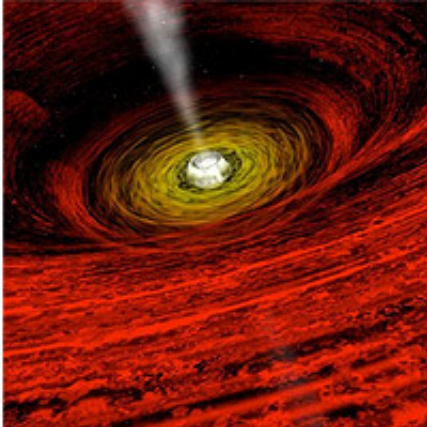


Invading black holes explain cosmic flashes

September 18 2009



(PhysOrg.com) -- Black holes are invading stars, providing a radical explanation to bright flashes in the universe that are one of the biggest mysteries in astronomy today.

The flashes, known as gamma ray bursts, are beams of high energy radiation - similar to the radiation emitted by explosions of nuclear weapons - produced by jets of plasma from massive dying [stars](#).

The orthodox model for this cosmic jet engine involves plasma being heated by [neutrinos](#) in a disk of matter that forms around a black hole, which is created when a star collapses.

But mathematicians at the University of Leeds have come up with a

different explanation: the jets come directly from [black holes](#), which can dive into nearby massive stars and devour them.

Their theory is based on recent observations by the Swift satellite which indicates that the central jet engine operates for up to 10,000 seconds - much longer than the neutrino model can explain.

Mathematicians believe that this is evidence for an electromagnetic origin of the jets, i.e. that the jets come directly from a rotating black hole, and that it is the magnetic stresses caused by the rotation that focus and accelerate the jet's flow.

For the mechanism to operate the collapsing star has to be rotating extremely rapidly. This increases the duration of the star's collapse as the gravity is opposed by strong centrifugal forces.

One particularly peculiar way of creating the right conditions involves not a collapsing star but a star invaded by its black hole companion in a binary system. The black hole acts like a parasite, diving into the normal star, spinning it with gravitational forces on its way to the star's centre, and finally eating it from the inside.

"The neutrino model cannot explain very long gamma ray bursts and the Swift observations, as the rate at which the black hole swallows the star becomes rather low quite quickly, rendering the neutrino mechanism inefficient, but the magnetic mechanism can," says Professor Komissarov from the School of Mathematics at the University of Leeds.

"Our knowledge of the amount of the matter that collects around the black hole and the rotation speed of the star allow us to calculate how long these long flashes will be - and the results correlate very well with observations from satellites," he adds.

More information: The research is published in the *Monthly Notices of the Royal Astronomical Society*.

Source: University of Leeds ([news](#) : [web](#))

Citation: Invading black holes explain cosmic flashes (2009, September 18) retrieved 18 April 2024 from <https://phys.org/news/2009-09-invading-black-holes-cosmic.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.