

To Go in the Dark

Earlier this summer, the world was amazed by the images of our universe provided by the James Webb Space Telescope. The stunning pictures of galaxies and nebulae showed us a glimpse into parts of our universe previously unknown and unseen. Not only are these areas of space so far away that they've never before been captured by our instruments, but because of their extraordinary distance... thirteen point six BILLION light years away... they show us an insight into not only space, but time. Being thirteen point six billion light years away means that the light from the contents of these images takes that much time to reach us. The pictures that have captured our minds and our hearts show us light from thirteen billion, six hundred million years ago, less than a billion years after the very creation of the universe.

During Rosh Hashanah, as we celebrate the beginning of a new year, I often find myself thinking about other notable beginnings, and none fascinate me quite so much as the beginning of the universe itself. This tiny but beautiful insight into the light of our universe in its "early days," of maybe just a couple of hundred million years after its birth, fills me with amazement that feels all the more at home in these *Yamim Nora'im*, these days of awe of our Holidays. In fact, our Rosh Hashanah liturgy tells us that "*hayom harat olam:*" this is the day the world was created. We are not just celebrating the beginning of a new year, but the very creation of the universe *b'reishit*, in the ultimate beginning. With these new images from space, we are watching astonishing triumphs of science in our times, exploring parts of our massive universe that we could barely have imagined a hundred years ago. We are learning things about our past, present, and future that provide us amazing insights into *harat olam*, into the past and continuing creation of the world. And yet, perhaps what fascinates me the most is that even with these incredible

feats of science, with every amazing thing we have learned... we still don't even understand four percent of the universe in which we live.

Four percent. This number, an estimate generally agreed upon by scientists in the field, astounds me, and to be perfectly frank, it's a generous rounding-up. For some this is a terrifying thing. This summer I met with renowned particle physicist Pekka Sinerva, one of the primary figures in the discovery of the Higgs Boson particle and the Truth quark. When asked how he felt about the idea that we have ninety six percent of the universe still to go, he answered that he felt... humiliated. This brilliant man, a scientist whose achievements will continue to shape the understanding of our universe for ages to come, when presented with this daunting number, is faced with a feeling also so crucial to this time of year in our Jewish calendar: humility. There is so much work left to do, so much left to be learned. We present ourselves before our community, our sense of the Divine, and maybe most challengingly, ourselves, looking for forgiveness for and freedom from the ways we have come up short. It is our job to lean in and look deeper into these dark places within ourselves, and not shy away.

Like us, our universe is full of darkness in many ways. Cosmologists and astronomers for centuries sought to understand the nature, birth, and behavior of the universe through what they could see. The more we could see— the greater our telescopes and light-capturing implements— the more we could glean. But even as early as the 17th century, with Sir Isaac Newton, we were realizing that there may be things that we just couldn't see at work. Newton, having given voice to the understanding that matter attracts matter through gravity, needed to address the issue that the universe itself was full of matter creating gravitational pulls, and yet, miraculously, was not collapsing in on itself. What could be keeping the universe from implosion, according to Newton? Of course: GD.

Now, I'm never one to say that anything is NOT GD, but I admit, I want some more science. In fact, Newton's explanation was that the universe was static, full of immovable stars, and that GD had, in GD's infinite wisdom and foresight, placed the stars "at immense distances from one another" "so that the systems of the fixed stars will not fall upon one another as a result of their gravity." This static understanding of the universe as fixed systems of stars was soon disproven in favor of an unfixed model, but the issue of the gravitational pull of all of the pieces within it not collapsing remained. In 1917, none other than Albert Einstein gave us a bit more of a scientific explanation. In his attempt to apply his theory of general relativity to cosmology, he ran into the same roadblock: why isn't the universe collapsing in on itself? Einstein's solution wasn't much more satisfying than Newton's: he created a stand-in symbol, the Greek letter "lambda," to represent this unknown variable.

In 1933, astrophysicist Fritz Zwicky was examining some of the galaxies within what was known as the Coma Cluster. His conclusion, upon calculating the expected masses according to their speed as opposed to their actual apparent masses, was that their density needed to be four hundred times what it could be according to their appearance. Without a better option on the table, scientists would have to accept the "astonishing conclusion" that "the density of luminous matter in Coma must be minuscule compared with the density of some sort of *dunkle*—or dark—matter."

Dark matter. Lamda. GD. These unknown variables that we just couldn't seem to measure, but that hold our very universe together—or, more specifically, create the spaces between to keep the universe intact. We have somewhat of a better idea of how to measure or identify this dark matter now, thanks to data discovered by astronomer Vera Rubin. In "The Four Percent Universe: Dark Matter, Dark Energy, and the Race To Discover the Rest of Reality,"

author Richard Panek elegantly describes the moment that Rubin, along with several other astronomers at Carnegie Institution's Department of Terrestrial Magnetism, realized what they were looking for as they viewed an image of the Andromeda galaxy, our nearest galactic neighbor:

Here was this beautiful swirl of billions of stars— the kind of majestic image that had captivated astronomers for more than half a century— though that's not where they were looking. They were looking beyond it. Beyond the bulge, beyond the stars, beyond the gas of the spiral arms— beyond all of the light, whether optical or radio. And even though there was nothing to see there, the small group of astronomers understood that they were nonetheless looking at the Andromeda galaxy.

It was what it wasn't.

It was what it wasn't. It was *l'eila*, as we say in our kaddish, beyond: beyond light, beyond what we can see or measure except in the way it affects the light around it. We could only measure the way that light bends and warps around this mysterious darkness that makes up so much of our universe.

The Webb telescope images are able to capture stunning images of the light of distant galaxies and stars. We learn so much from this light; by seeing the ways the colors shift from blue to red, we can identify the velocity of the galaxies themselves, as they continue the accelerating expansion of the universe. But what can we learn from the dark? What can we learn from the spaces in between, the things that don't come to light, but still orient everything around them? I am reminded by the mystery of dark matter of our Torah scrolls. If you have ever had to roll your way through a sefer Torah to find a particular verse, you may have realized it is much

more effective to look not for the words themselves, but for the distinctive spaces in between that can help identify different sections. Rav Abraham Isaac Kook tells us: “When we think about a Torah scroll, we usually only consider the letters themselves, written in black ink. Yet, the Talmud (Menachot 29a) rules that every letter in a Torah scroll must be completely surrounded by parchment. This requirement is called *mukaf gevil*. In other words, the white parchment around the letters is an integral part of the Torah; without it, the Torah scroll is disqualified. In fact, the white space is a higher form of Torah. It is analogous to the white fire of Sinai — a sublime, hidden Torah that cannot be read in the usual manner.” A hidden, necessary, orienting force surrounding that which we can see and read and understand. For me, this reads like dark matter. It reads like Lambda. And it reads, of course, like GD.

In my own preparation for the Holidays, I’ve been thinking a lot about what it means to look into the dark. A friend recently introduced me to the poem by Wendell Berry, “To Know the Dark:”

To go in the dark with a light is to know the light

To know the dark, go dark; go without sight

And find that the dark, too, blooms and sings

And is traveled by dark feet and dark wings.

When we look back at our year in these upcoming days of repentance, how can we let ourselves look deep into the dark spaces between? Do we need to look with a light, or can we let ourselves embrace our whole selves, light and dark, understood and still mysterious? What might bloom and sing in ourselves, in our relationships with one another, or perhaps in our relationship to our sense of what is Divine, if we accept that the things we cannot fully see and understand are also Divinely created? As our *Yotzeir Or* prayer in our morning services reminds us, “*Baruch Atah,*

Adonai, Eloheinu, Melech HaOlam, yotzeir or uvorei choshech—” blessed are You, Adonai, our GD, Sovereign of the Universe, who forms light AND creates darkness. In these *yamim nora'im*, these Days of Awe that begin today, I challenge us to take some time to go dark: to explore that which has been unseen within our own needs, within our relationships, within our spirituality— that which we can’t quite understand, but which is deserving of our attention nonetheless; to embrace the quiet, the mystery, the still small voice whispering inside, even if all we hear is the hum of the cosmic microwave background radiation, the echoes of the Big Bang, which sing the song of the universe’s creation. For if the most brilliant scientists can take on the humility to accept that they understand barely four percent of the universe... how much more could we have to understand about ourselves?

May these Days of Repentance, these Days of Awe, bring us time to both rejoice with the light and go into the dark, and find the beauty, sweetness, and holiness in both, finding all that can bloom and sing. Once again, I invite us to take in the the words of Wendell Berry, as set by Katie Hicks, and see what we might find when we go in the dark:

[Sung]

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And find that the dark, too, blooms and sings

And is traveled by dark feet and dark wings.

Shanah tovah u'metukah— may it be a sweet year in all its light and darkness!

Bibliography

Berry, W. (2011). To Know the Dark. In *Farming: A hand book*. Counterpoint.

Kook, A. I., & Morrison, C. (2015). In *Gold from the Land of Israel: A New Light on the Weekly Torah Portion from the Writings of Rabbi Abraham Isaac HaKohen Kook* (pp. 179–181). Urim Publications.

Norén, L. (1970, January 1). *References to darkness : A study of darkness in a selection of poems by Wendell Berry*. References to Darkness : A study of darkness in a selection of poems by Wendell Berry. Retrieved from <https://lup.lub.lu.se/student-papers/search/publication/8971664>

Panek, R. (2012). *The 4 Percent Universe: Dark Matter, Dark Energy, and the Race to Discover the Rest of Reality*. Oneworld Publications.