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# New view: Dust blocks brightness of universe

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By C.Hawk (JHU), B.Savage (U. Wisconsin), N.A.Sharp (NOAO)/WYN/NOAO/NSF

Dust clogs the disks of spiral galaxies, obscuring their light. When galaxies are edge-on, such as NGC 891 shown here, dust is especially prominent.

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SPACE

By Clara Moskowitz, SPACE.com

The universe is twice as bright as it appears, astronomers now suggest.

The light bulb went on when they calculated that dust blocks about the half the light emitted from stars and galaxies.

Astronomers have known about interstellar dust for a while, but they haven't been able to quantify just how much light it blocks. Now a team of researchers has studied a catalogue of galaxies and found that dust shields roughly 50% of their light.

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"I was shocked by the sheer scale of the effect," said Simon Driver, an astronomer from the University of St. Andrews in Scotland who led the study. "Most people just kind of said, 'We suspect dust is a minor problem.' I spent much of my career working on deep images from Hubble and I've always ignored dust almost entirely."

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The result will likely cause many astronomers to revise their calculations of the intrinsic brightness of many celestial objects, Driver said. Until now, many astronomers thought stars and galaxies were really about 10% brighter in optical light than they appeared because of dust. If the new findings are true, it turns out that objects in the sky are about twice as bright than they appear.

"This is a strong, clear-cut result," Driver told SPACE.com. "We've really got to take dust seriously and we've got to make large adjustments to our magnitude calculations." (A magnitude scale is used to define brightness of celestial objects.)

The astronomers detailed their findings in the May 10 issue of the *Astrophysical Journal Letters*.

Interstellar dust isn't exactly the same thing that coats our bookshelves and covers our TV screens. It's made up of lumps of carbon and silicates that form dust grains only a few thousandths of a millimeter long. It hangs out in galaxies, but generally steers clear of the space between them.

To calculate dust's effect, the researchers analyzed data from the Millennium Galaxy Catalogue, a collection of images of 10,000 galaxies compiled by Driver and his team using the Isaac Newton Telescope on La Palma and others.

They counted the number of galaxies in the catalogue that were directly facing us, and compared it to the number that were tilted 90 degrees away from us. Without dust, they reasoned, they should see just about equal numbers of galaxies in each orientation. But with dust, they would likely find fewer edge-on than face-on galaxies. Since dust lies in the disks of spiral galaxies, and not the dense central bulge, when we view galaxies from the side we are looking through thicker layers of dust, so we should see less light. In fact, the researchers counted about 70% fewer edge-on galaxies than face-on galaxies.

They used this discrepancy to quantify dust's effect by combing their counts with a model of dust distribution in galaxies developed by Cristina Popescu of the University of Central Lancashire and Richard Tufts of the Max Planck Institute for Nuclear Physics.

"It's been a revelation to many people in the community, but there are small groups that had a suspicion this was coming," Driver said. "I wouldn't be surprised if there's a refinement of the result, but I think the result is basically here to stay."

The research was funded by the Science and Technology Facilities Council, the Australian Research Council, the Max-Planck Society and a Livesey award from the University of Central Lancashire.

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**fiddler8** wrote: 3d 7h ago

I am waiting with bated breath to hear the consequences of this discovery for the theoretical assertions about dark matter and dark energy. Consider:

One link in the chain of measurements used to determine galactic distances is the inverse square change in light intensity (see post by The Mick). If distant galaxies (or their variable stars and supernovae) appear to dim, we have over-estimated their distances, and under-estimated their visible-matter masses. By over-estimating their distances, we have also over-estimated their sizes, and over-estimated the total quantity of matter (visible plus dark) needed to hold them together.

Fascinating...


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**moshedemartian** wrote: 3d 9h ago

Time to break out the cosmic vacuum cleaners. :)


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**The Mick** wrote: 3d 13h ago

When I taught optics and wanted to get across the fact that as light spreads out from a source, it's brightness falls off proportional to the square of the distance it travels, I would point out to students that every part of our the sky was occupied by some of the billions of stars from our galaxy and billions of other galaxies shining on us and asked why the night sky wasn't totally lit up. Now some wit will answer "interstellar dust".

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**newmexicocraig** wrote: 4d 9h ago

Heck, I've got the Earth atmosphere's own clouds blocking my telescope view of the universe tonight!

I only =wish= interstellar dust was my viewing problem.

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**maddaddy** wrote: 4d 16h ago

cosmic dust is probably not matter, i.e. not charged with electricity surface charge. matter is charged with electricity. we are matter, electrical entities.

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