Мир двойных звёзд

Константин Маланчев, ГАИШ МГУ

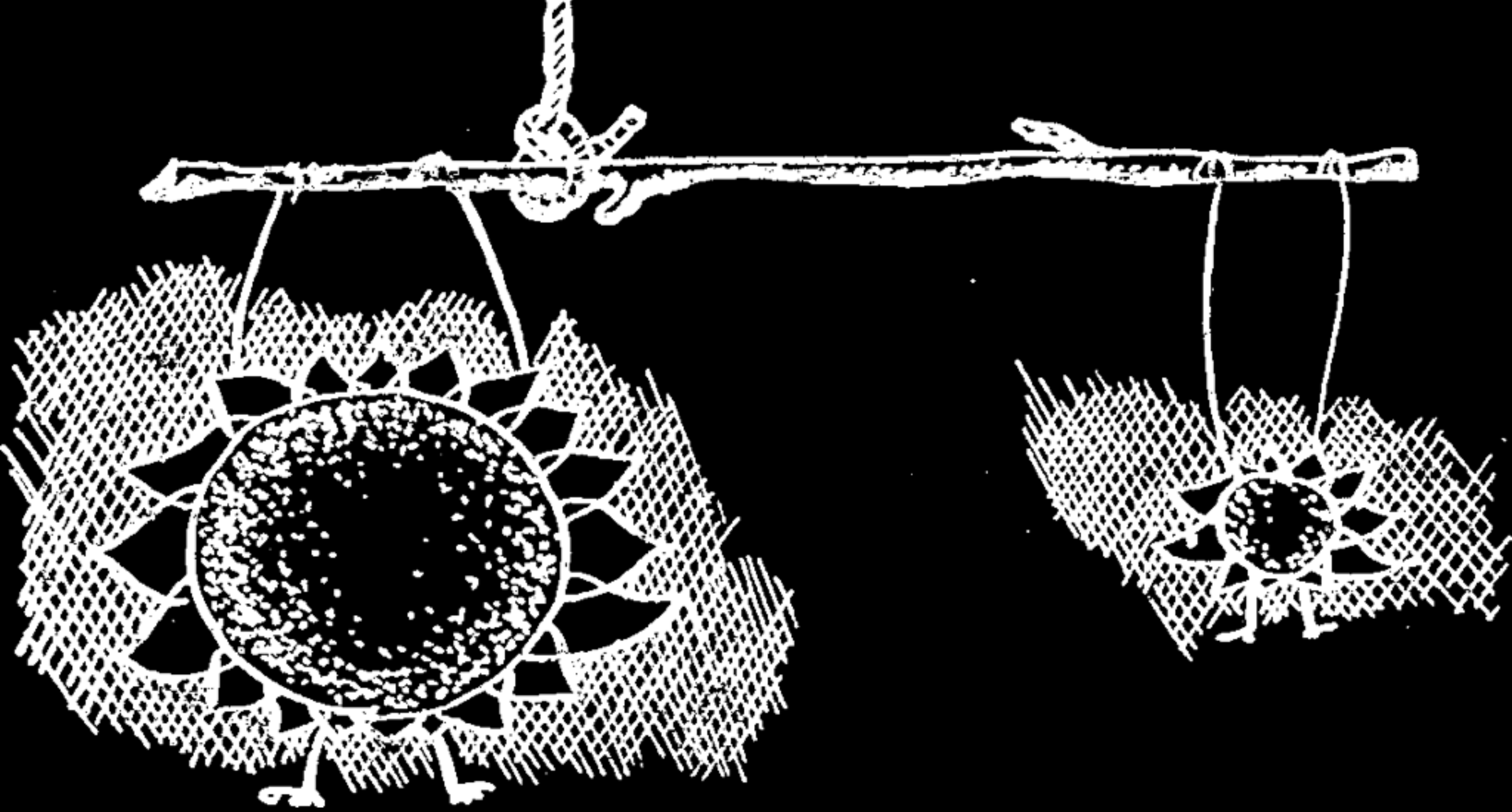
Фото: Сергей Лисаков

Эпсилон Лиры

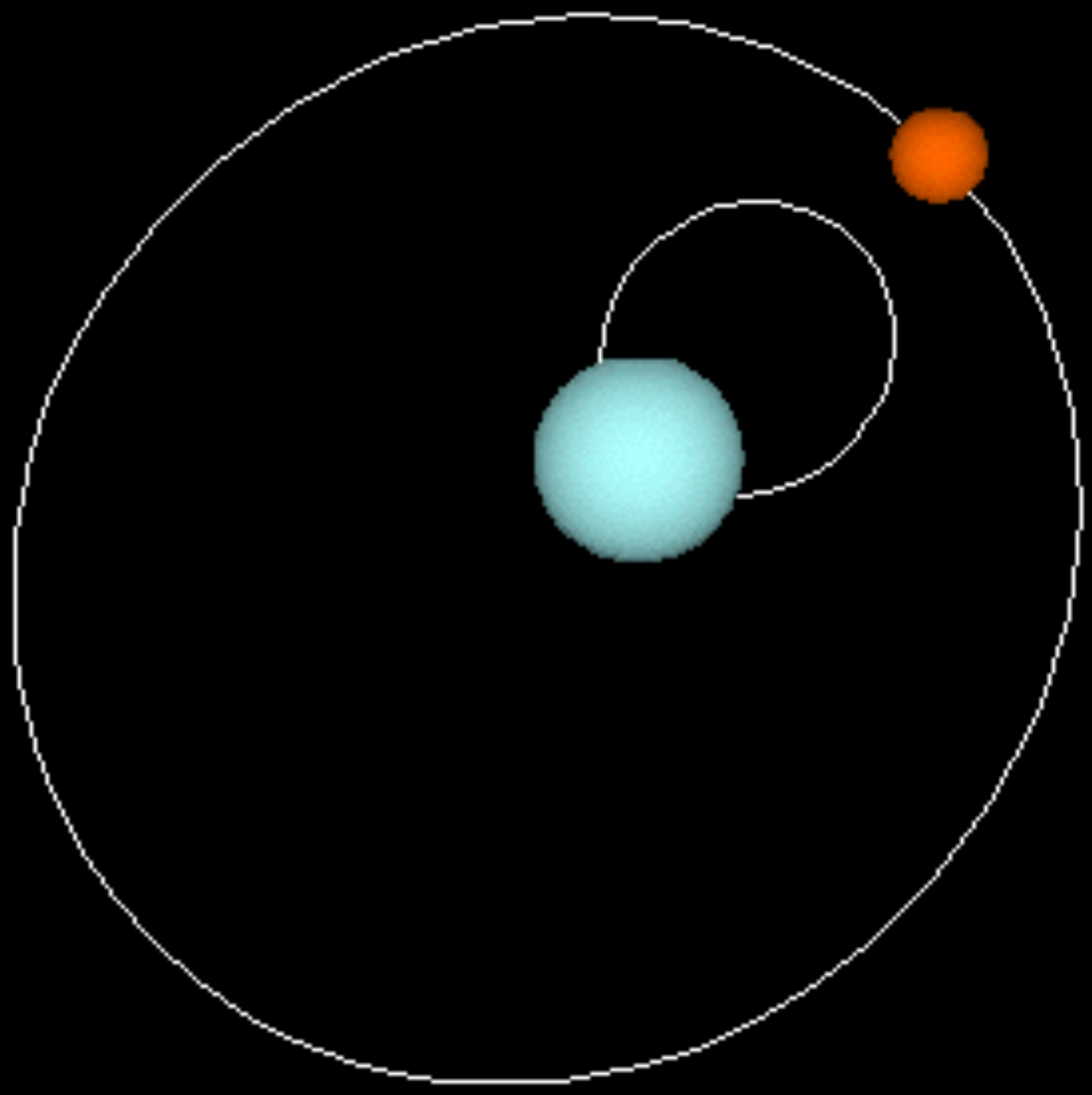
Фото: Сергей Голышев

Эпсилон Лиры

Фото: Сергей Голышев

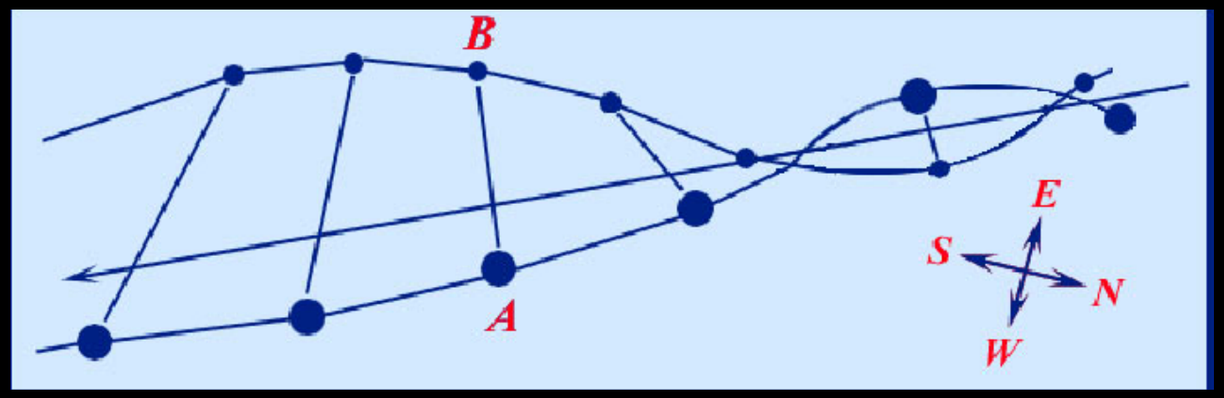


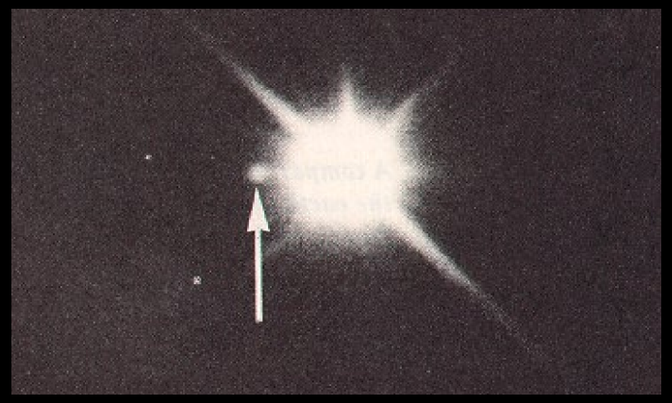
Изображение: В. Липунов

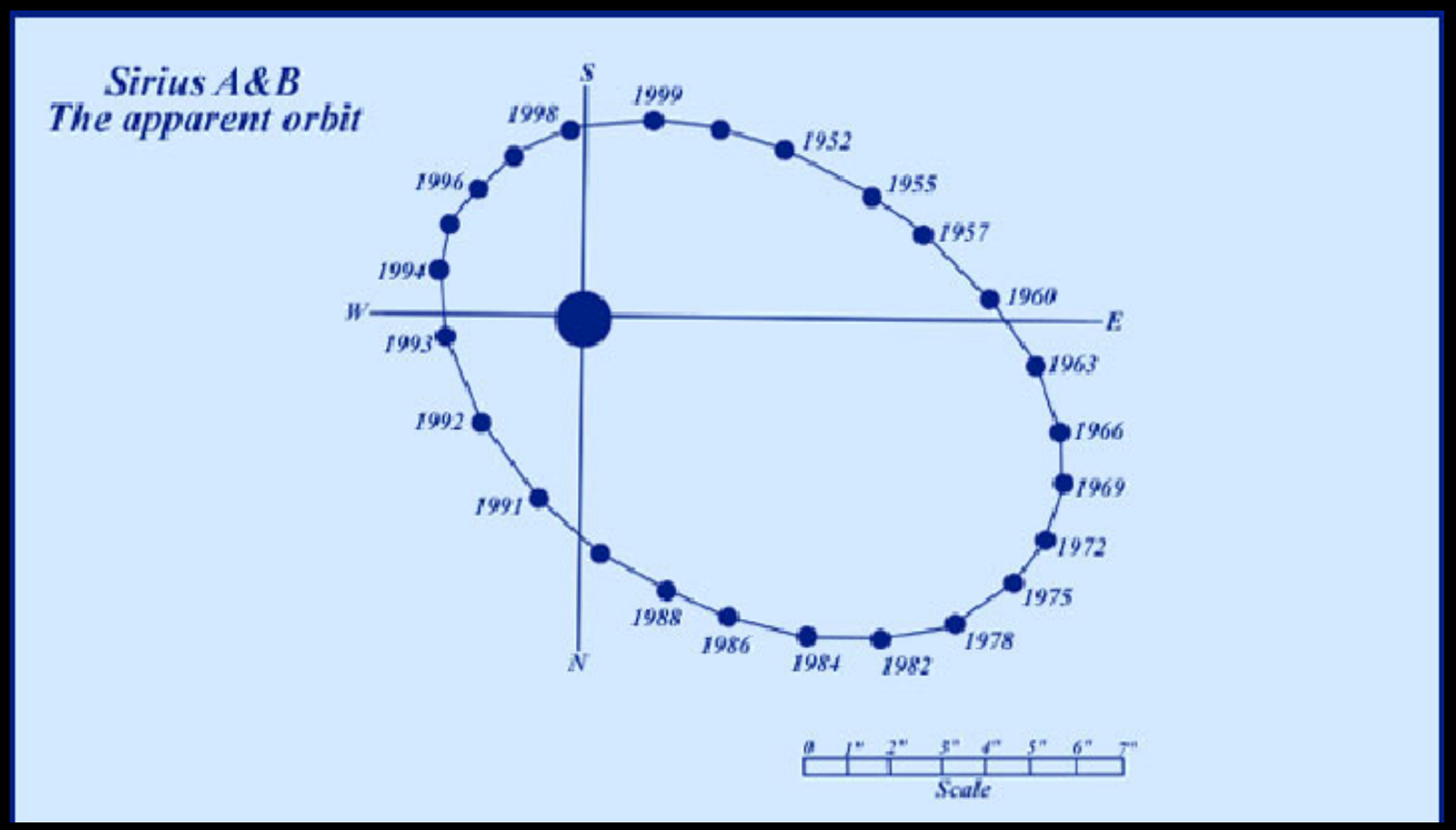


Визуально-двойная звезда

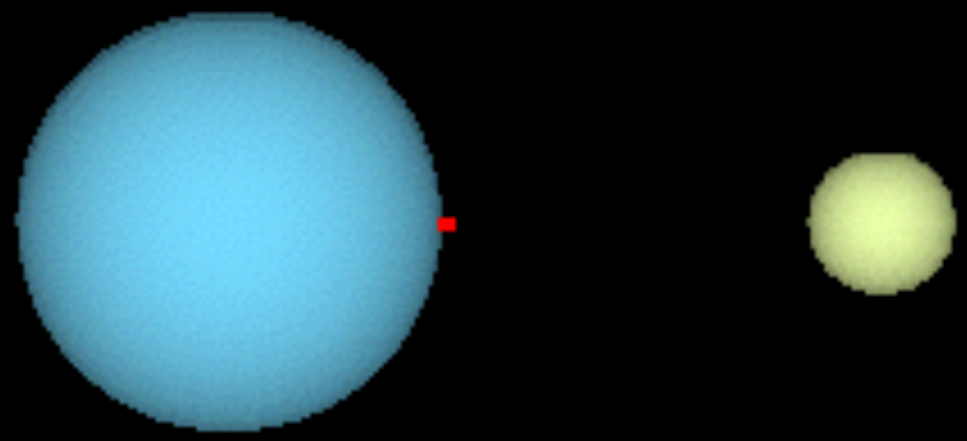
Анимация: P. Rogge

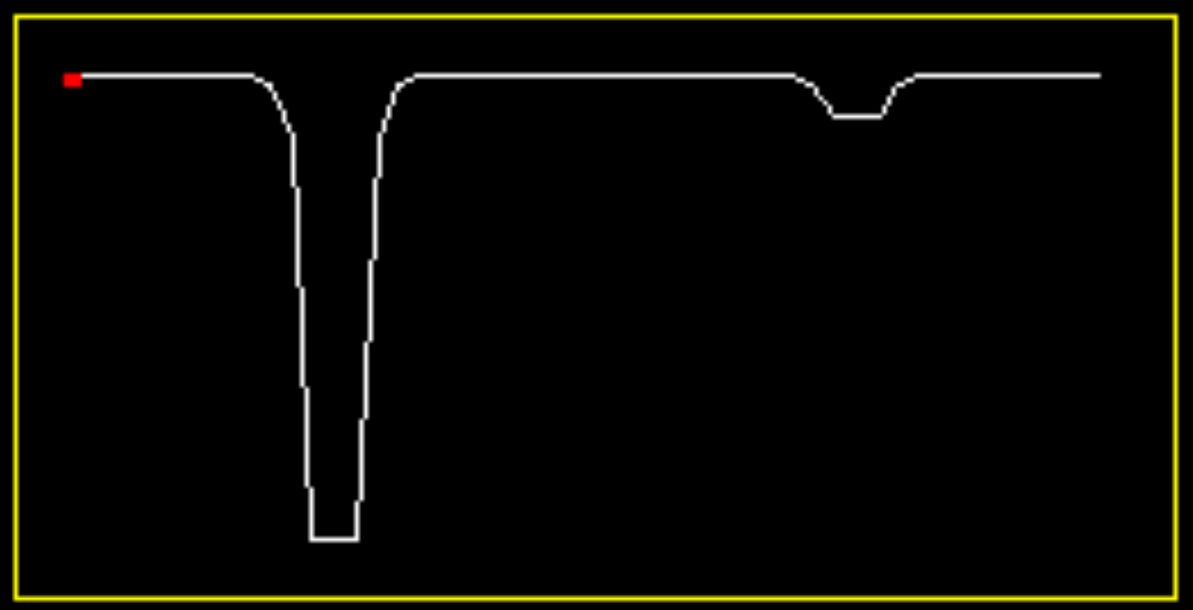

B
A
E
S
N
W




Sirius A&B
The apparent orbit
S
1999
1998
1952
1996
1955
1957
1994
1960
W
E
1993
1963
1992
1966
1991
1969
1972
1988
1975
1986
1984
1982
1978
N
0
1"
2"
3"
4"
5"
6"
7"
Scale

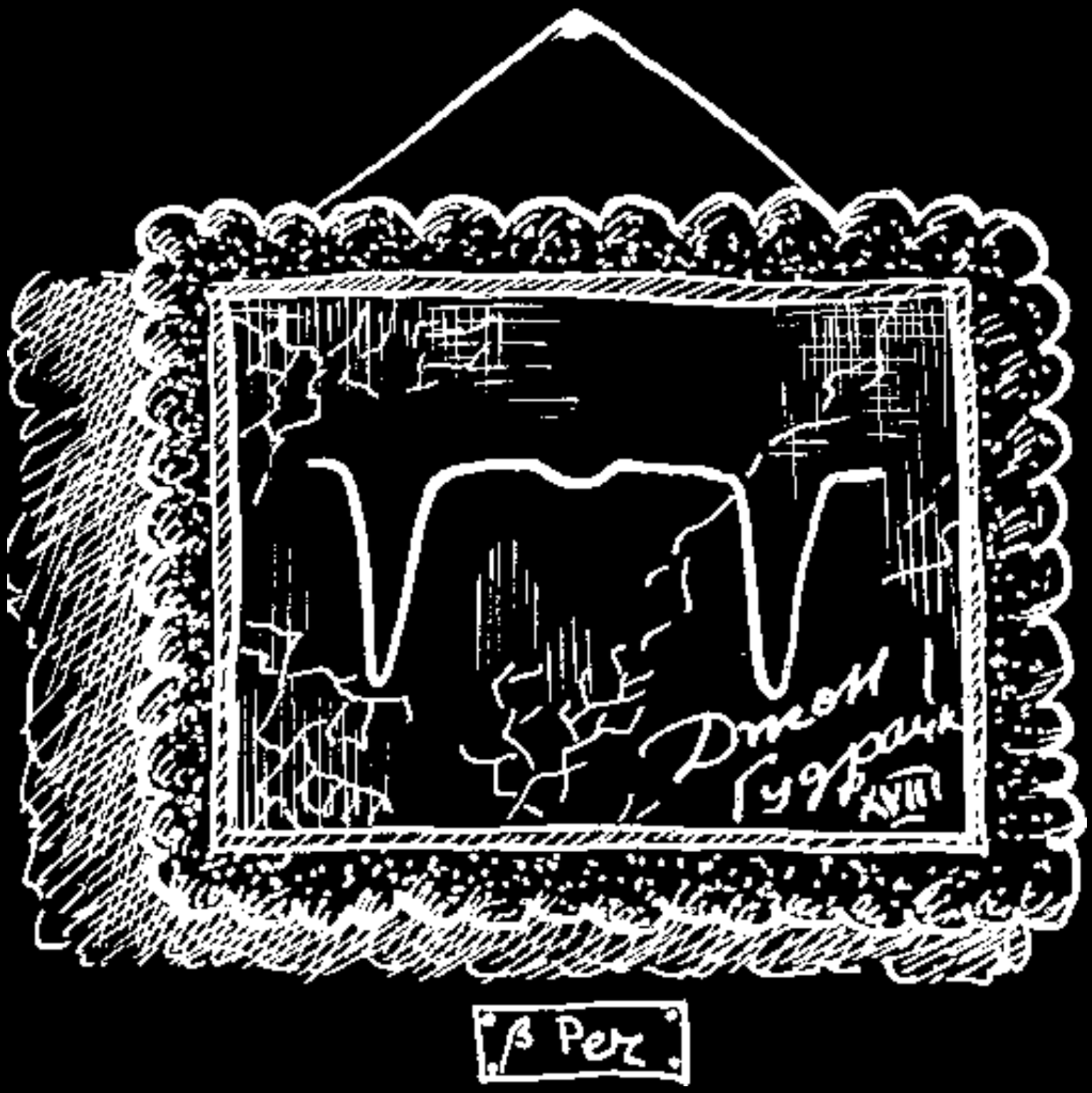
Сириус Б





Затменная двойная звезда

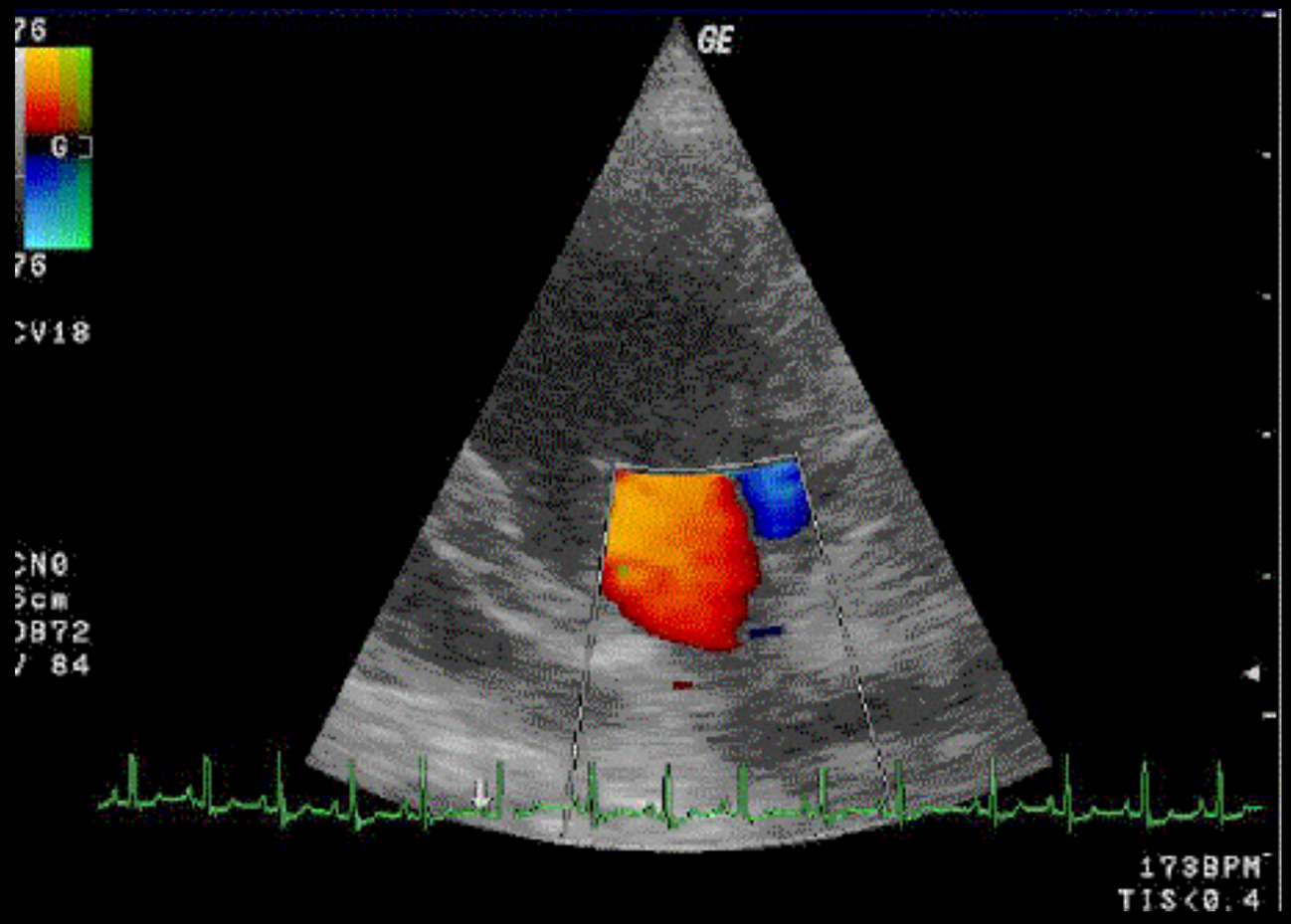
Анимация: P. Rogge



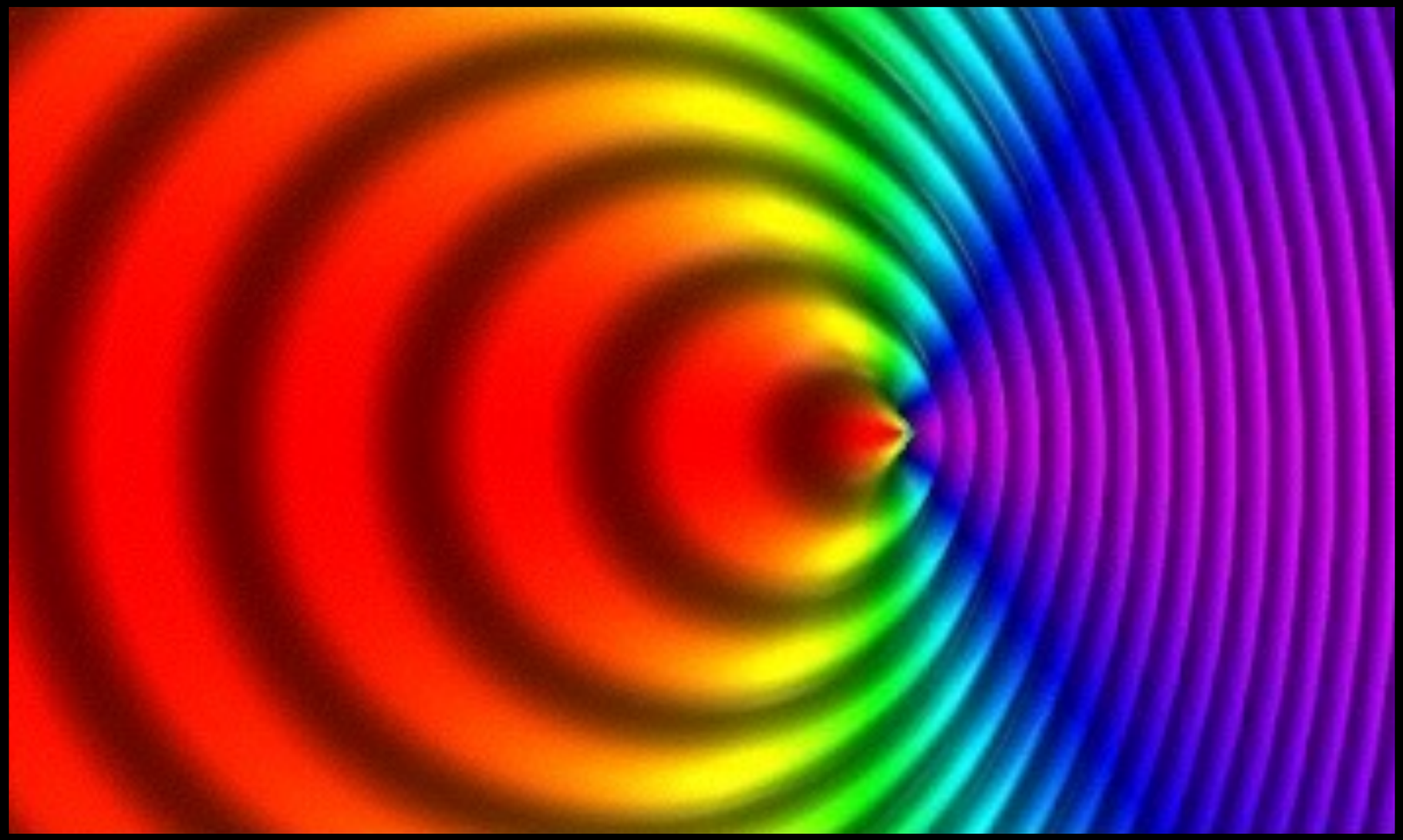
Алголь

Изображение: В. Липунов

Фото: Glan Wallace

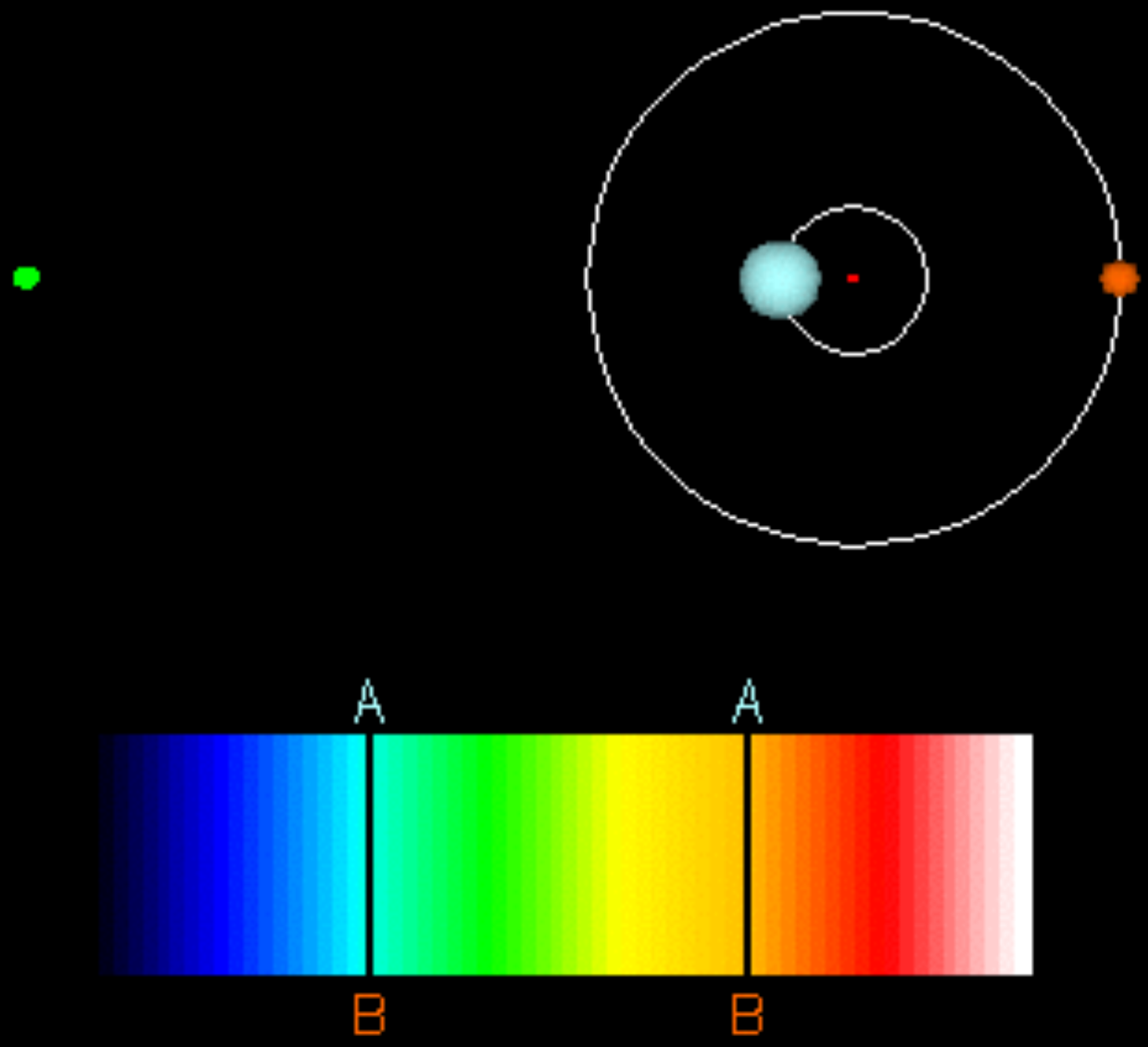


Анимация: Kolumet, Wikipedia Commons



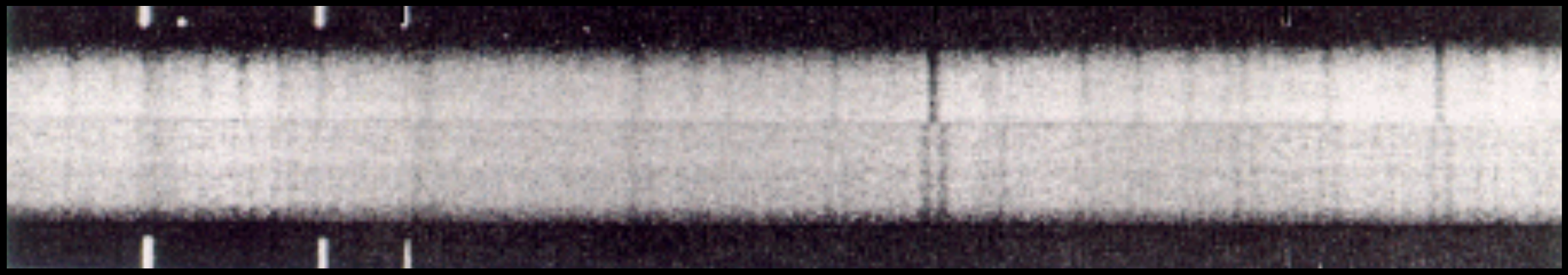
Изображение: TxAlien, Wikipedia Commons

Эффект Доплера

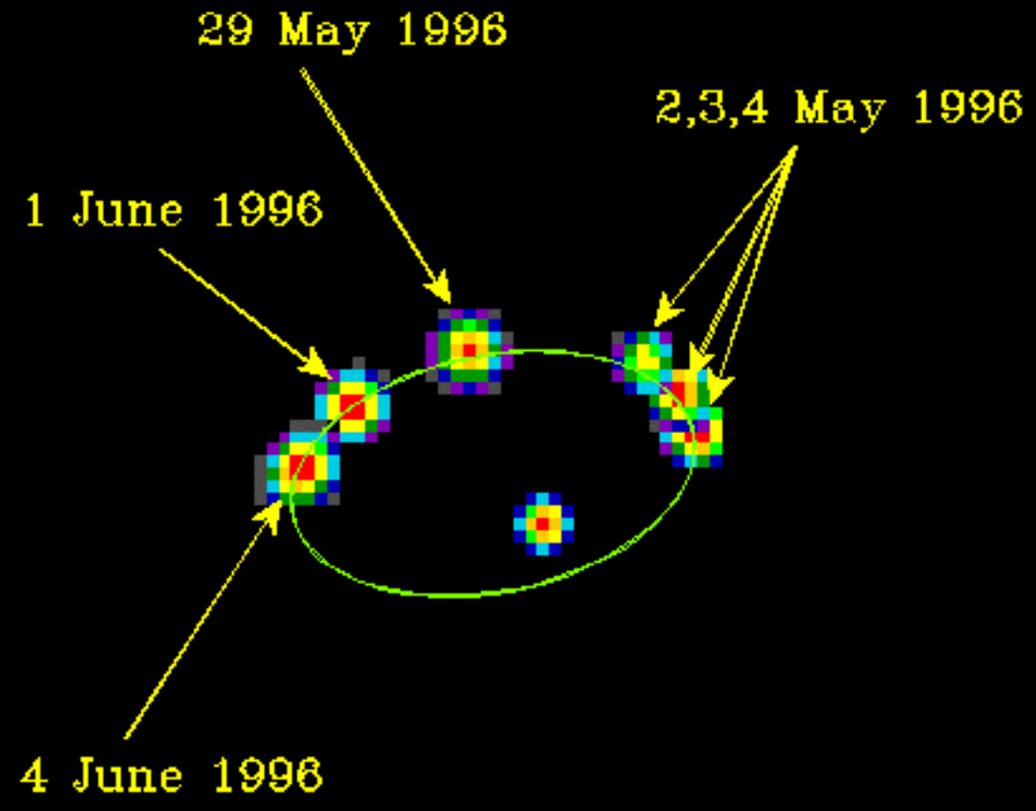


Спектрально-двойная звезда

Анимация: P. Rogge



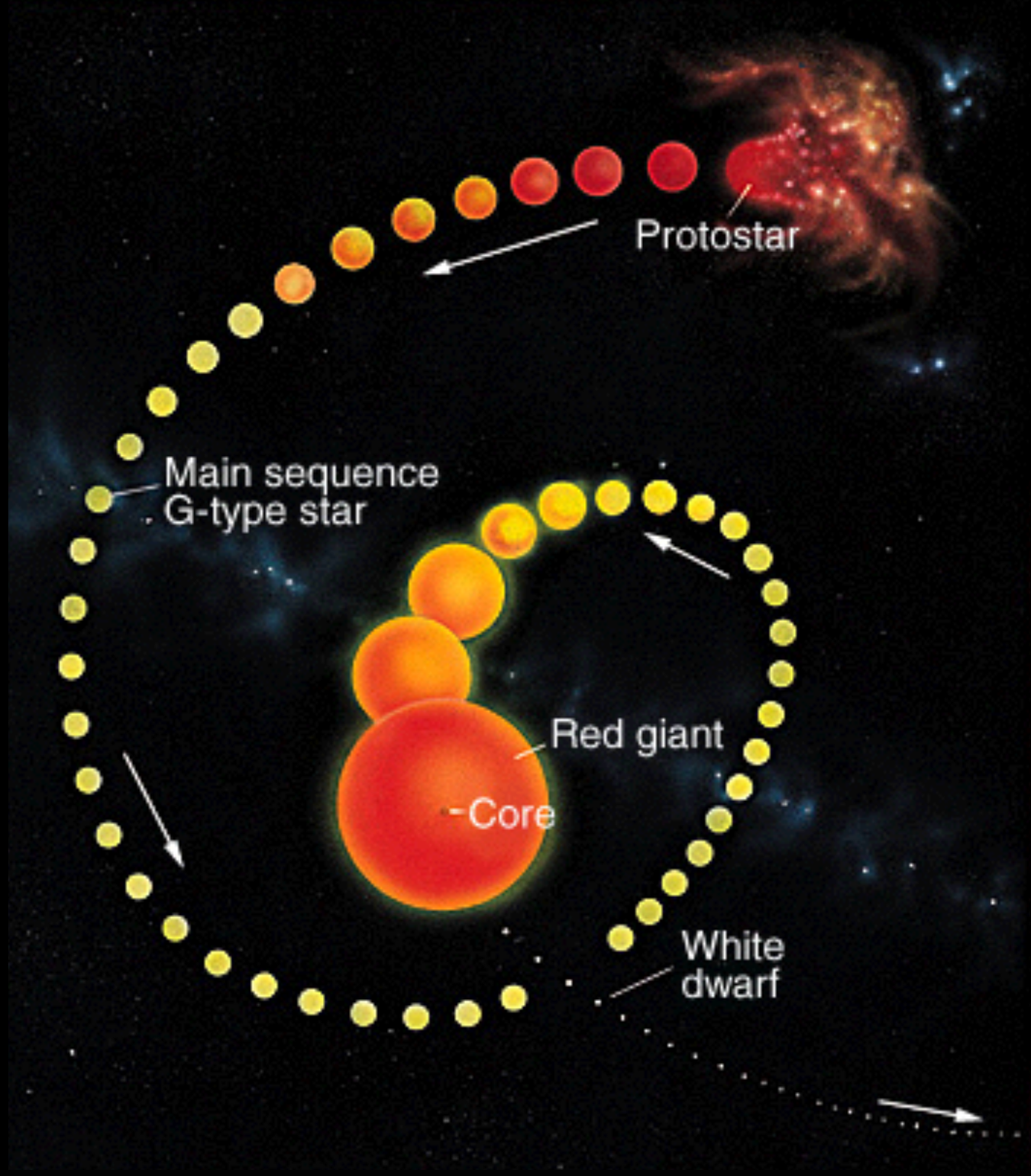
Изображение: Caltech



Изображение: R. Nemiroff, J. Bonnel

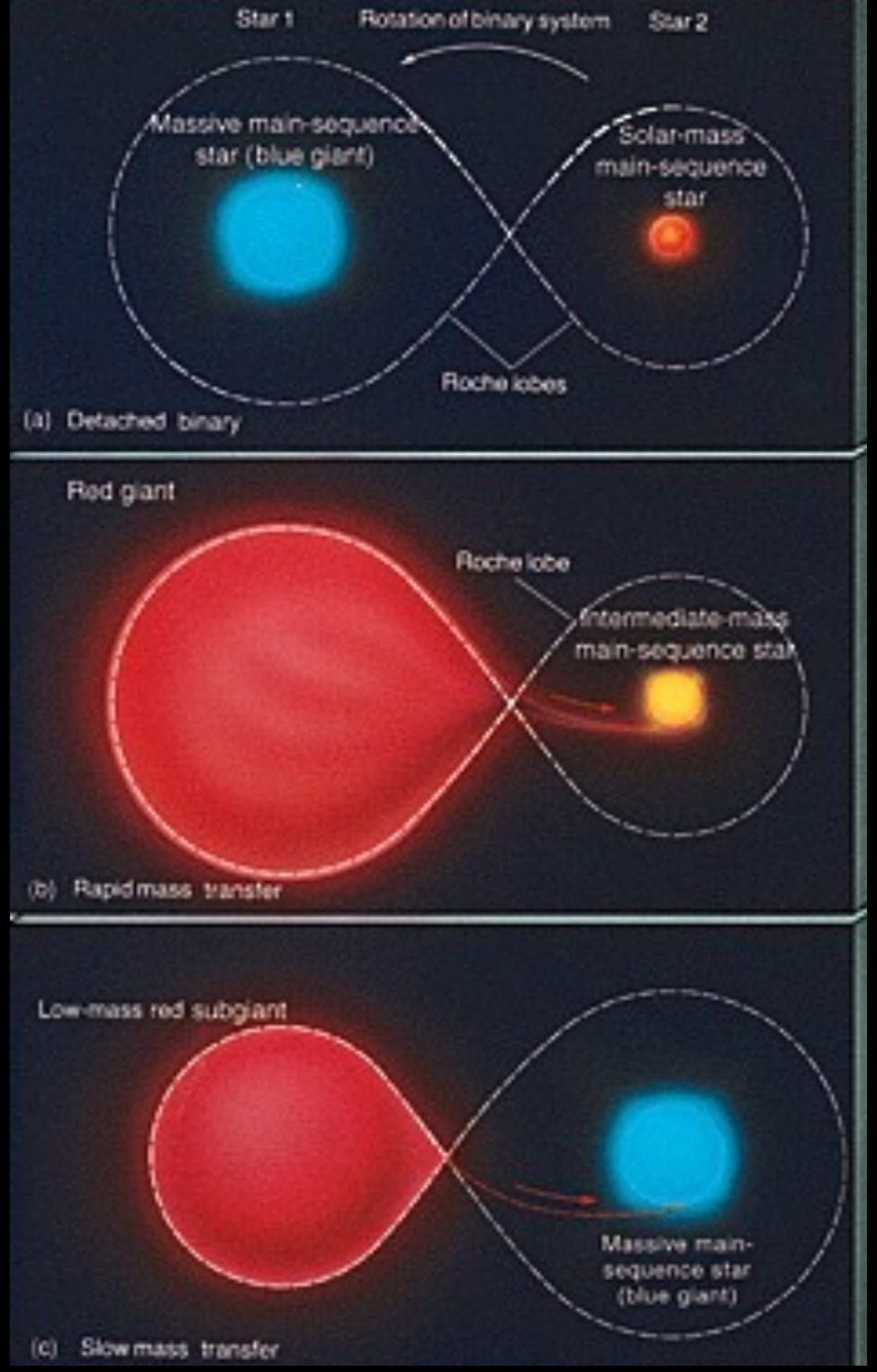
Мицар A

Формирование звёзд



Изображение: «Astronomy Today 2E», Prentice Hall

Эволюция Солнца



Изображение: «Astronomy Today 2E», Prentice Hall

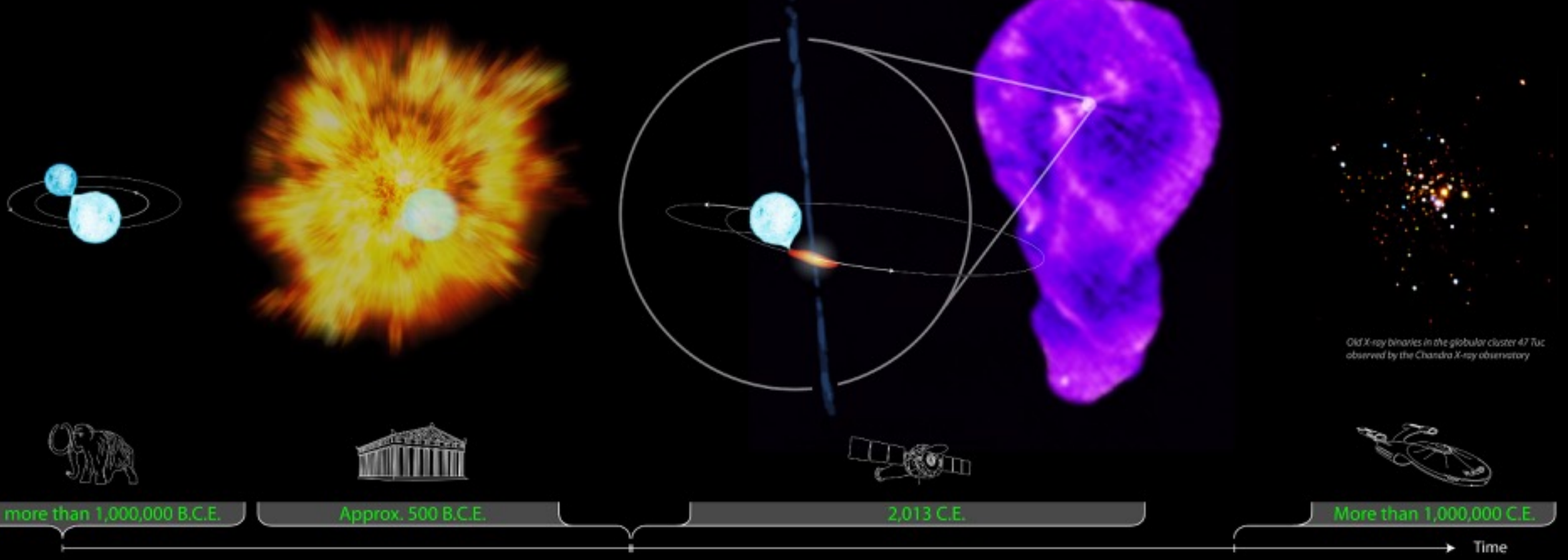
Пример эволюции тесной двойной звезды

1) Two ordinary stars orbit each other for a few million years after they were born.

2) The initially more massive star runs out of nuclear fuel and explodes in a supernova, leaving behind a neutron star.

3) The neutron star and its companion in **Circinus X-1** orbit each other inside the short-lived residual glow of the supernova explosion. The explosion distorted the orbit to become elliptical. At closest approach, the neutron star is force-fed by its companion.

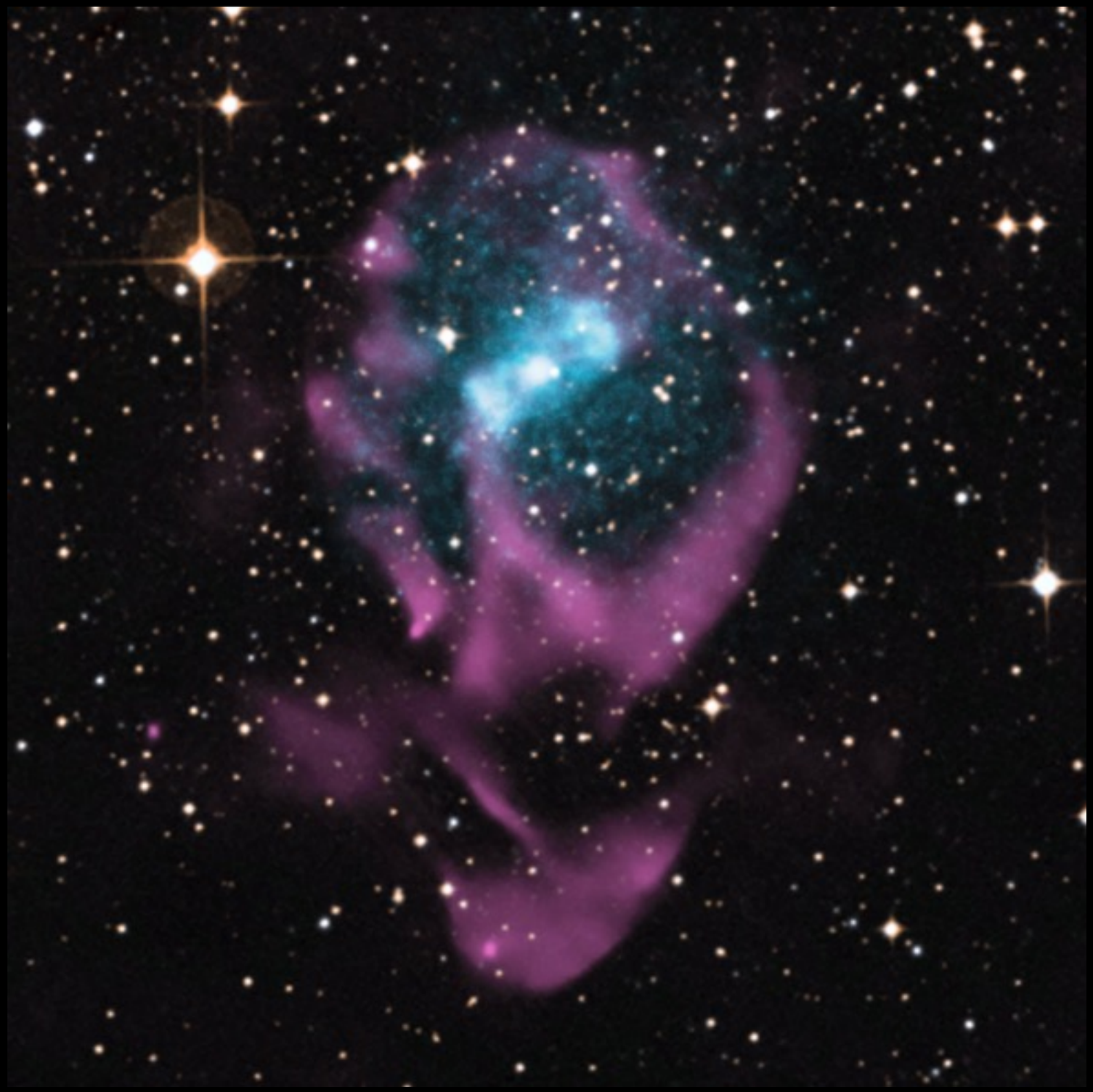
4) We observe **Circinus X-1** approximately 2,500 years after the explosion. Typical X-ray binaries are observed millions to billions of years after the supernova. Their supernova remnants have long since disappeared.



Old X-ray binaries in the globular cluster 47 Tuc observed by the Chandra X-ray observatory

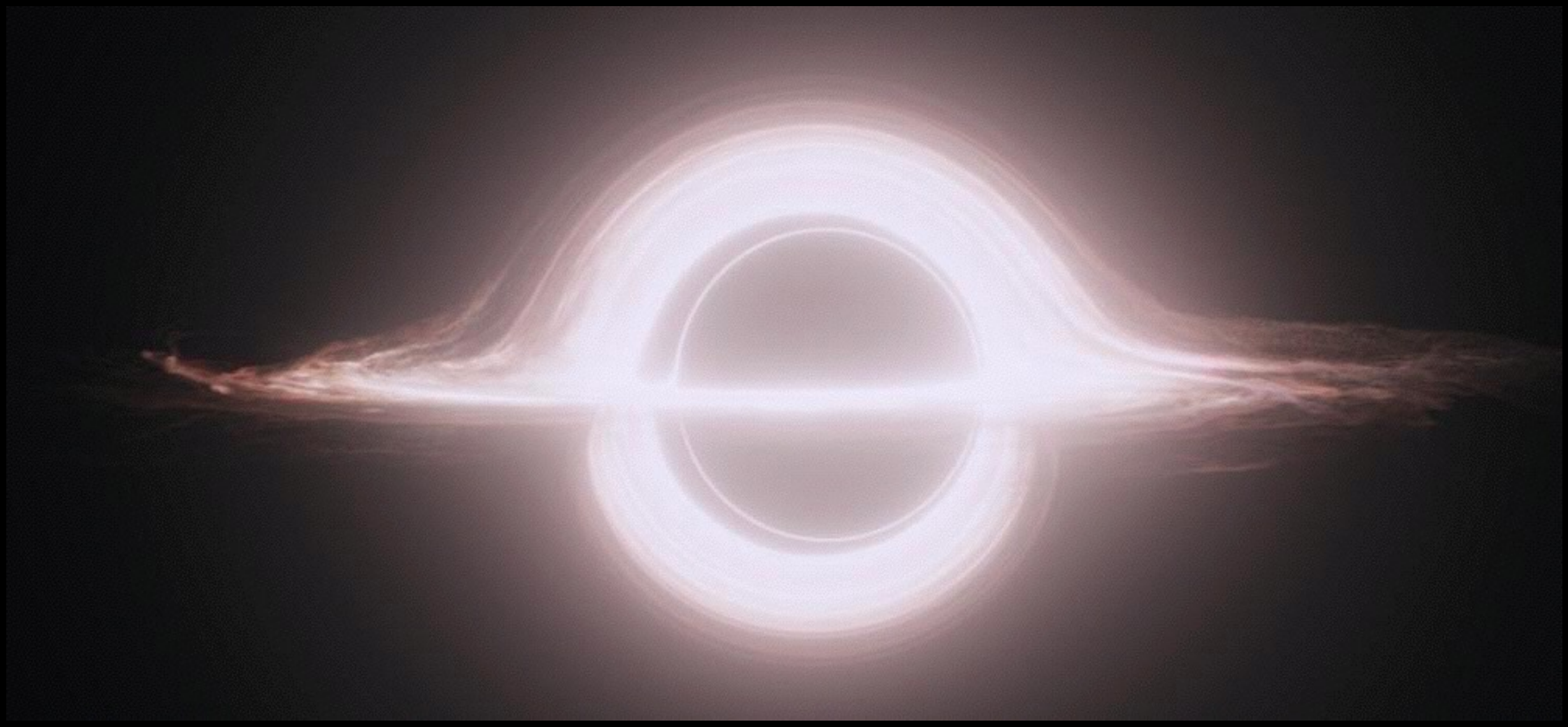
Изображение:Univ. of Wisconsin-Madison/S.Heinz et al

Эволюция Циркуля X-1



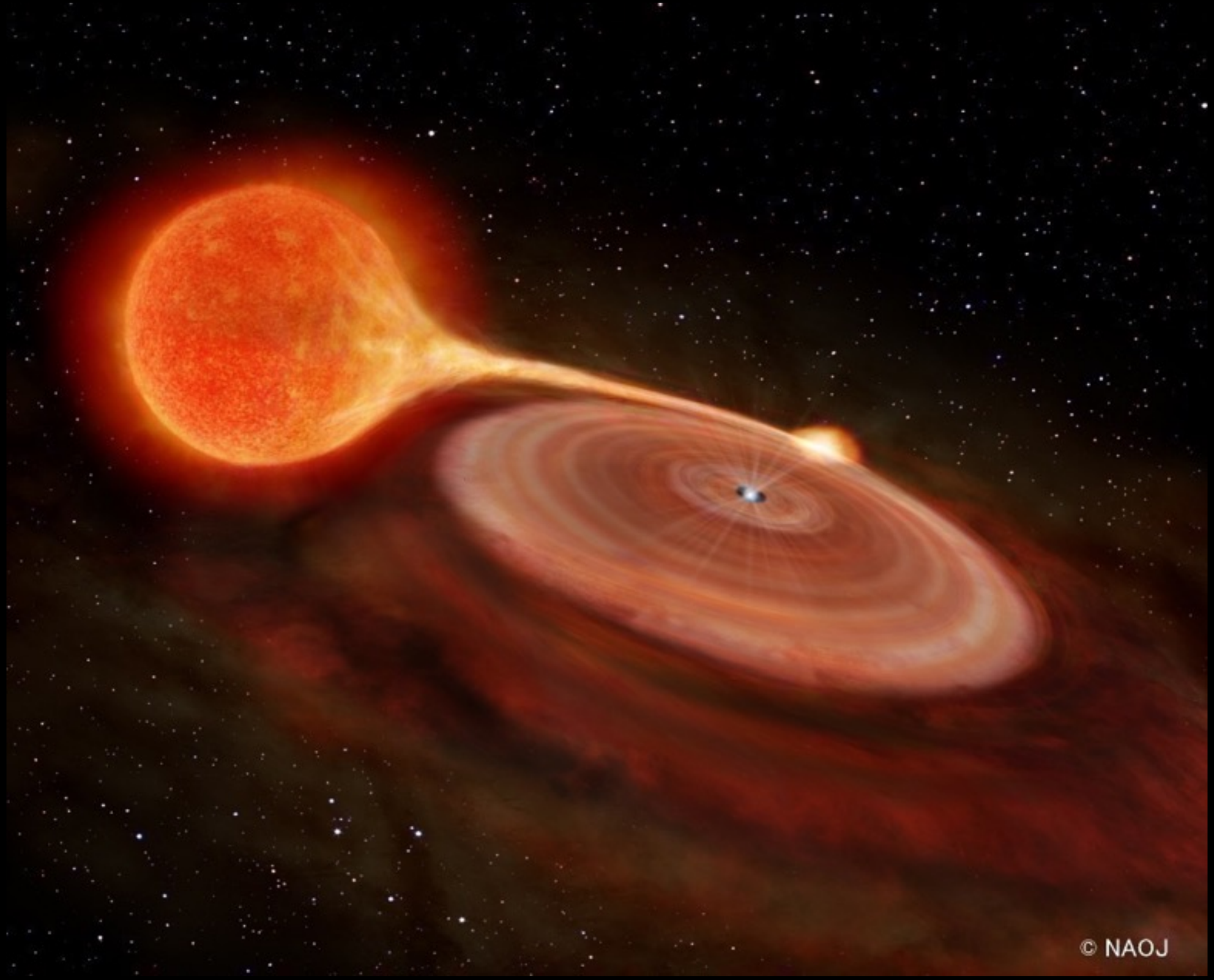
Изображение: NASA's Marshall Space Flight Center

Циркуль X-1



Изображение: Double Negative, Warner Bros.

Аккреционный диск



Карликовая новая

Видео: NASA Goddard Space Flight Center

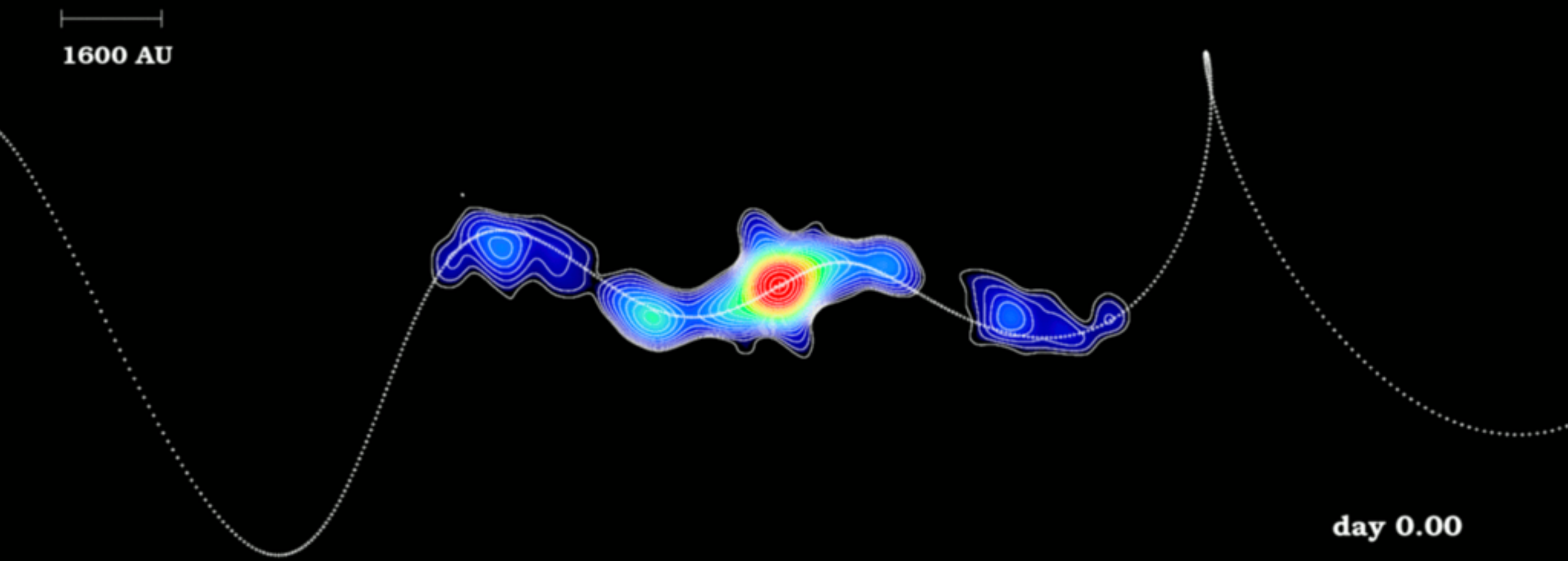
Аккреция на чёрную дыру

Изображение: NRAO/AUI/NSF, K. Golap, M. Goss; NASA's WISE

Остаток сверхновой

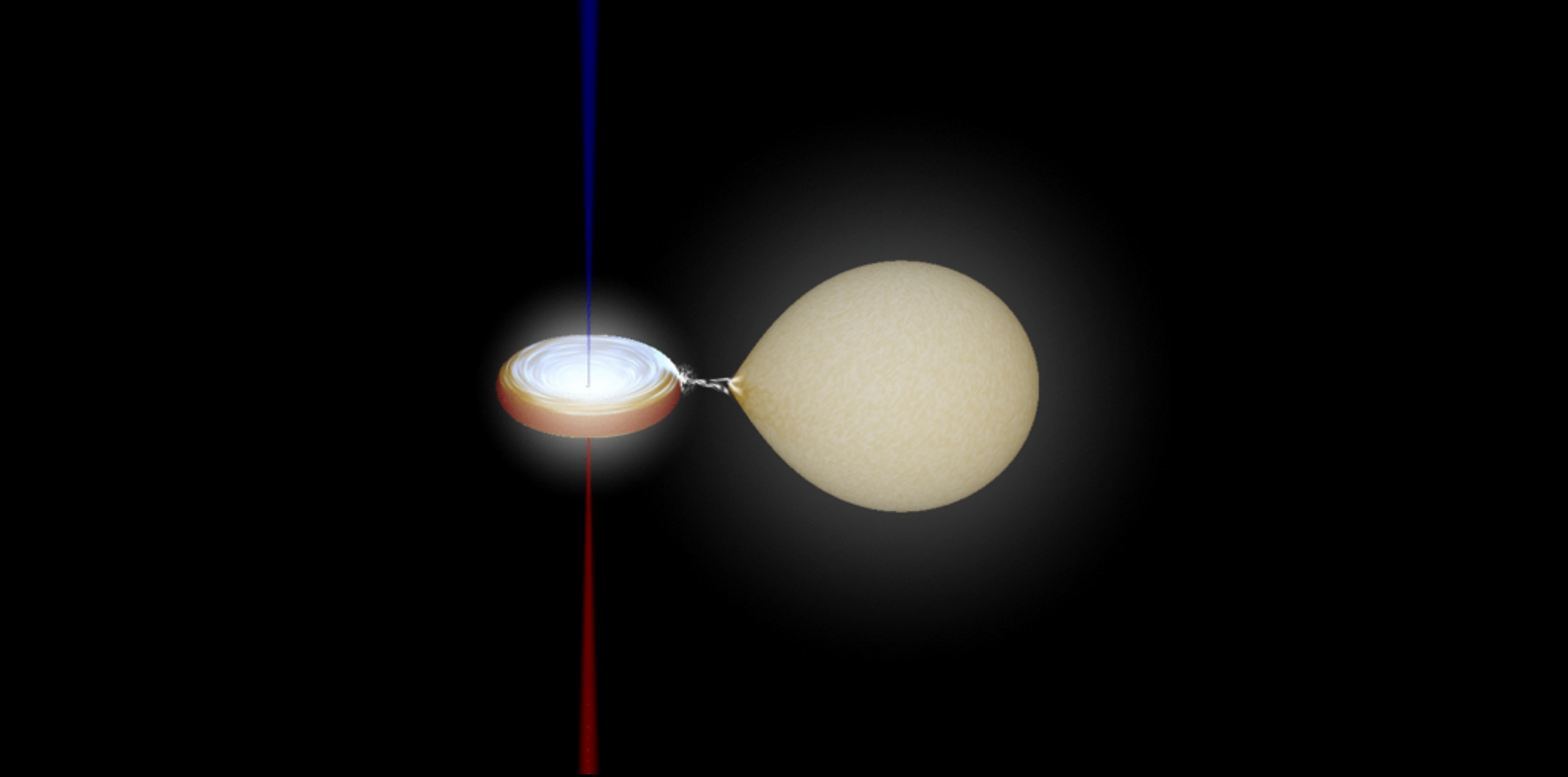
Фото:T. Colson

Ламантин



Анимация:A. Mioduszewski et al., NRAO/AUI/NSF

Микроквазар SS 433



Анимация:Robert Hynes, Tania Burchell

Микроквазар SS 433

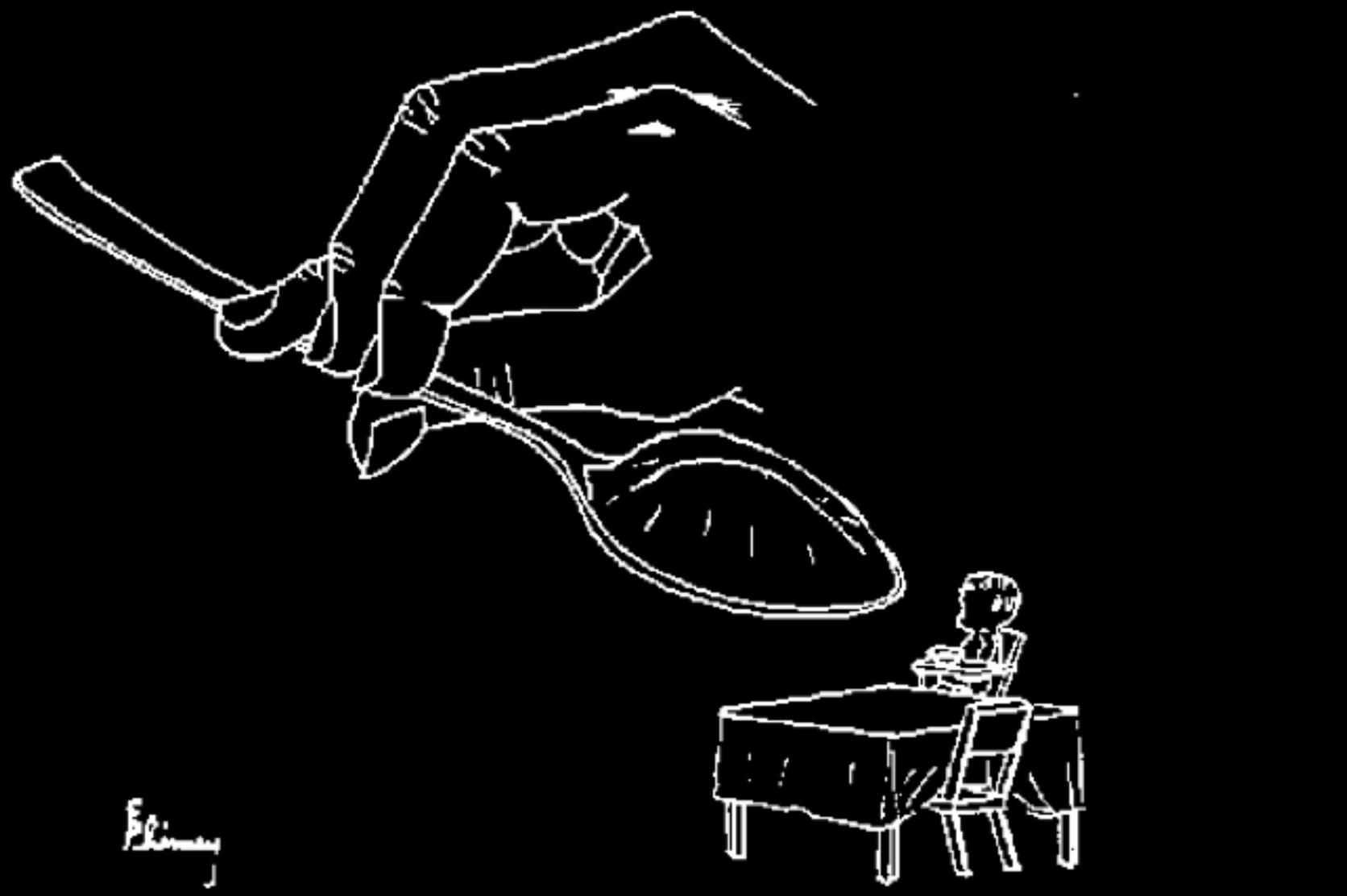


Fig. 1—The problem of feeding the monster: a large (angular momentum) spoon and a small (angular momentum) mouth. Hands and teeth (gravitational and magnetic forces, viscosity, ...) are needed to guide and divide the food into morsels that can be metabolised during activity.

Сверхкритическая аккреция

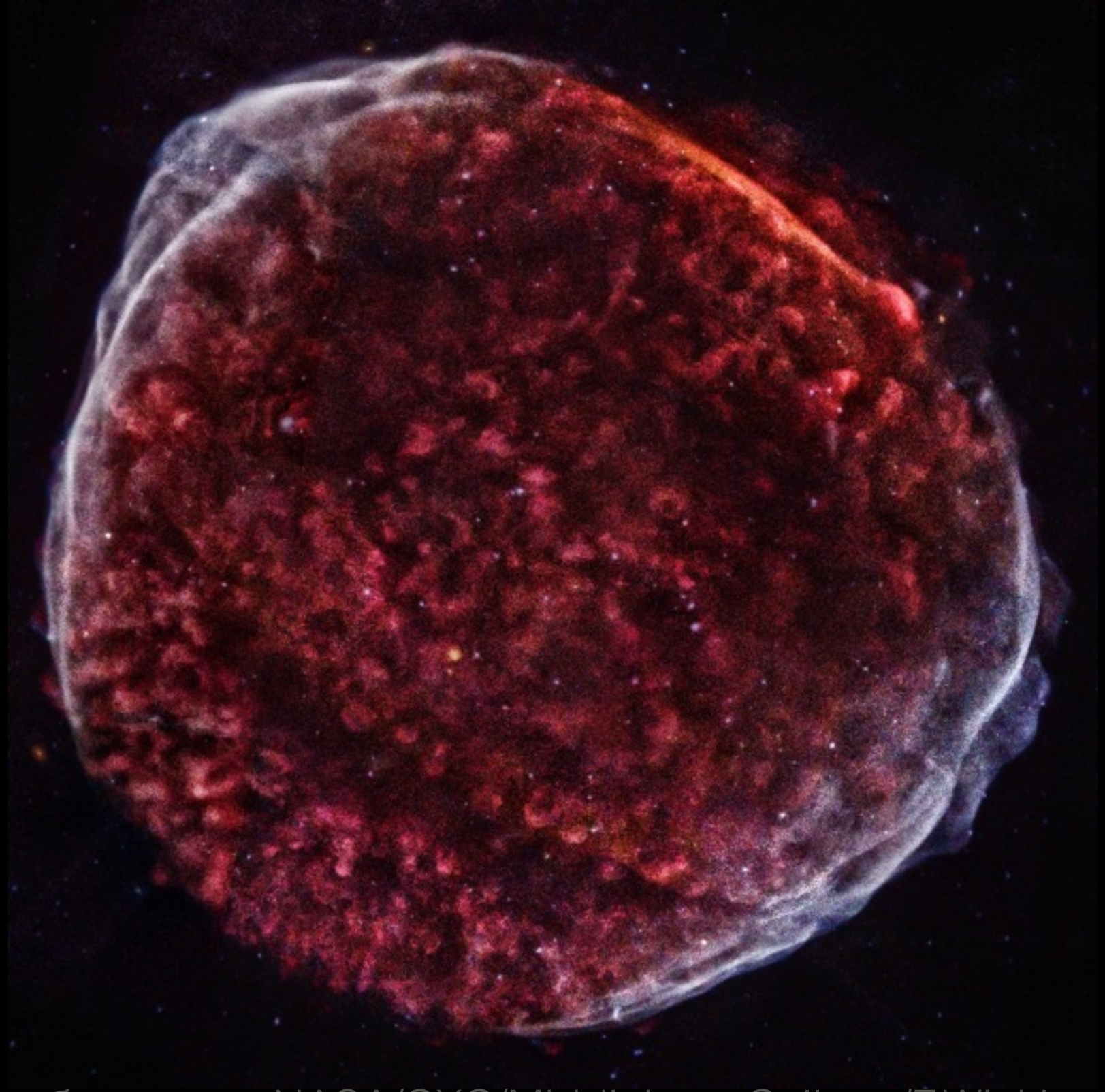
https://www.flickr.com/photos/gsfc/4889085984

Видео: NASA Goddard Space Flight Center

Новая — термоядерный взрыв на белом карлике

Видео:ESO/M. Kornmesser

Сверхновая Ia — термоядерный взрыв белого карлика



Изображение: NASA/CXC/Middlebury College/F.Winklerch

Остаток взрыва сверхновой Ia

Спасибо за внимание