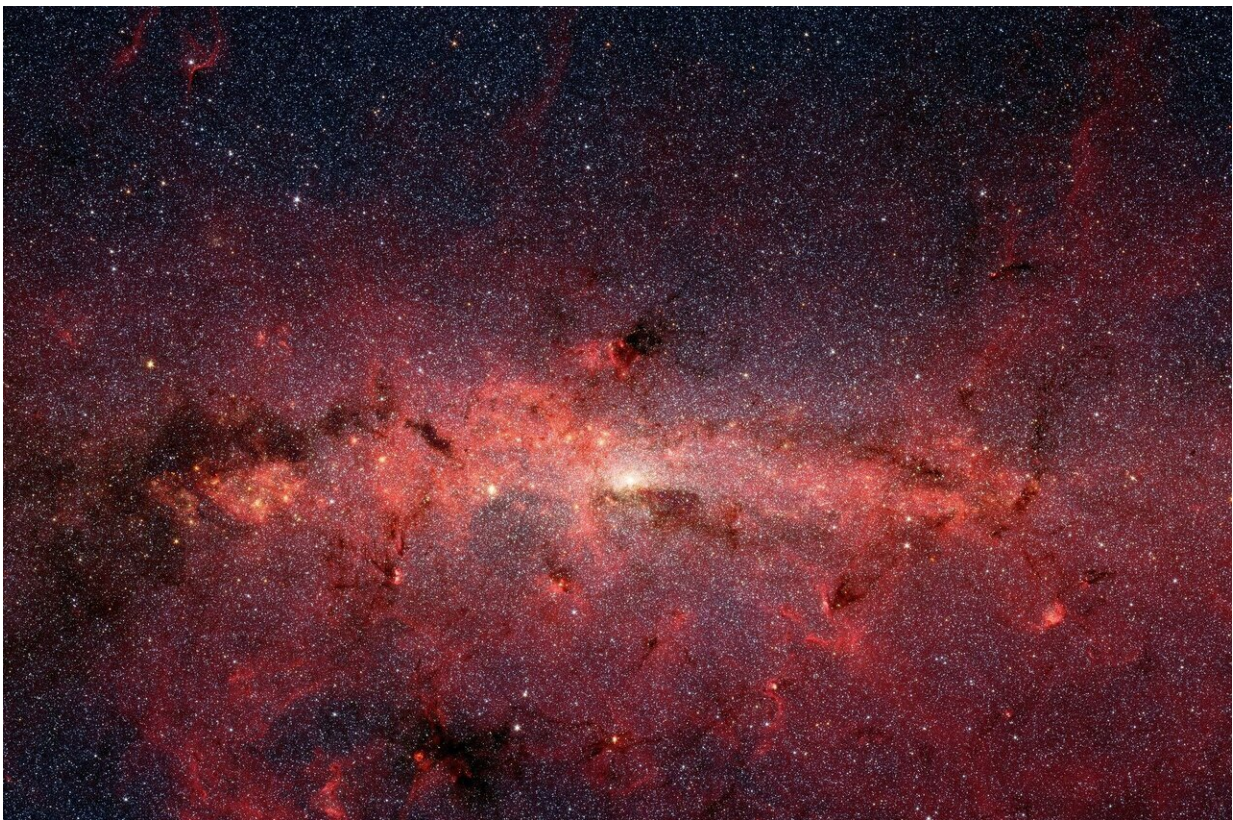


Researchers reveal rapid mass transfer between twin components in hierarchical triple system

June 18 2021, by Liu Jia



Credit: Pixabay/CC0 Public Domain

In a study published in *Monthly Notices of the Royal Astronomical Society*, Dr. Zhao Ergang and Prof. Qian Shengbang from Yunnan

Observatories of the Chinese Academy of Sciences revealed rapid mass transfer between the two twin components in the eclipsing binary system GK Cepheus (GK Cep), suggesting that GK Cep is a key target to understand the mass transfer during binary evolution. They found that this system contains a solar-type stellar component expect the eclipsing binary.

GK Cep is an eclipsing binary that contains two A-type components with an [orbital period](#) of close to one day. Both two components are twins because of nearly the same mass, radius and effective temperature.

It is hard to observe total continuous [light curve](#) of GK Cep by using the ground-based telescope due to its unit period. The lunar-based ultraviolet telescope (LUT), one of the scientific payloads onboard the Chang'e-3 [lunar lander](#), is dedicated to continuous monitoring of variable stars for as long as dozens of days in the near-ultraviolet band, which is not available on the ground.

The total continuous light curves were obtained with LUT and several eclipse times were monitored with the Sino-Thai 70-cm telescope of Lijiang Gaomeigu Station and the 1.0-m telescope at Yunnan Observatories.

By analyzing the data of these light curves, the researchers revealed that GK Cep is a semi-detached system where the slightly less massive component is the hotter one filling its critical Roche lobe. The semi-detached configuration, together with the increase of the orbital period, suggested the mass transfer from secondary component to primary one, which could be proved by the hot spot found on the neck of the more massive by light curves.

They also revealed that GK Cep is one of the few close binaries on the key evolution state just after the shortest-period stage during rapid [mass](#)

[transfer](#).

Apart from the continuous increase of the orbital period, the cyclic change could arise from the light-travel time effect of a solar-type stellar [component](#), which is in agreement with the third body contribution being about 2.6% to the total light of the triple system from [light](#) curve. The researchers could infer that the third body should have played an important role and the evolution of central binary could be accelerated during the interaction and the dynamical evolution.

More information: E-G Zhao et al, Rapid mass transfer between the twin components in the hierarchical triple system GK Cep, *Monthly Notices of the Royal Astronomical Society* (2021). [DOI: 10.1093/mnras/stab1188](#)

Provided by Chinese Academy of Sciences

Citation: Researchers reveal rapid mass transfer between twin components in hierarchical triple system (2021, June 18) retrieved 19 April 2024 from <https://phys.org/news/2021-06-reveal-rapid-mass-twin-components.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.