

PRESS RELEASE - PARIS - 23 APRIL 2020

New discovery: first asteroid population from outside our solar system

Ka`epaoka`awela asteroid¹ surprised the world in 2018: it was the first object in the solar system that was demonstrated to be of extrasolar origin. But now those who discovered it have announced that it is not alone. Published in *MNRAS* on 23 April 2020, work by Fathi Namouni, a CNRS researcher in the Laboratoire Lagrange (CNRS/Observatoire de la Côte d'Azur/Université Côte d'Azur), and Helena Morais, researcher at UNESP in Brazil, proves that at least 19 other asteroids orbited another star before joining our system.

Although some interstellar bodies only pass through, others remain and orbit the sun. This is the case for 19 asteroids that gravitate between Jupiter and Neptune. According to the two scientists' calculations, their current orbits and characteristics can only be explained if these objects were not in our solar system at its birth, 4.5 billion years ago.

They are all part of the Centaur family, asteroids located between the gas giants that sometimes behave like comets, and whose orbits computer models cannot explain or predict. Fathi Namouni and Helena Morais chose to develop a very precise simulation of the orbits of these asteroids² that "went back in time" to find their past positions.

The objects in our system already orbited the sun 4.5 billion years ago in the same plane as the dust and gas disc in which they were formed. However, the 19 Centaurs were not part of this disc. The simulations show not only that these Centaurs orbit the Sun on a plane perpendicular to planetary motion at that time, but also that they were located far from the disc that gave rise to solar system asteroids.

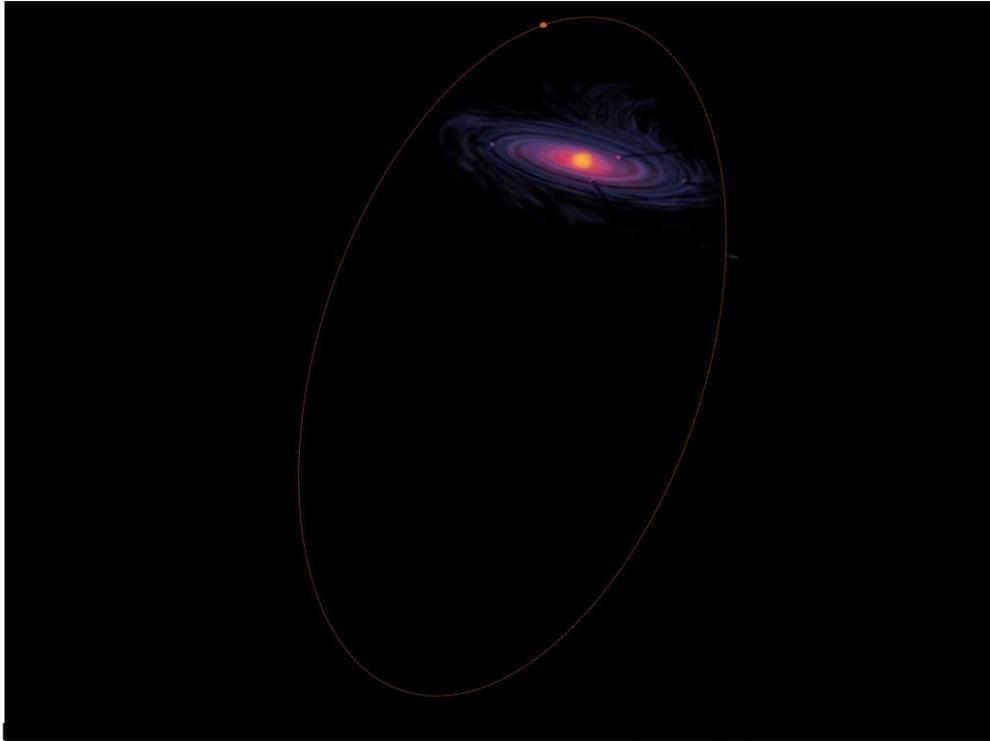
These 19 asteroids were not part of the solar system when it was born. Stellar proximity in the Sun's birth cluster gave rise to strong gravitational interactions that allowed stellar systems to capture asteroids from one another. The scientists now plan to continue this work by looking for specific events when common capture of several extrasolar bodies occurred.

Notes

1- In 2018 the asteroid had the provisional name 2015 BZ509. Read our press release: <http://www.cnrs.fr/fr/decouverte-du-premier-corps-du-systeme-solaire-dorigine-extrasolaire-0?debut=-7&theme1=6>

2- These calculations were made possible thanks to the SIGAMM Mésocentre de Calcul Intensif at the Observatoire de la Côte d'Azur





protoplanetary disc. The asteroid orbits around the sun far from the disc in a plane perpendicular to it.

© *Protoplanetary disc*: NASA

Bibliography

An interstellar origin for high-inclination Centaurs. F. Namouni and M. H. M. Morais. *MNRAS*, 23 April 2020.

Contacts

CNRS researcher | Fathi Namouni | fathi.namouni@oca.eu

CNRS press officer | François Maginiot | francois.maginiot@cnrs.fr

