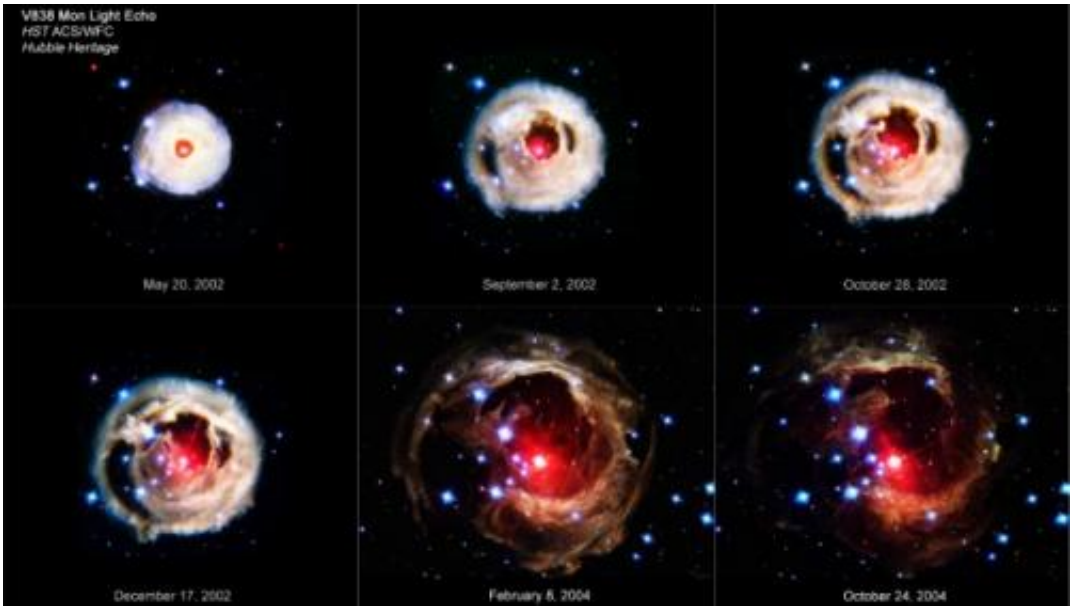
Red explosions: The secret life of binary stars is revealed

January 24 2013, by Brian Murphy



Hubble space telescope images show an expanding burst of light from a red supergiant star. Credit: NASA/ESA

A University of Alberta professor has revealed the workings of a celestial event involving binary stars that results in an explosion so powerful it ranks close to Supernovae in luminosity.

Astrophysicists have long debated about what happens when binary stars, two stars that orbit one another, come together in a common envelope. When this dramatic cannibalizing event ends there are two possible

outcomes; the two stars merge into a single star or an initial binary transforms in an exotic short-period one.

The event is believed to take anywhere from a dozen days to a few hundred years to complete. Either length is considered to be extremely fast in terms of celestial events. More than a half of all stars in the universe are binary stars. Up until now, researchers had no idea what a common envelope event would look like.

U of A theoretical astrophysicist Natalia Ivanova analyzed the physics of what happens in the outer layers of a common envelope. She found that hot and ionized material in the common envelope cools and expands and then releases energy in the form of a bright red outburst of light.

Ivanova linked these theoretically anticipated common envelope outbursts with recently discovered Luminous Red Novae, mysterious transients that are brighter than Novae and just a bit less luminous than Supernovae.

Her research provided both a way to identify common envelope events and explained the luminosity generated during the common envelope event.

The research was published in the journal *Science*.

More information: "Identification of the Long-Sought Common-Envelope Events," by N. Ivanova et al. *Science*, 2013.

Provided by University of Alberta