THE VIEW from the CENTER of the UNIVERSE
In this new scientific picture, we are cosmically central, and we live at a pivotal time. Cosmology is going through a scientific revolution that is creating humanity’s first picture of the history of the universe as a whole that might actually be true.

In this new scientific picture, we are cosmically central, and we live at a pivotal time.

Knowing this helps us redefine Tikkun Olam for our pivotal time.
The Modern Scientific Cosmos

Our Cosmic Address

VOYAGE TO THE VIRGÓ CLUSTER

Sloan Digital Sky Survey

each dot is a big galaxy
VOYAGE TO THE VIRGO CLUSTER
VOYAGE TO THE VIRGO CLUSTER
Nearby Galaxies to 2 billion light years

Luminous Red Galaxies to 6 billion light years

Quasars to 28 billion light years

Sloan Digital Sky Survey
GALAXIES MAPPED BY THE SLOAN SURVEY

Data Release 4:
565,715 Galaxies & 76,403 Quasars
Cosmic Spheres of Time

When we look out in space we look back in time...

- Cosmic Horizon (The Big Bang)
- Cosmic Background Radiation
- Cosmic Dark Ages
- Bright Galaxies Form
- Big Galaxies Form
- Earth Forms
- Today

Cosmic Spheres of Time
The Cosmic Uroboros

Planck Length $10^{-33}$ cm

Cosmic Horizon $10^{29}$ cm

Human scale - in the middle
There is a kind of **Goldilocks Principle**: creatures much smaller than we are could not have sufficient complexity for our kind of intelligence, because they would not be made of a large enough number of atoms. But intelligent creatures could not be much larger than we are either, because the speed of nerve impulses – and ultimately the speed of light – becomes a serious internal limitation.

**We are just the right size.**

Joel Primack and Nancy Abrams, *The View From the Center of the Universe*
You might expect that a galaxy-scale intelligence would think at a fabulously deep level. But the number of thoughts that could have traveled back and forth across the vast reaches of our Galaxy in its roughly 10 billion-year lifetime is perhaps the number an average person has every few minutes. The speed of light seems dizzyingly fast to us, but on the scale of the visible universe it is excruciatingly slow and would prevent the parts of any large intelligence from communicating with each other in a reasonable amount of time compared to the age of the universe. Thus **the cosmos can’t have a central brain or government.**

Joel Primack and Nancy Abrams, *The View From the Center of the Universe*
This picture is beautiful but misleading: it only shows the 0.5% of the universe that's visible.

What's the other 99.5%?
Dark Energy 70%

Cold Dark Matter 25%

Invisible Atoms 4%

All Other Atoms 0.01%
  H and He  0.5%

"Imagine that the entire universe is an ocean of dark energy. On that ocean, there sail billions of ghostly ships made of dark matter..."
"Imagine that the entire universe is an ocean of dark energy. On that ocean, there sail billions of ghostly ships made of dark matter..."

Nancy Ellen Abrams
Big Bang Data Agrees with Double Dark Theory!

Double Dark theory

POWER

COBE
1992

WMAP

2003
Latest Big Bang Data Strengthens the Agreement!

POWER

Angular Scale

WMAP 5-YEAR DATA

Released March 5, 2008

Double Dark theory

Ground-based data
Distribution of Matter
Also Agrees with Double Dark Theory!

Max Tegmark
What happened before the Big Bang?

No one knows! But there is a favorite theory...

ETERNAL INFLATION
OUR COSMIC BUBBLE IN ETERNAL INFLATION
THE COSMIC LAS VEGAS

Coins constantly flip. Heads, and the coin is twice the size and there are two of them. Tails, and a coin is half the size.

Consider a coin that has a run of tails. It becomes so small it can pass through the grating on the floor.

At the instant it passes through the floor, it exits eternity.

Time begins with a Big Bang, and it becomes a universe and starts evolving.

The Multiverse
Kabbalistic Version of Medieval Cosmos

God Surrounds the Created World
Joel Primack and Nancy Abrams,
*The View From the Center of the Universe*
Human beings are central to the Universe not in a simple geographic sense but in at least seven different ways all of which follow directly from astronomy and physics.
1) We live at the center of our Cosmic Spheres of Time. The finite speed of light makes this inevitable.

2) We are made of the rarest stuff in the universe: stardust.
3) We live at the middle of all possible sizes – where the possibility of tremendous variety and complexity coming in small packages keeps life interesting. Life of our complexity could bloom nowhere else on the Cosmic Uroboros.
4) We live in a universe that may be a rare bubble of spacetime in the infinite, seething cauldron of the eternal superuniverse. Outside our unique and isolated bubble, which we call the Big Bang, there is neither space nor time as we know it. But here inside there is time for evolution and history, and there is space across which connections can form and structures can develop.
5) We live at the midpoint of cosmic time, which is also the peak moment in the entire evolution of the universe for astronomical observation. The most distant galaxies – which we have just acquired the ability to see – are beginning to disappear over the cosmic horizon now that the expansion of the universe has begun to accelerate.
6) We live at the midpoint in the life of our planet. It formed, along with the sun and the other planets, about four and a half billion years ago. It has about six billion years to go before it is roasted when our sun swells into a red giant star.

Complex life evolved about half a billion years ago, and has about half a billion years to go until the warming sun overheats the earth.

Or billions of years if our descendants move the earth farther from the sun.
7) From the point of view of our species, today is late enough to have evolved to our present abilities while early enough to have a multi-billion year potential future. For the generations alive now, it is late enough that we are sobering up to the scale of our problems, but not so late that we have lost all chance to solve them. This is a very special time that will never come again.

Now is the time for Tikkun Olam!
We Jews have helped to create the new cosmological worldview. Now we should help lead the way in absorbing it into the emerging global culture. Our shared creation story can help unify world culture and help us save our planet.

The Biblical creation stories (except for Job) emphasized the origin and significance of humans. Modern cosmology shows that we humans are central or special in important ways. But we also have unique responsibilities in this special moment.

THINK COSMICALLY
ACT GLOBALLY
EAT LOCALLY
Videos:
Voyage to Virgo Cluster - www.ifa.hawaii.edu/~tully
SDSS galaxies map - astro.uchicago.edu/cosmus

Music:
Nancy Abrams
Nancy Abrams

Symbolic Images of the Cosmos:
Cosmic Uroboros
Cosmic Density Pyramid
Cosmic Spheres of Time

LINKS and IMAGES are at our website
http://ViewfromtheCenter.com

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