

# Supernovae not what they used to be

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Exploding stars that light the way for research on dark energy aren't as powerful or bright, on average, as they once were, says a new study by University of Toronto astronomers.

The study, which compared supernovae in nearby galaxies with those that exploded up to nine billion light years away in the distant universe, found the distant supernovae were an average of 12 per cent brighter. The distant supernovae were brighter because they were younger, the study found.

Since uniformly bright exploding stars help astronomers study the nature of dark energy – an unknown type of energy that causes the universe to accelerate its expansion – the team's findings suggest it could become more difficult to study dark energy in the future. Astronomers can correct for supernovae of varying brightness, but it will prove challenging.

“The findings do not call into question that the universe is accelerating but the evolving mix of supernovae could limit future attempts to determine the nature of dark energy,” said Andrew Howell, lead author of the study and post-doctoral researcher. The paper appears in the Sept. 20 issue of the *Astrophysical Journal Letters*.

“You can think of supernovae as light bulbs,” he said. “We found that the early universe supernovae had a higher wattage, but as long as we can figure out the wattage, we should be able to correct for that. Learning more about dark energy is going to take very precise corrections though

and we aren't sure how well we can do that yet.”

The paper, Predicted and Observed Evolution in the Mean Properties of Type Ia Supernovae with Redshift, was co-authored by post-doctoral researchers Mark Sullivan and Alex Conley and Professor Ray Carlberg of astronomy and astrophysics.

Source: University of Toronto

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