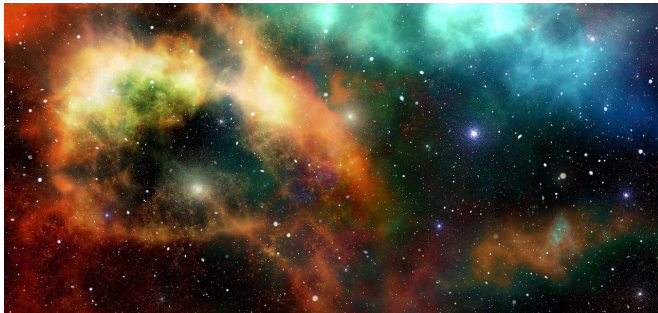


Two separate teams of astronomers find evidence of missing Baryonic matter

10 October 2017, by Bob Yirka



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(Phys.org)—Two teams working independently have found evidence of the existence of missing Baryonic matter—particles that link galaxies together. One team was made of members from the Institute of Space Astrophysics, the other was based out of the University of Edinburgh. Both teams have uploaded a paper describing their work to the *arXiv* preprint server and both are claiming their findings solve the mystery of where so much of the normal matter—protons, neutrons and electrons—in the universe has been hiding.

Once scientists came up with the Big Bang Theory, a problem immediately arose—after calculating how much normal matter should exist in the universe at this point in time, they found approximately 50 percent of it is missing. Since then, scientists have worked on theories to explain where all that matter was hiding—the prevailing theory suggests that it exists as strands of Baryonic matter floating in the space between galaxies and cannot be seen with conventional instruments—this was the theory both teams in this new effort tested.

To get around the problem of not being able to see the Baryonic matter directly, the researchers considered a phenomenon called the Sunyaev-Zel'dovich effect in which light left over from the

Big Bang scatters as it passes through hot gas—it should be measurable in the [cosmic microwave background](#). Both teams used data from the Planck Collaboration [presented](#) two years ago to create a map of where Baryonic matter strands might exist. Each selected a pair of galaxies to study, focusing on the space between them. Then, they stacked data from between the two galaxies to magnify data believed to be from Baryonic matter.

Both teams repeated this process for multiple pairs of galaxies to show that their readings were consistent across multiple test sites—one team tested a million pairs, the other 260,000. Both report finding evidence of the theorized filaments between the galaxies. One group found them to be three times as dense as the mean of observable matter, the other group six times—a difference that was expected, the groups explain, due to differences in distances from the [galaxies](#) that were studied.

Both groups claim their findings prove the existence of missing Baryonic matter and thus solve the mystery of where all the unmeasurable [matter](#) has been hiding.

More information: A Search for Warm/Hot Gas Filaments Between Pairs of SDSS Luminous Red Galaxies, arXiv:1709.05024 [astro-ph.CO] arxiv.org/abs/1709.05024

Missing baryons in the cosmic web revealed by the Sunyaev-Zel'dovich effect, arXiv:1709.10378 [astro-ph.CO] arxiv.org/abs/1709.10378v1

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