

When Galaxies Collide, our Solar System Will Go for a Ride (Forwarded)

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Cambridge, MA — For decades, astronomers have known that the Milky Way galaxy is on a collision course with the neighboring Andromeda spiral galaxy. What was unknown until now: the fate of the Sun and our solar system in that melee. New calculations by theorists T.J. Cox and Avi Loeb (Harvard-Smithsonian Center for Astrophysics) show that the Sun and its planets will be exiled to the outer reaches of the merged galaxy. Moreover, the collision will take place within the Sun's lifetime, before it becomes a burned-out white dwarf star.

"You could say that we're being sent to a retirement home in the country," said Cox. "We're living in the suburbs of the Milky Way right now, but we're likely to move much farther out after the coming cosmic smash-up."

Computer simulations by Cox and Loeb show that big changes are coming in only 2 billion years, when the Milky Way and Andromeda experience their first close pass. A viewer on Earth would see the night sky evolve from a strip of stars (the Milky Way seen edge-on) to a muddled mess as Andromeda's powerful pull flings stars from their stately orbits.

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At that time, the Sun will still be a hydrogen-burning main-sequence star, although it will have brightened and heated enough to boil the oceans from the Earth.

The two galaxies will swing around each other a couple of times, intermingling their stars as gravitational forces stir them together.

About 5 billion years from now, Andromeda and the Milky Way will have completely combined to form a single, football-shaped elliptical galaxy. The Sun will be an aging star nearing the red giant phase and the end of its lifetime. It and the solar system likely will reside 100,000 light-years from the center of the new galaxy -- 4 times further than the current 25,000 light-year distance.

Any descendants of humans observing the future sky will experience a very different view. The strip of Milky Way will be gone, replaced by a huge bulge of billions of stars. Future scientists may look back on today's research as the first prediction of things to come.

"This is the first paper in my publication record that has a chance of being cited five billion years from now," joked Loeb.

The paper describing this research has been submitted for publication to the Monthly Notices of the Royal Astronomical Society. It is available online at

<http://www.cfa.harvard.edu/~tcox/localgroup/>

and

<http://arxiv.org/abs/0705.1170>

Headquartered in Cambridge, Mass., the Harvard-Smithsonian Center for Astrophysics (CfA) is a joint collaboration between the Smithsonian Astrophysical Observatory and the Harvard College Observatory. CfA scientists, organized into six research divisions, study the origin, evolution and ultimate fate of the universe.