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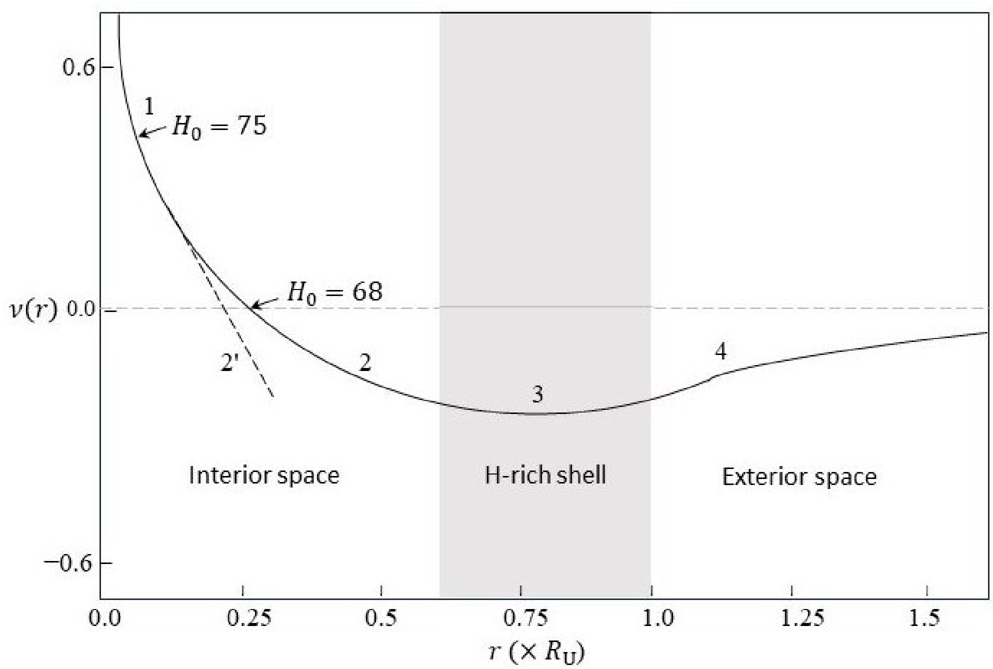
Do we live in a shell universe?

September 12 2024, by Matthew R. Edwards



Ni shell universe. The shell consists of galaxies and clouds of hydrogen or a hydrogen/dark matter mix. The negative derivative of ν(r) in the interior space indicates a repulsive field directed away from the origin. Key points: 1—Milky Way; 2, 2′—galaxy at its true distance and underestimated distance, respectively; 3—hydrogen-rich galaxies and gas clouds; 4—possible matter in the exterior space. Credit: Adapted from: deLyra, J.L.; de A Orselli, R.; Carneiro, C.E.I. Exact solution of the Einstein field equations for a spherical shell of fluid matter. Gen. Relativ. Gravit. 2023, 55, 68.

The universe might not be as you think. Until recently, the Lambda Cold

Dark Matter model seemed to have a lock on cosmology. Like earlier Big Bang models, it supposes that the universe expanded from a hyperdense state and that the expansion of spacetime causes the Hubble redshift of light. Dark matter and dark energy are added to overcome problems relating to the cosmic microwave background and the unexpected dimness of remote supernovae.

But now, cracks have started to appear in the model. The JWST revealed that mature galaxies formed far too soon after the universe supposedly began. Other anomalies, such as the so-called "Hubble tension" and an apparent late entry of dark energy in the universe, have led to the notion that a crisis in cosmology could be at hand.

While hopes of tweaking the LCDM model to solve these problems remain high, new findings in general relativity point in a dramatically different direction. In 2011, Jun Ni discovered a new class of solutions for the Einstein field equations of neutron stars. These solutions were completed and generalized by Lubos Neslušan, Jorge deLyra and others.

The Ni-Neslušan-deLyra solutions atypically feature a shell-like configuration and a central matter void. A repulsive gravitational field centered on the origin causes matter inside the shell cavity to be attracted towards the shell. This also induces a gravitational redshift in light moving from the shell towards the center and a blueshift in light moving back towards the shell.

This runs counter to the standard picture in general relativity, which features a flat, Minkowski spacetime inside a spherical shell of matter.

All the tensions of the LCDM model could be resolved if the matter of the observable universe—in both early and late times—were concentrated in a thick Ni shell, with the Milky Way lying close to the center within the KBC Void.

While this positioning is at odds with the cosmological principle, anomalies in quasar counts and other observational "dipoles" are not inconsistent with it. In a Ni shell universe, the Hubble redshift seen in light from distant stars would arise at least partly from the gravitational redshift induced by the outer shell.

The Hubble tension would then be explained with the changing derivative of $\nu(r)$, which causes the Hubble constant to steadily decrease as one moves from the center of the universe towards the shell. The dark energy of the LCDM model would no longer be needed.

Supernova dimming would instead result from the Ni redshift causing objects to appear further away from us than they really are. In like-fashion to Rajendra Gupta's "CCC + TL" model, the Ni solutions could be blended with the LCDM model in a hybrid approach.

And yet the Ni approach can go much deeper than this. With recent findings of unexpectedly high mass density at high redshifts, the universe may have so much mass that it becomes a black hole.

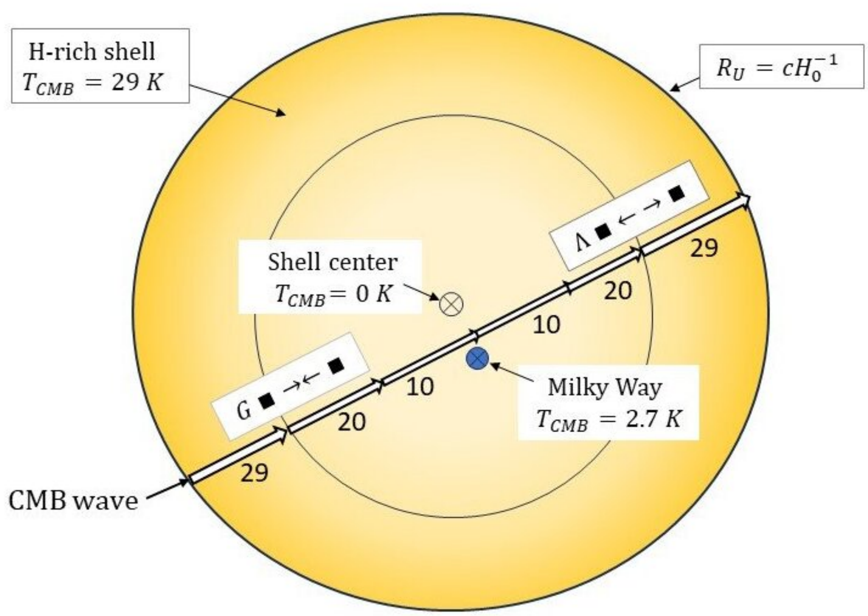
In this case, a whole new cosmology could be in play. Its only prerequisite is that spacetime consists of photonic filaments interconnecting all masses, as I have proposed in my gravity and geophysics work. These filaments could consist of overlapping photon pairs, as described by Arto Annila and colleagues.

As a black hole universe, all radiation would be trapped inside the interior cosmic space that we see. The CMB would have originated as gravitational energy released and then trapped during the formation of the shell. Over time, the CMB could have given rise to a cosmological cycle for gravity and a repulsive force analogous to Einstein's cosmological constant Λ.

Gravity would result from absorption of CMB photon energy in spacetime filaments, pulling masses together, while the reverse Λ process returns absorbed filament energy to photons, pushing masses apart. This is in keeping with the Ni solutions, since gravity and Λ would be driven by inwardly moving, redshifted waves and outwardly moving, blue shifted waves respectively.

Concerning the Λ process, I (Matthew R. Edwards) had earlier found much evidence consistent with it in the bolometric luminosities of neutron stars, white dwarfs and supermassive black holes. On this basis, I even proposed a new theory of plate tectonics, in which heat emitted by the core powers deep mantle plumes and a slow expansion of the upper mantle.

Our work is published in the journal *Astronomy*.



Ni black hole universe with CMB cycle for gravity and Λ. A CMB wave moving inwardly from the shell is redshifted. The lost energy is transferred to spacetime filaments, causing masses to be attracted in gravity (▮→←▮). The weakened photons are then blue shifted by the return transfer of energy from spacetime filaments as they head back toward the shell. This causes masses to be pushed apart, generating Λ (▮← →▮). Credit: Matthew Edwards

The problems of so-called "tired light" cosmology models, moreover, would not arise. Supernova time dilation would result from the gravitational redshift of the shell. The CMB would retain its characteristic blackbody spectrum at all points in space through repartitioning of photon energy with spacetime photonic energy.

A problem does arise in that stars closer to the center of the universe than us should exhibit a systematic blueshift, which has never been seen. However, this can also be explained with the repartitioning of starlight energy and spacetime energy.

A Ni shell black hole universe is also testable. The maximum CMB temperature in it would only be about 29 K within the shell, while the lowest point, near the center, could be near 0 K. The local CMB temperature of 2.73 K in this case could reflect an offset of the Milky Way relative to the origin. Probing CMB temperatures near our position thus affords a clear and simple test of the model.

The structures of black holes can be reverse engineered from a Ni shell black hole universe. If all black holes have analogous shell structures and gravity/Λ cycles, they should all generate the same "maximum luminosity" as the universe—$c^5/4G$—regardless of the black hole mass.

A small black hole must work harder against gravity to keep from collapsing. In rapidly rotating black holes, the Ni shell would collapse to a torus, as possibly reflected in the dramatic photos of supermassive black holes.

At a deeper level, the gravity/Λ mechanism might be seen as a kind of quantum overlay of the Ni solutions, a possible step towards reconciliation of the quantum gravity and general relativity perspectives.

Cosmologists will not be quick to endorse a shell universe. There is still much heavy lifting still to do, for instance, in matching the Ni solutions to the observed universe. Dark matter and dark energy will not lightly be cast aside. But if I am right, the universe is not as you may always have thought.

Rather than expanding endlessly and fading out in a "heat death," it would be a secure and possibly even permanent home—not just for humanity but for life everywhere.

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More information: Matthew R. Edwards, Shell Universe: Reducing Cosmological Tensions with the Relativistic Ni Solutions, *Astronomy* (2024). DOI: 10.3390/astronomy3030014

Matthew Edwards works at the University of Toronto Library. For many years he has written on diverse theoretical topics, including the origin of life, gravitation physics, geophysics and cosmology. In 2002, he edited the book "Pushing Gravity: New Perspectives on Le Sage's Theory of Gravitation." Recently he has proposed methods for surviving future mass extinctions using frozen embryos and gametes.