

The Magnitude of God

ASA "Science-Faith Synergy: Glorifying God and Serving Humanity"

July 31, 2011

Dr. Pamela Bryant

Howard Payne University

"Wisdom is supreme; therefore get wisdom. Though it cost all you have, get understanding." Proverbs 4:7
NIV, 1984

- The world we call home

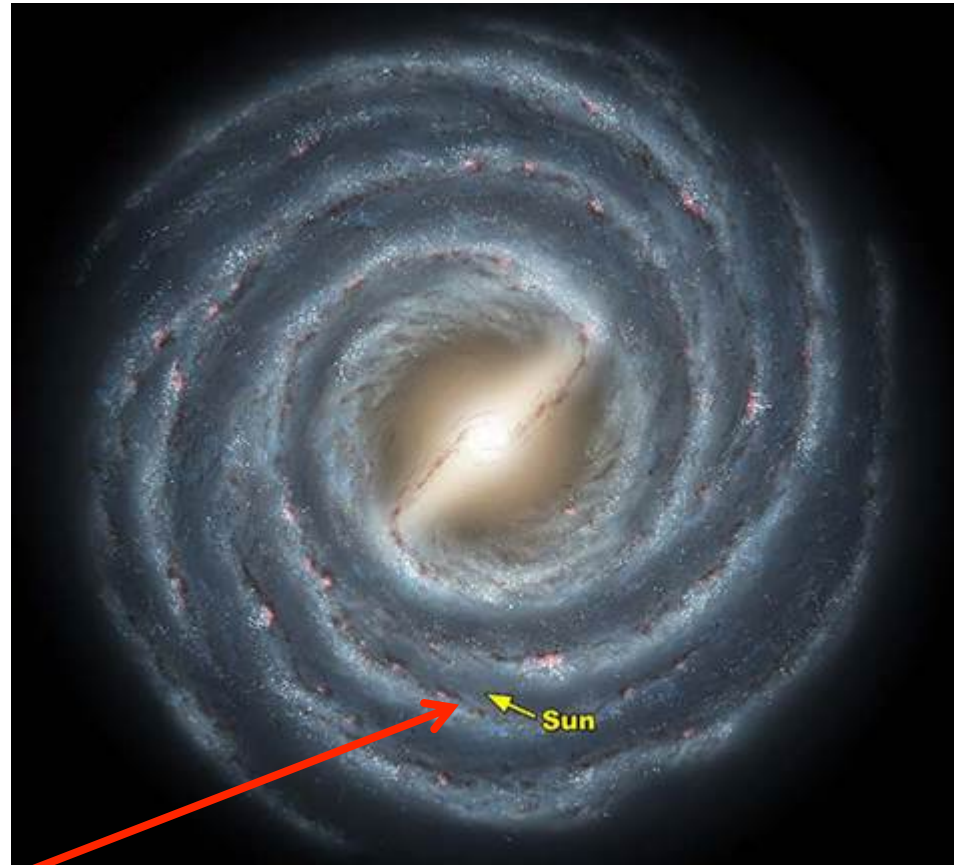


“Lord, through all the generations you have been our home! Before the mountains were born, before you gave birth to the earth and the world, from beginning to end, you are God.”
Psalm 90:1-2 ESV, 2001

- and the galaxy
our Earth calls
home...



A map just in case you get lost.



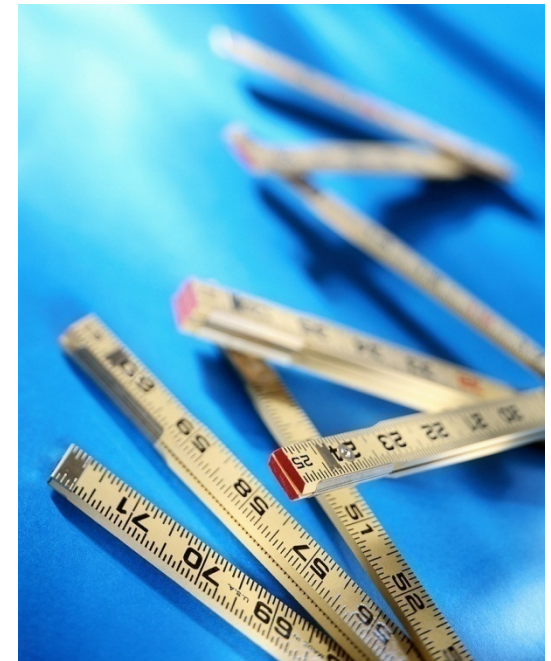
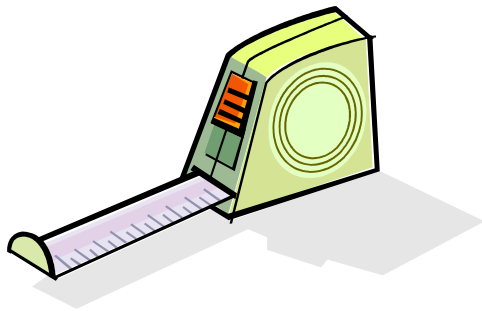
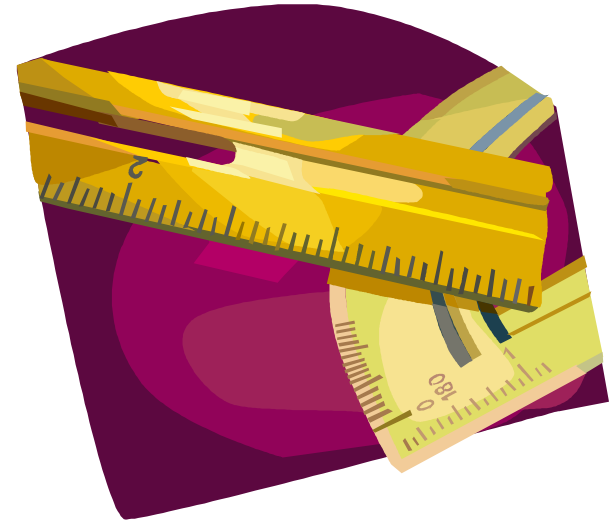
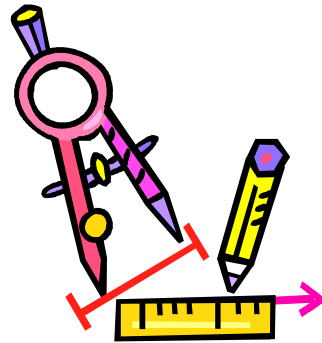
You are here

[http://www.nasa.gov/multimedia/
imagegallery/](http://www.nasa.gov/multimedia/imagegallery/)

NASA Image Gallery
NASA/JPL-Caltech

“Because of our faith, we know that the world was made
at God's command.” Hebrews 11:3a CEV, 1995

- are just some of the things we try to comprehend using measurements.



“Did any of you measure the ocean by yourself or stretch out the sky with your own hands?
Did you put the soil of the earth in a bucket or weigh the hills and mountains on balance scales?” Isaiah 40:12 CEV, 1995

- Within our home, there are things we can see...



“Ears that hear and eyes that see—
the LORD has made them both.” Proverbs 20:12 NIV, 1984

- There are things we can touch and feel...



“People were bringing little children to Jesus to have him touch them, but the disciples rebuked them.” Mark 10:13 NIV, 1984

- yet, we seek to know more so we use light collecting instruments to identify the invisible both large and small...



Telescopes and microscopes

“But all things become visible when they are exposed by the light, for everything that becomes visible is light” Ephesians 5:13 NASB, 1995



<http://www.pptbackgrounds.net/microscope-backgrounds.html>

- and then assign units of size...

yotta	Y	1,000,000,000,000,000,000,000,000	10^{24}
zetta	Z	1,000,000,000,000,000,000,000	10^{21}
exa	E	1,000,000,000,000,000,000	10^{18}
peta	P	1,000,000,000,000,000	10^{15}
tera	T	1,000,000,000,000	10^{12}
giga	G	1,000,000,000	10^9
mega	M	1,000,000	10^6
kilo	k	1,000	10^3
hecto	h	100	10^2
deca	da	10	10^1
no prefix means:		1	10^0
deci	d	0.1	10^{-1}
centi	c	0.01	10^{-2}
milli	m	0.001	10^{-3}
micro	μ	0.000001	10^{-6}
nano	n	0.000000001	10^{-9}
pico	p	0.000000000001	10^{-12}
femto	f	0.0000000000000001	10^{-15}
atto	a	0.000000000000000001	10^{-18}
zepto	z	0.00000000000000000001	10^{-21}
yocto	y	0.0000000000000000000001	10^{-24}

- ...for deeper understanding.

We really don't understand this picture until we know its size.

This is the Oort Cloud

A giant bubble containing the Solar System

Diameter

9.46×10^{15} meters

9,460,000,000,000,000 m



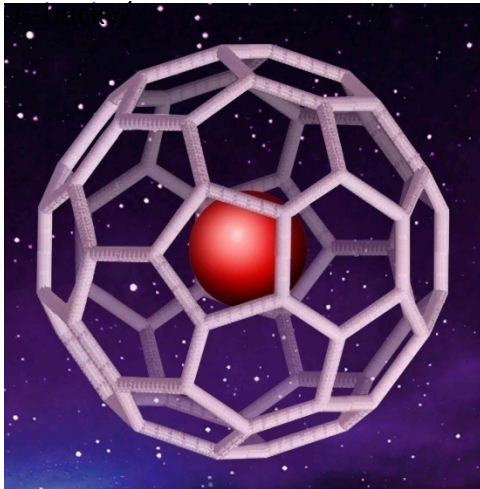
“To whom, then, will you compare God? What image will you compare him to?” Isaiah 40:18 NIV, 1984

- By comparing object measurements we are able to comprehend better their function and place in the universe.

http://www.dailygalaxy.com/my_weblog/2008/08/new-discoveries.html Art John Lomberg

<http://www.faqs.org/photo-dict/phrase/691/soap-bubble.html>

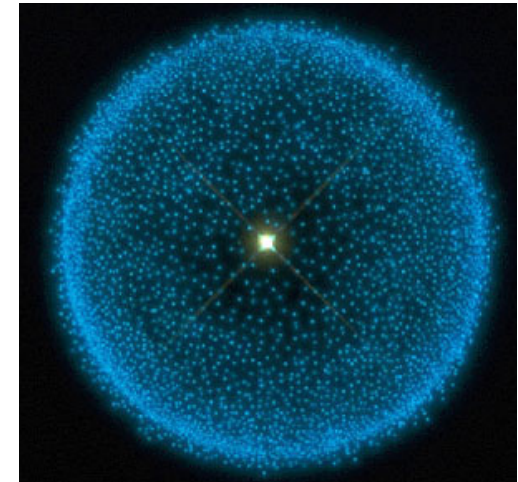
<http://teachoncelearntwice.com.au/google-features-bucky-balls-so-who->



Bucky ball
 10^{-9} m



Bubbles
 10^{-2} m



Oort Cloud
 10^{15} m

“Have you comprehended the vast expanses of the earth?
Tell me, if you know all this.” Job 38:18 NIV, 1984

- Yet, we know that we are surrounded by things seen and unseen.



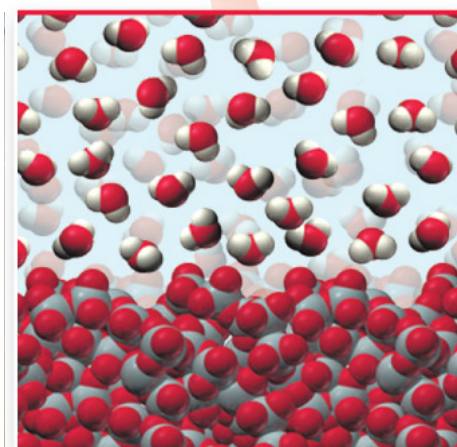
NASA

<http://bss.sfsu.edu/holzman/courses/fall01%20projects/rainbow%20trout.htm>

John White



Tro, Chemistry A Molecular Approach



Wet sand

“... For since the creation of the world His invisible attributes are clearly seen, being understood by the things that are made, even His eternal power and Godhead, so that they are without excuse.” Romans 1:20 NLT, 2007

- In the unseen, a realm may exist which is not yet measurable

Animation Patricia Schwarz -
The Official String Theory Web Site



string-theory-2.jpg oints.wordpress.com

String theory:

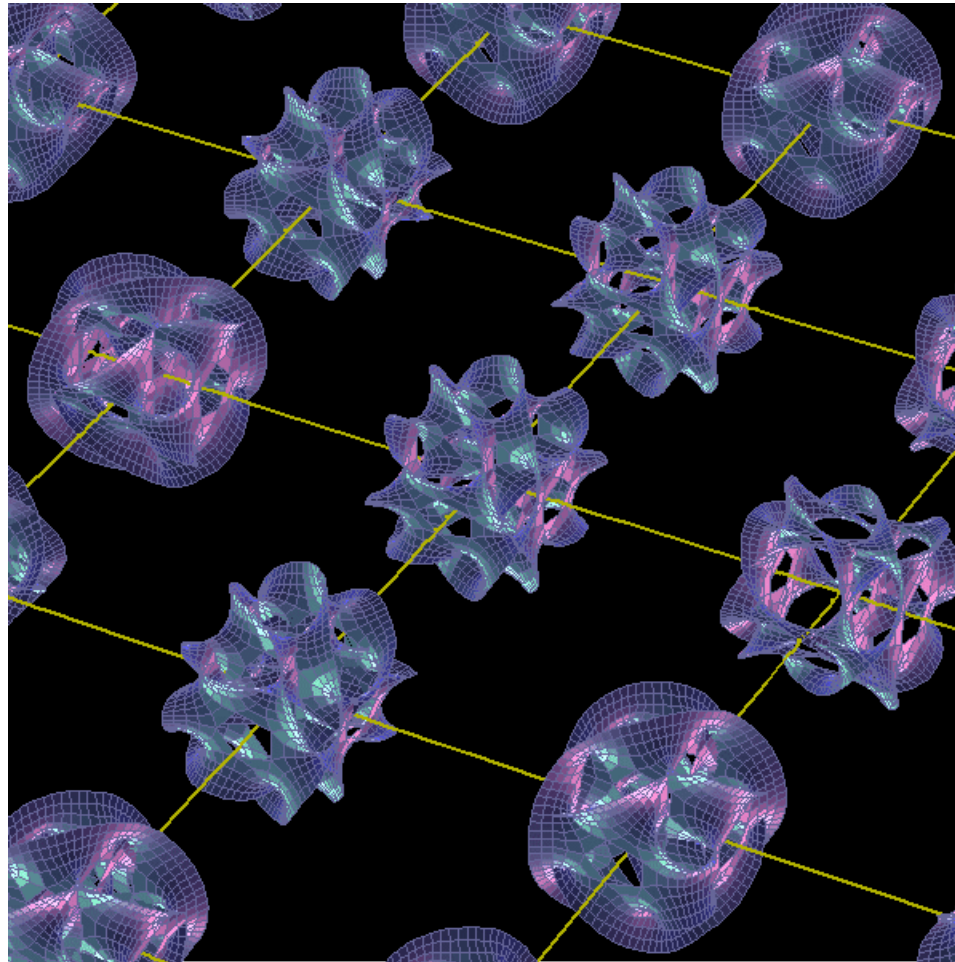
- The basis of all matter are not particles but waves which vibrate, generating different frequencies that correspond to specific elementary particles. (Paul Davies, Brian Greene)

“With an instrument of ten strings, and with the psaltery; With a solemn sound upon the harp.”
Psalm 92:3 NASB 1995

- The different particles and forces in nature are just the strings vibrating in a multitude of different ways ...

Just as a symphonic band generates music, each string participates in the whole symphony, **matter.**

Cosmic Symphony Brian Greene



<http://members.wolfram.com/jeffb/visualization/stringtheory.shtml> Mathematica, Jeff Bryant

"Hear this, you kings! Listen, you rulers! I will sing to the LORD, I will sing; I will make music to the LORD, the God of Israel." Judges 5:3 NIV 1984

This proposed realm includes the Quark. Murray Gell-Mann and George Zweig

Though existence can be demonstrated, the size of the quark is relatively unknown

Protons and neutrons contain hadrons of quarks

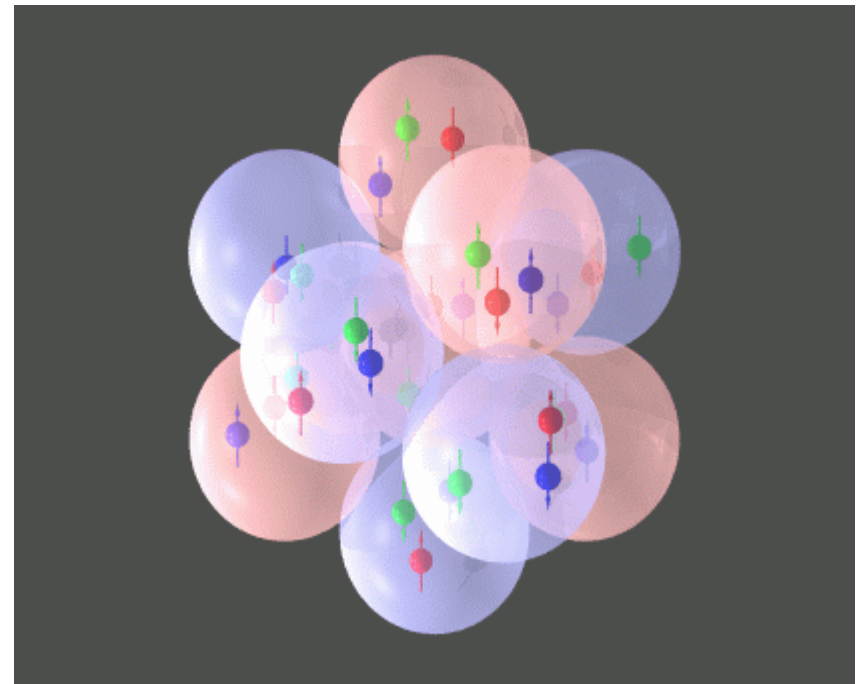
Femtometer scale 10^{-15} m

Proton: up up down ($\uparrow\uparrow\downarrow$)

neutron: up down down ($\uparrow\downarrow\downarrow$)

“For the earth is the Lord’s and all it contains” 1 Corinthians 10:26
NASB, 1995

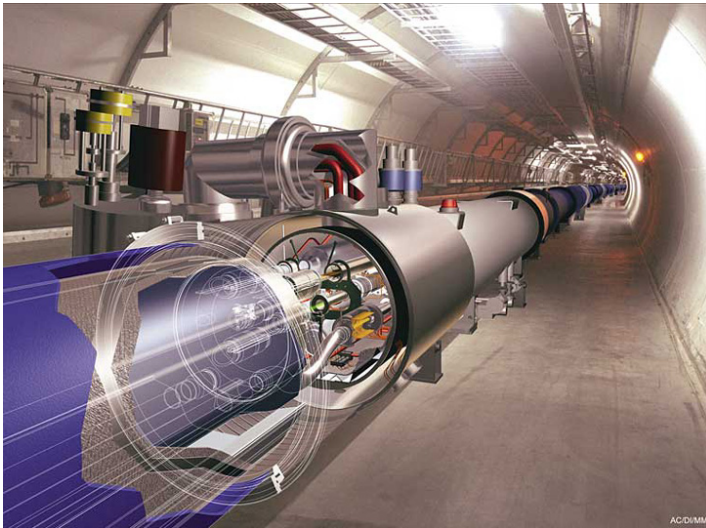
■ Dynamics of Colored Quarks;; The Quark Gluon Plasma in the Computer Stefan Scherer, 2004



■ carbon nucleus with quark substructure:

- On September 10, 2008 scientists at CERN sent a beam of protons around a 17-mile ring on a collision course with other protons to study quarks in a hadron.

Femtometer scale 10^{-15} m



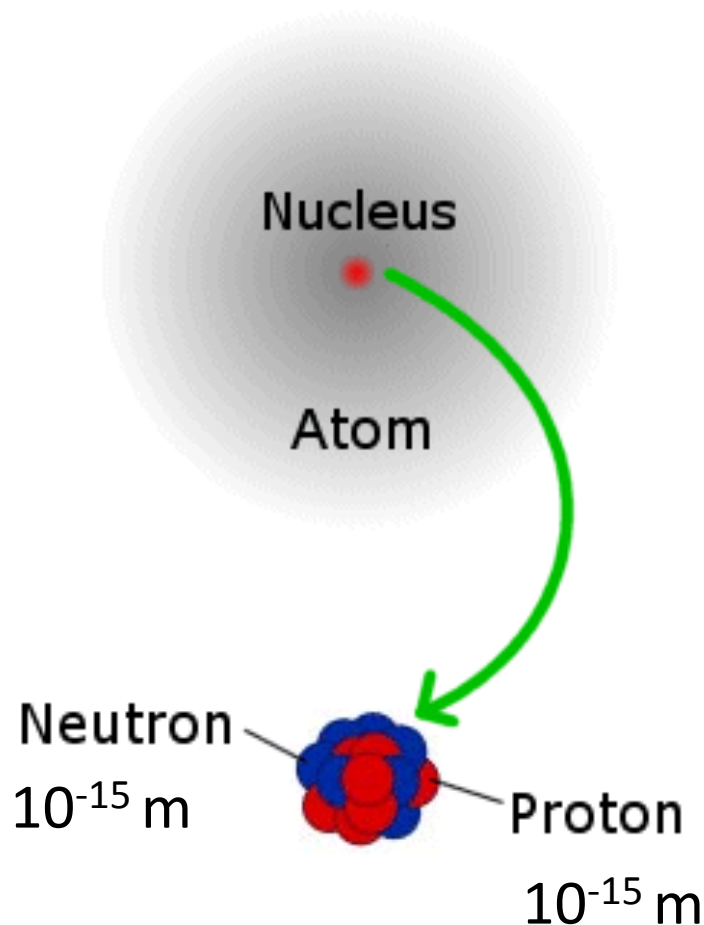
Accelerator tunnel CERN picture

17-mile ring CERN picture



“Who is like the wise man and who knows the interpretation of a matter? A man's wisdom illumines him and causes his stern face to beam.” Ecclesiastes 8:1 NASB, 1995

- The neutron is similar in size to the proton—rather small, neutrally charged, part of the nucleus of the atom and seemingly innocuous



Femtometer scale 10^{-15} m

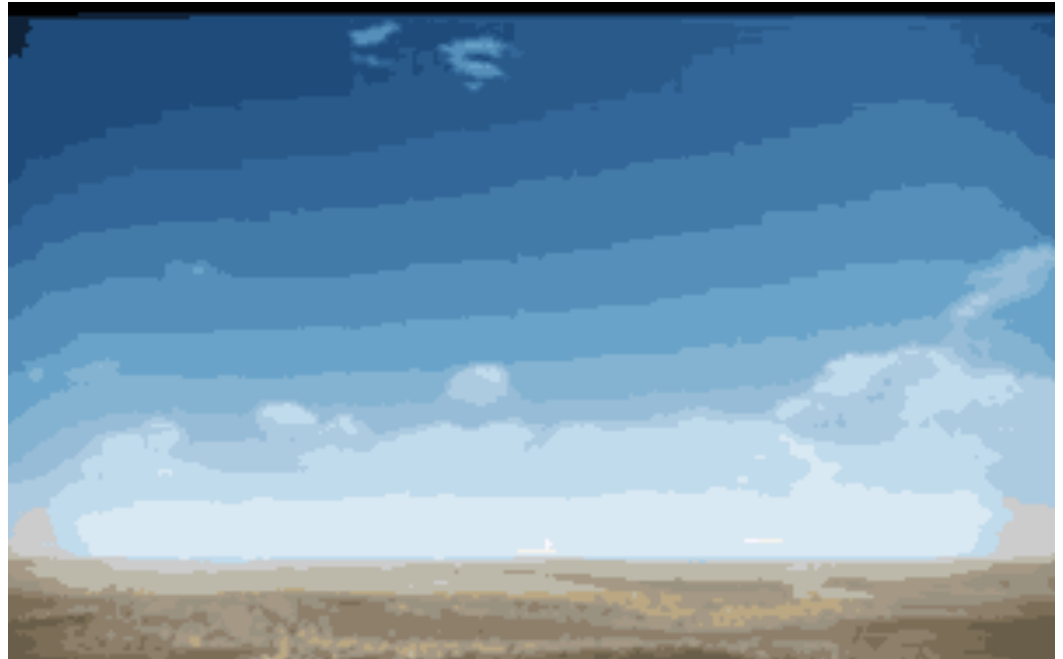


<http://www.dynamicscience.com.au/tester/solutions/chemistry/atoms%20structure.htm>

“He is the radiance of the glory of God and the exact imprint of his nature, and he upholds the universe by the word of his power.” Hebrews 1:3a ESV, 2001

- Yet, the neutron bomb
Femtometer scale
 10^{-15} m maximizes
damage to people but
minimizes damage to
buildings and
equipment.
- Waves of high speed
neutrons can
penetrate armor or
several feet of earth.

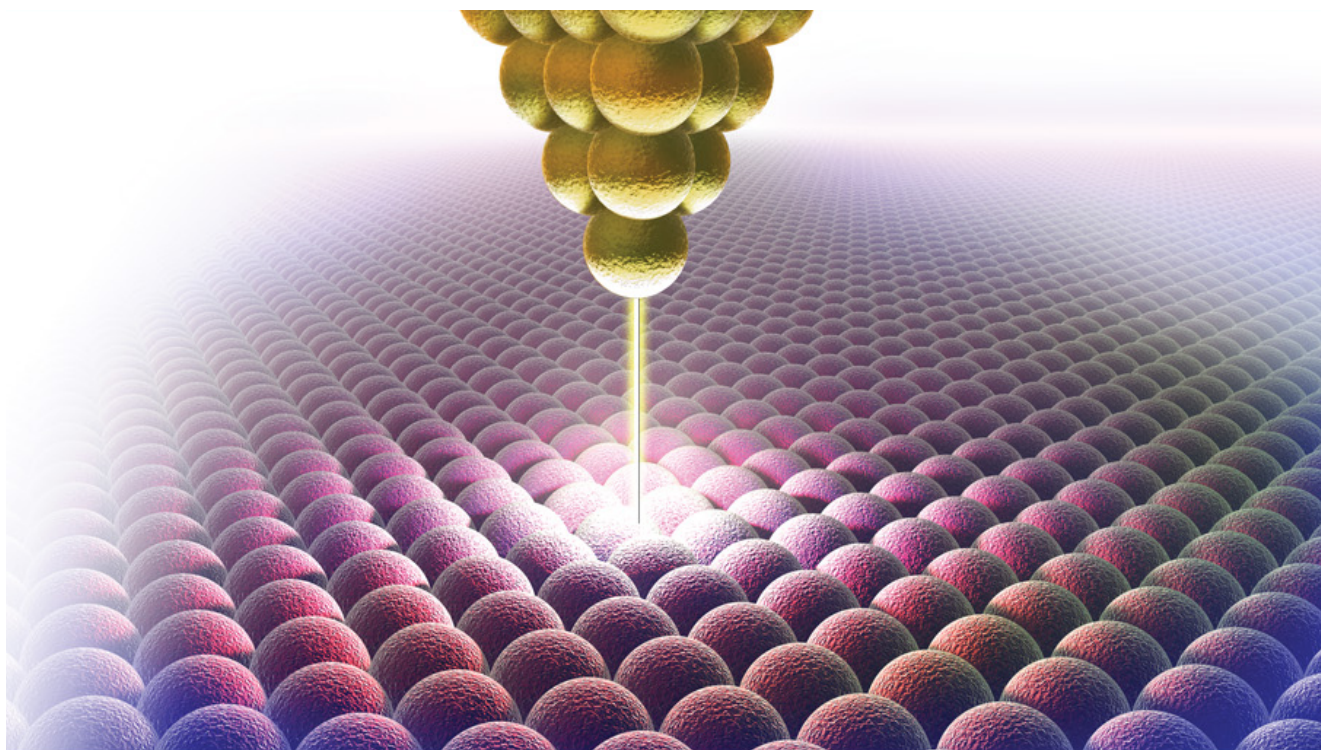
<http://www.dynamicscience.com.au/tester/solutions/chemistry/atoms%20structure.htm>



Nuclear explosions such as the atomic bomb are examples of the energy contained within the nucleus

“It is a day of darkness and gloom, a day of thick clouds and deep blackness. Suddenly, like dawn spreading across the mountains, a great and mighty army appears. Nothing like it has been seen before or will ever be seen again.” Joel 2:2 NLT, 2007

- With scanning tunneling microscopes we can now see the atoms of an element—smaller particles have not yet been seen, but assumed from experimentation and theory. picometer scale, 10^{-12}m



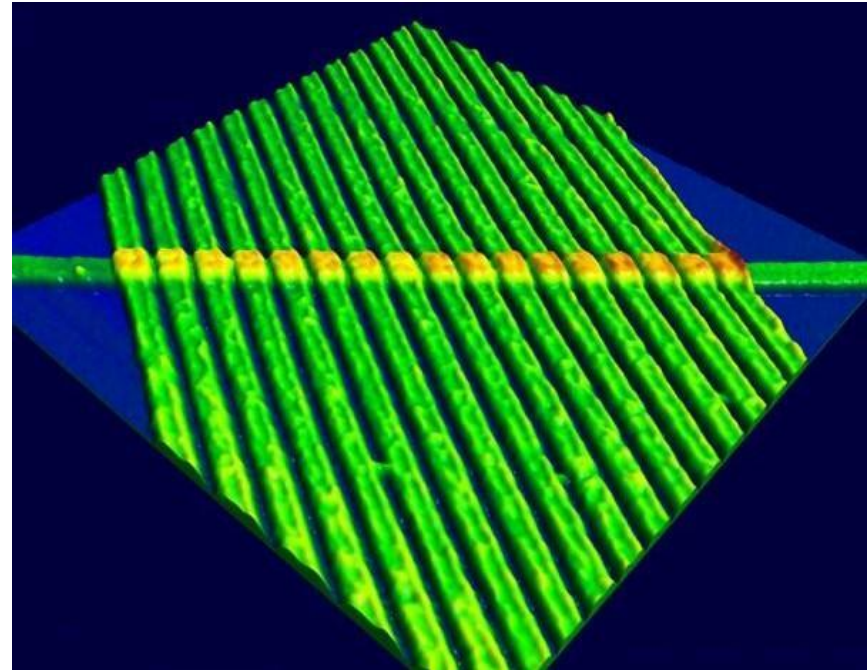
Tro, Chemistry a Molecular Approach

“By faith we understand that the entire universe was formed at God's command, that what we now see did not come from anything that can be seen. “ Hebrews 11:3 NLT, 2007

- We are limited to what we can “see” only by our imagination, critical thinking and scientific reasoning. If we can comprehend this smallness we can make it useful.

Picoscale circuitry

Wires in this Memristor (HP) image are about 150 atoms, wide. Soon a cm^2 will hold one terabyte of information.



<http://www.impactlab.net/2010/04/13/memristors-could-revolutionize-the-memory-chip/> J. J. Yang, HP labs

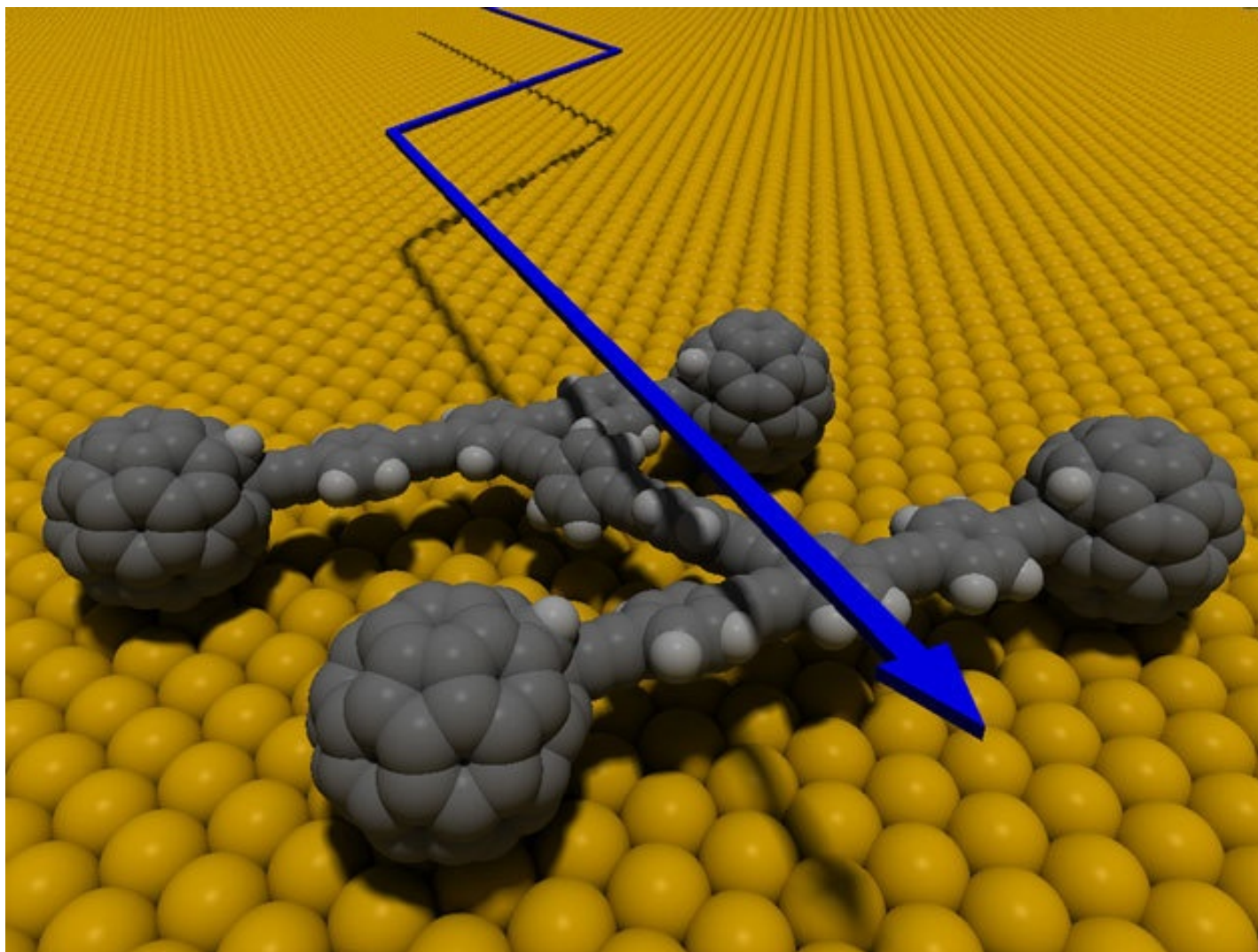
“Therefore since we are God’s offspring, we should not think that the divine being is like gold or silver or stone—an image made by human design and skill.”
Acts 17:29 NIV, 1984

picometer scale, 10^{-12}m

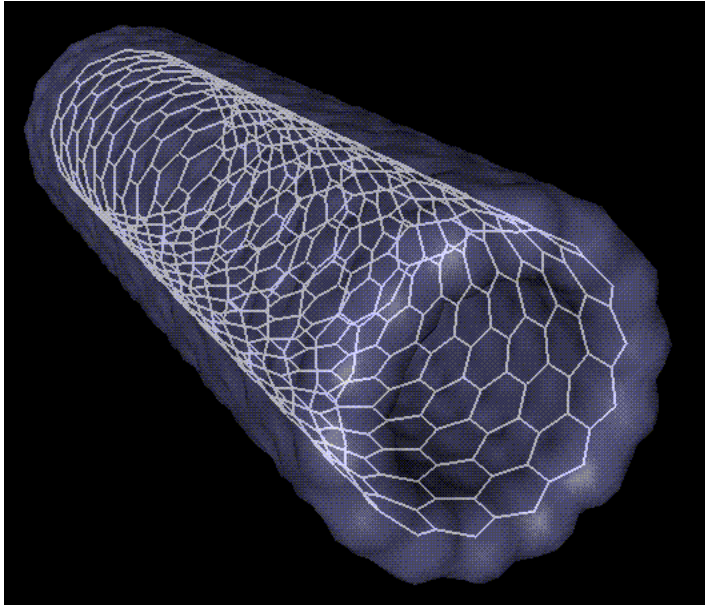
picometer scale, 10^{-12}m

James Tour, et. Al. Photo Y. Shira, Rice U.

“Make a careful exploration of who you are and the work you have been given, and then sink yourself into that. Don't be impressed with yourself. Don't compare yourself with others. Each of you must take responsibility for doing the creative best you can with your own life.”
Galatians 6:4-5
MSG, 2002,



- Using a single molecule, Rice U. scientists constructed the world's smallest car using carbon and hydrogen.



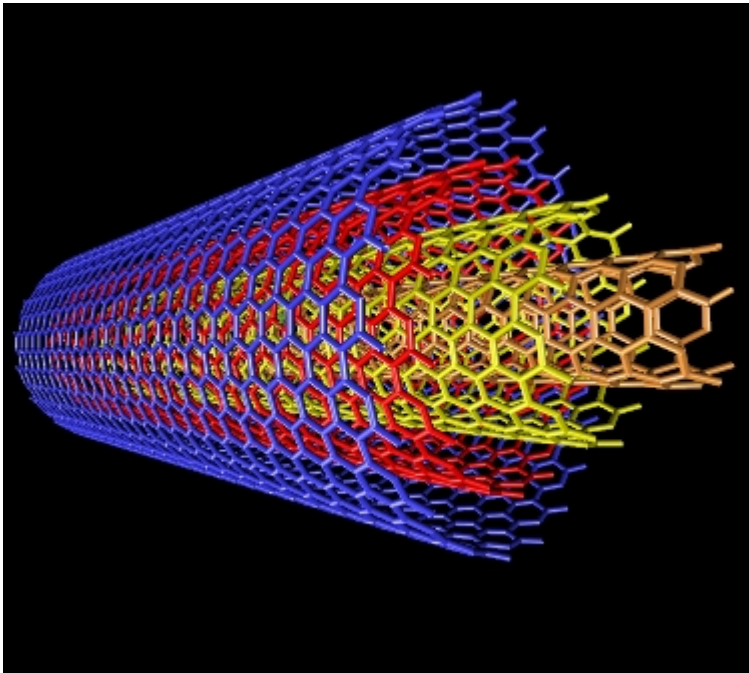
<http://artsci.ucla.edu/summer/2011/?q=node/156>

http://www.tedpella.com/gold_html/Nanotubes.htm

carbon nanotube 10 nm diameter

- We engineer nanotubes with twenty times the strength of steel, 50% lighter than aluminum, and durable to temperatures of 2000° C

nanometer scale, 10^{-9}m



- What do we do, we make them stronger and more durable

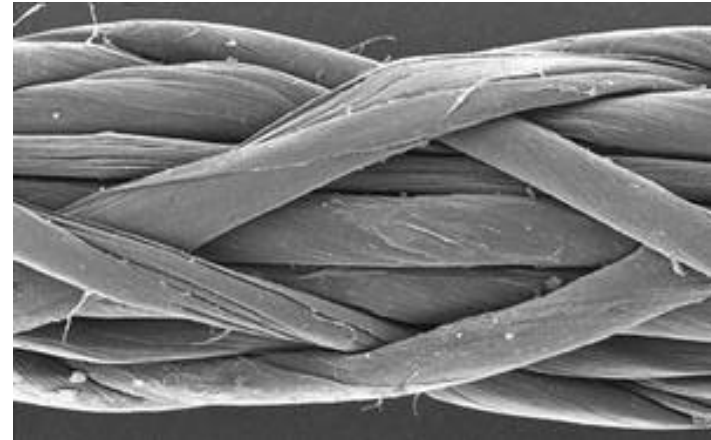
“Of David. The LORD is my light and my salvation--
whom shall I fear? The LORD is the stronghold of my
life--of whom shall I be afraid? “ Psalm 27:1, NIV, 1984

- So we imagine and design an elevator to space with nanotubes



AdAstra Magazine Spring 06 issue

nanometer scale, 10^{-9}m



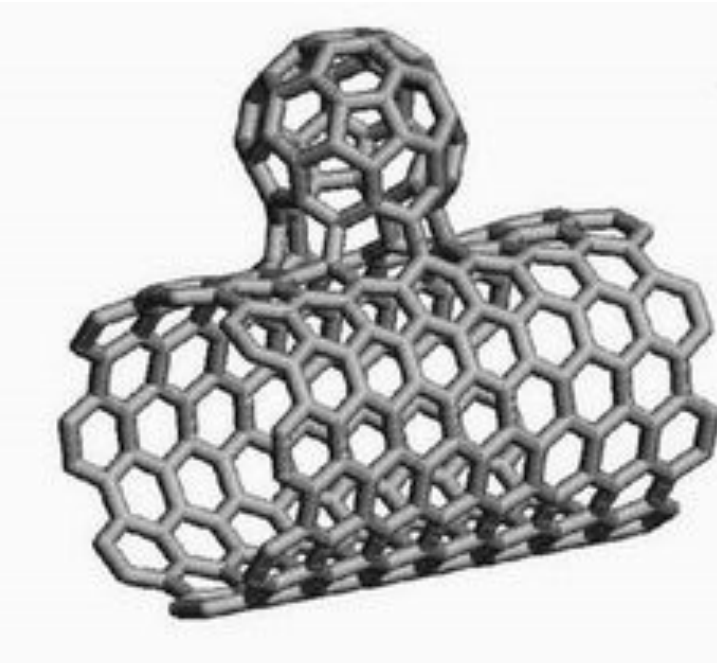
Each tube is 10 nm in diameter

<http://www.hightech-edge.com/carbon-nanotubes-1km-long-sheets-nanocomp-technologies/5068/>

“For as high as the heavens are above the earth, so great is his love for those who fear him;” Psalm 103:11 NIV, 1984



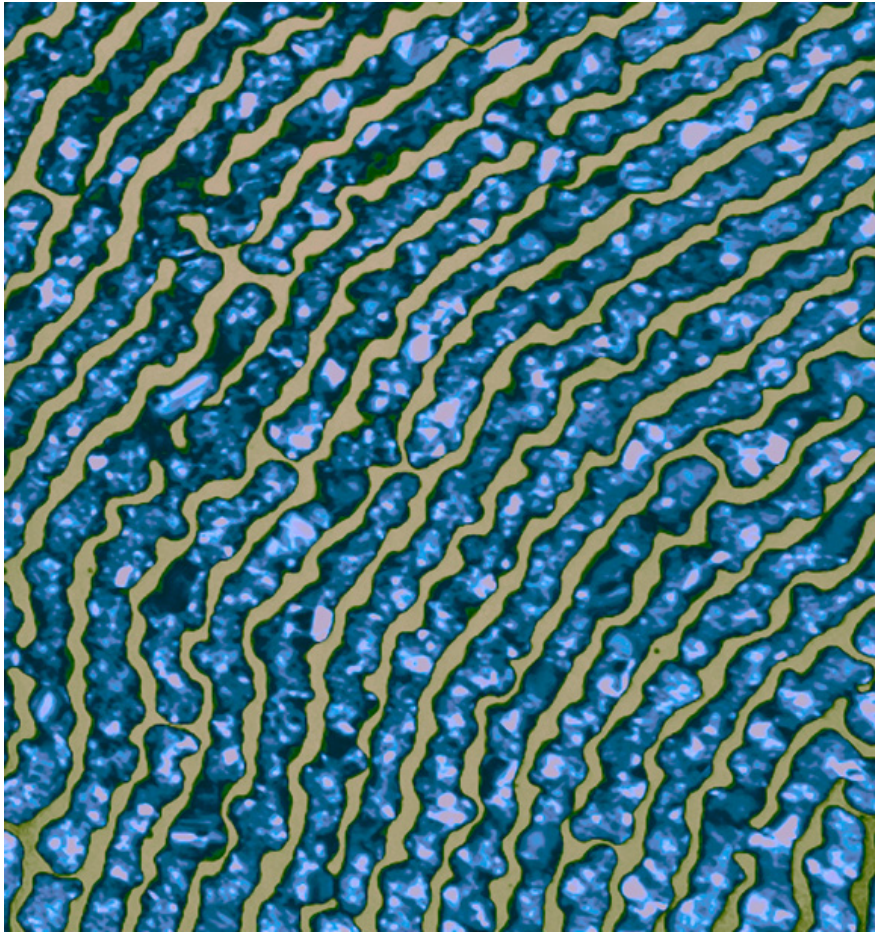
March 2007 edition of *Nature Nanotechnology*.



Esko Kauppinen, et al., Helsinki University of Technology

- Nanobuds: nanotubes fused to bucky balls 5 nm diameter
nanometer scale, 10^{-9}m
used to create miniaturized, power efficient technologies, flat-panel displays and electron microscopes.

“He has filled them with skill to do all kinds of work as engravers, designers, ...” Exodus 35:35a NIV, 1984

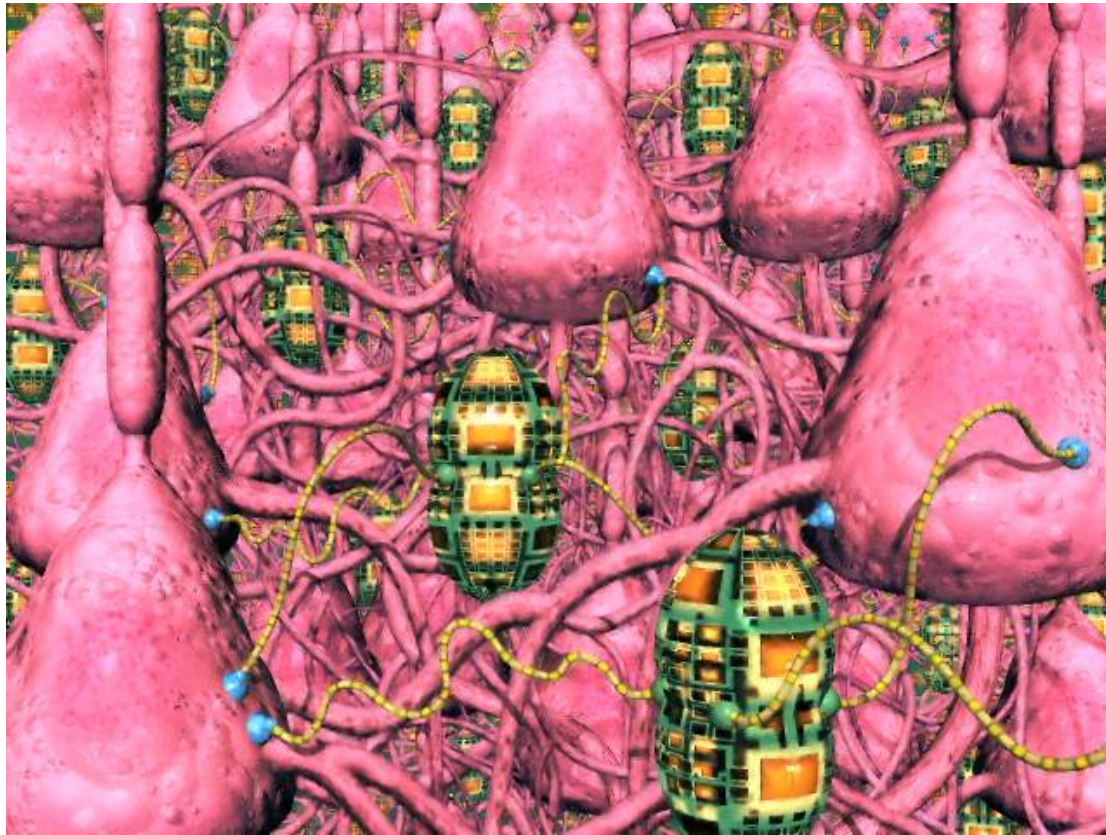


silver nanowires produced at the University of Chicago
Heinrich Jaeger and Ward Lopes
Polymethylmethacrylate domain between silver wires

- Research developers can now make the purest high quality silver nanowires 50 nm apart
- Nanowires can be used for neural prosthetics

nanometer scale, 10^{-9}m

¹⁷I love everyone who loves me, and I will be found by all who honestly search.
¹⁸I can make you rich and famous, important and successful.
¹⁹What you receive from me is more valuable than even the finest gold or the purest silver. “
Proverbs 8:17-19 CEV, 1995



“Acquire wisdom! Acquire understanding! Do not forget nor turn away from the words of my mouth.”
Proverbs 4:5 NASB, 1995

20 to 40 μm bots with
nanometer size parts

nanometer scale, 10^{-9}m

Tim Fonseca.

- Artificial brain cells: Each brainbot houses a computer that contains information equaling a large library, and instruments for recording "surface thoughts". Daniel Simon

J D Simeral *et al* April **2011** *J. Neural Eng.* **8** Neural control of cursor trajectory and click by a human with tetraplegia 1000 days after implant of an intracortical microelectrode array



- The feasibility of nanobots are currently being researched to move objects on a nano scale.

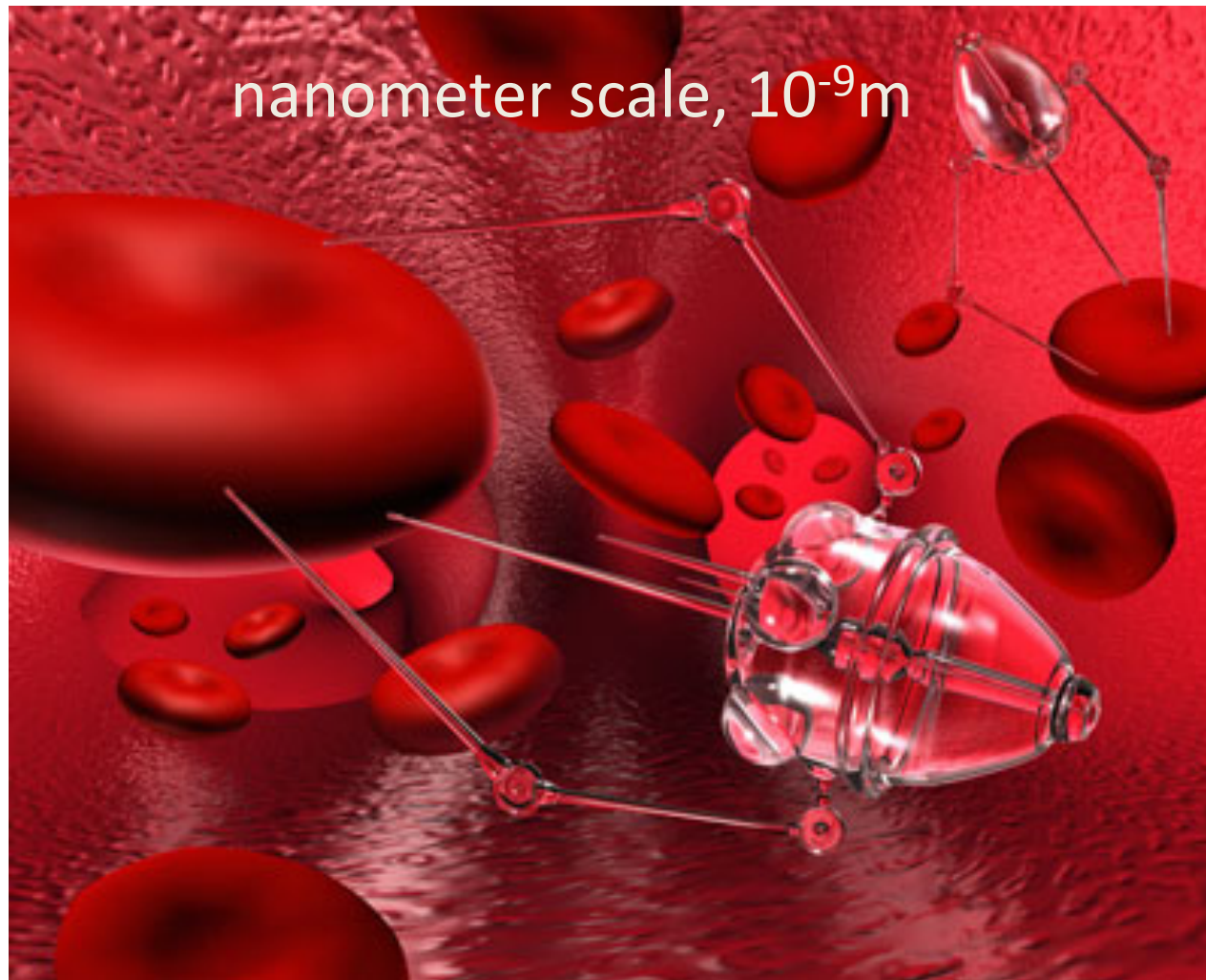
nanometer scale, 10^{-9}m

- Nanochips arrange blood cells to create artificial tissues

“Create in me a clean heart, O God, And renew a steadfast spirit within me.” Psalm 51:10 NASB, 1995

<http://news.bbc.co.uk/2/hi/americas/7248875.stm> Sylvain Martel

Platlet 7-8 μm



<http://www.innovationcanada.ca/en/articles/invasion-of-nanorobots> Sylvain Martel,
Nanorobotics Laboratory at the École polytechnique de Montréal,

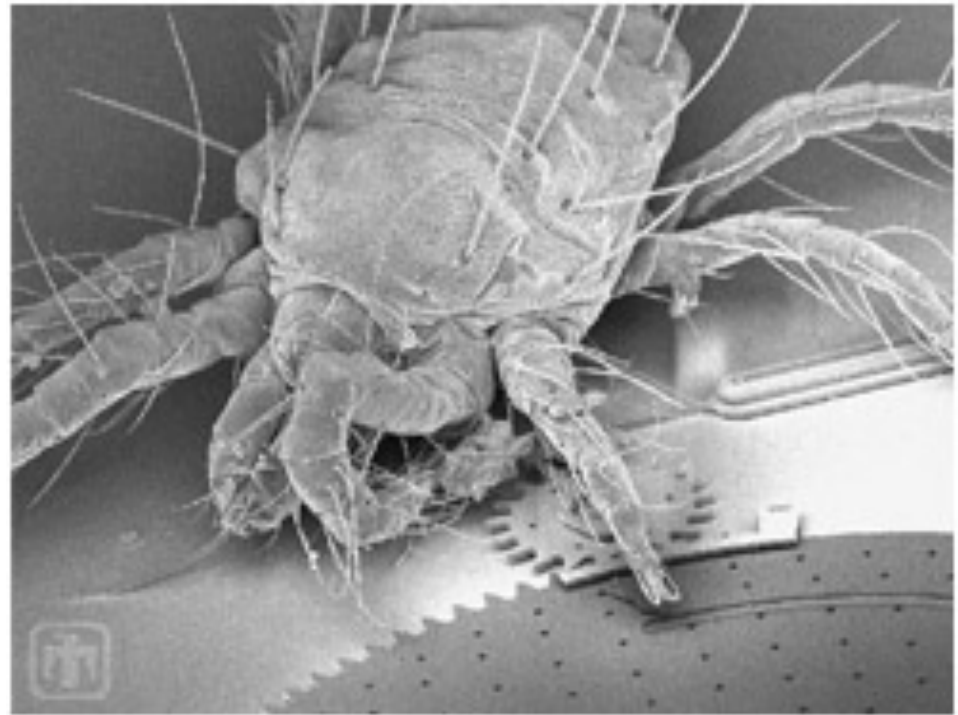
“²⁵ A woman in the crowd had suffered for twelve years with constant bleeding. ²⁶ She had suffered a great deal from many doctors, and over the years she had spent everything she had to pay them, but she had gotten no better. In fact, she had gotten worse. ²⁷ She had heard about Jesus, so she came up behind him through the crowd and touched his robe. ²⁸ For she thought to herself, “If I can just touch his robe, I will be healed.” ²⁹ Immediately the bleeding stopped, and she could feel in her body that she had been healed of her terrible condition.” Mark 5:25-29 NLT, 2007

- Nanobots may lead to advances in cancer or diabetic treatments by attacking cancers and injecting insulin.

nanometer scale, 10^{-9}m



Each cog in the gear 4 nm (whole gear less than $\frac{1}{2}$ diameter of human hair)

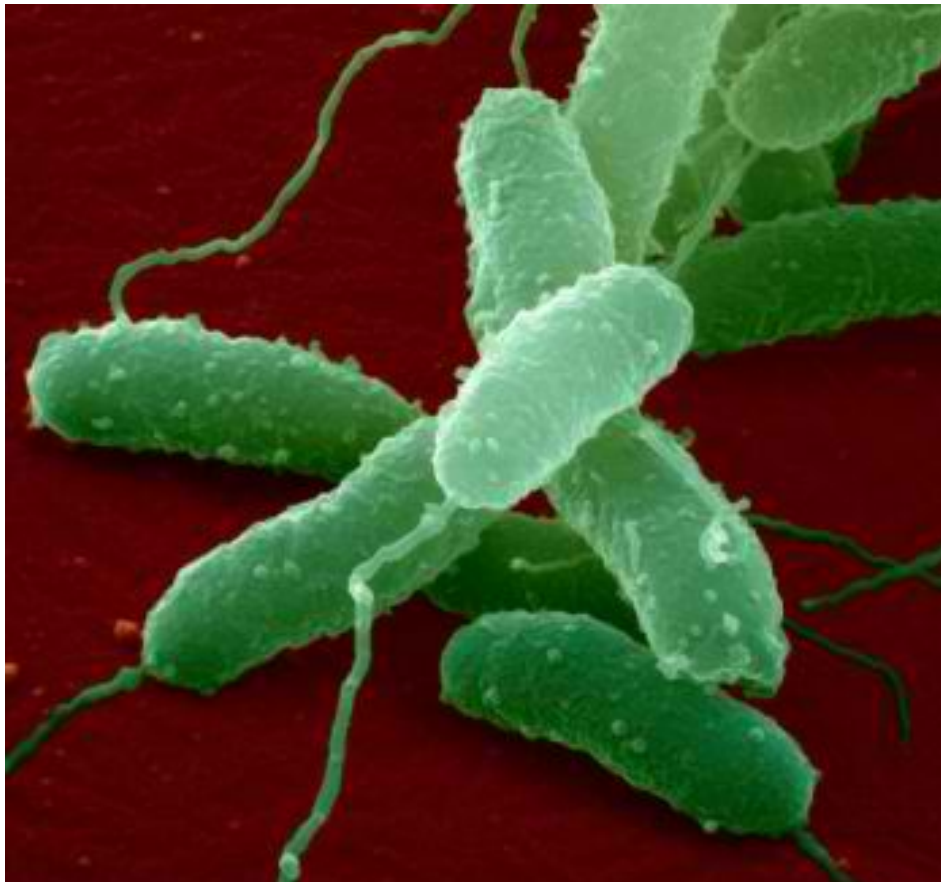


Sandia National Labs http://mems.sandia.gov/tech-info/doc/2B_1.pdf

Dust mite 400 nm head to tail, size of period on a page

As impressive as nanotechnology is, it doesn't compare to the complexity of the common dust mite.

⁸ Although I am less than the least of all the Lord's people, this grace was given me: to preach to the Gentiles the boundless riches of Christ,⁹ and to make plain to everyone the administration of this mystery, which for ages past was kept hidden in God, who created all things." Ephesians 3:8-9 NIV, 2011



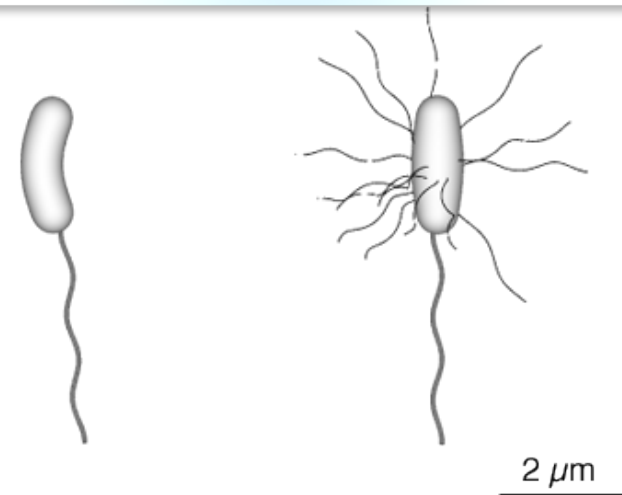
DAVID SCHARF/SCIENCE PHOTO LIBRARY

Cholera bacteria as seen in Haiti

micrometer scale, 10^{-6}m

- Micro-bots already exist which swim through arteries and digestive systems--bacteria.

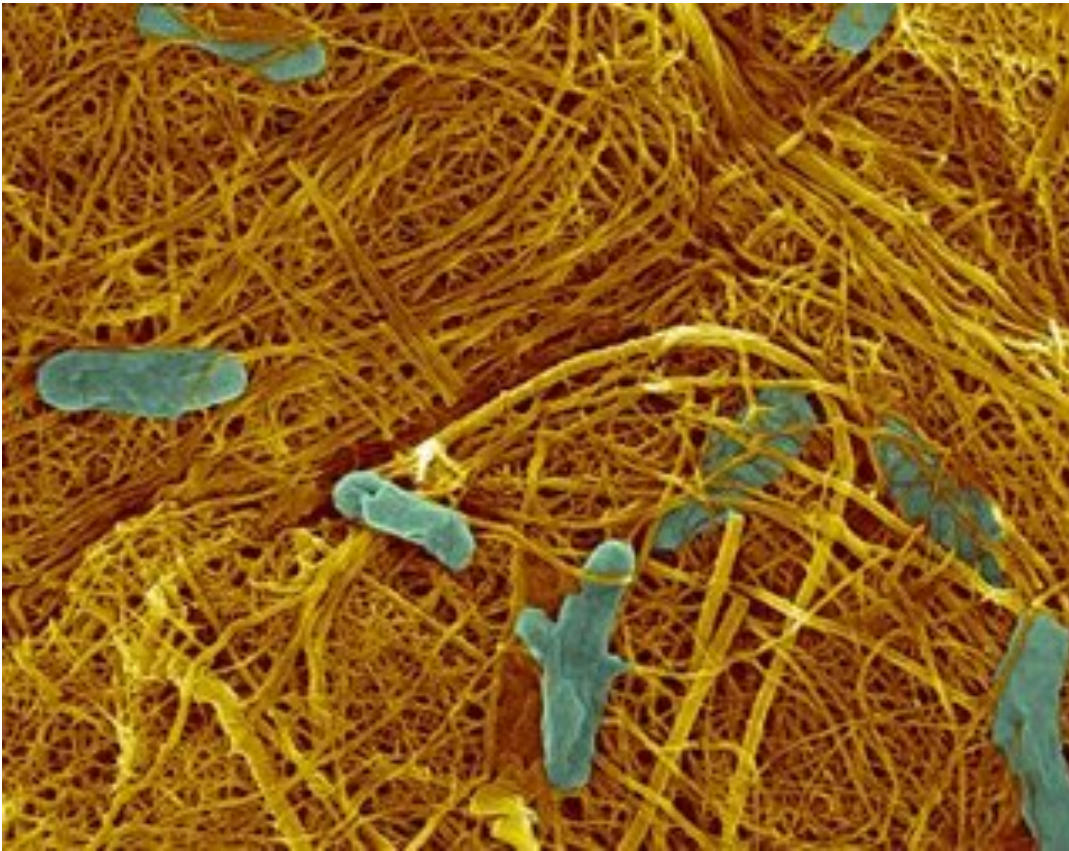
“ Then God said, “Let the waters swarm with fish and other life.” Genesis 1:20a NLT, 2007



http://en.wikipedia.org/wiki/File:Vibrio_diagram.png

Most bacteria are 0.4 to 0.7 μm wide and 2-4 μm long.

WHIPLIKE TAILS, found on many bacteria allow the bacteria to move through liquid.



Shewanella bacteria (shown in blue) can form nanotubes. These nanotubes are semiconducting yet produced by living bacteria

micrometer scale, 10^{-6}m

<http://io9.com/333629/a-nanotech-twist-on-silkworms> UC Riverside

- So, we study bacteria to discovery ways to create nanoelectronic devices.

“for through him God created everything in the heavenly realms and on earth. He made the things we can see and the things we can’t see” Colossians 1:16a NLT, 2007

micrometer scale, 10^{-6}m

http://www.gadgetrivia.com/13882-best_32gb_micro_sd_card



This SD card holds 32 Gigabytes, is 15 x 11 mm and holds 720 hours of movies. It fits in my Droid!!!!



http://www.nanotech-now.com/news.cgi?story_id=42358

E. Coli bacteria

The circuitry of this micro-computer chip is about 10 times bigger than E. Coli.

E. Coli computes ~1,000 times faster, its memory density is 100 million times higher and it needs only 100 millionth the power to operate.

"I also pray that you will understand the incredible greatness of God's power for us who believe him. This is the same mighty power." Ephesians 1:19 NLT, 2007

Pollen: 20 -- 60 μm

micrometer scale, 10^{-6}m

<http://ohscience.tumblr.com/post/4516159306/pollen-on-sunflower-pistil>

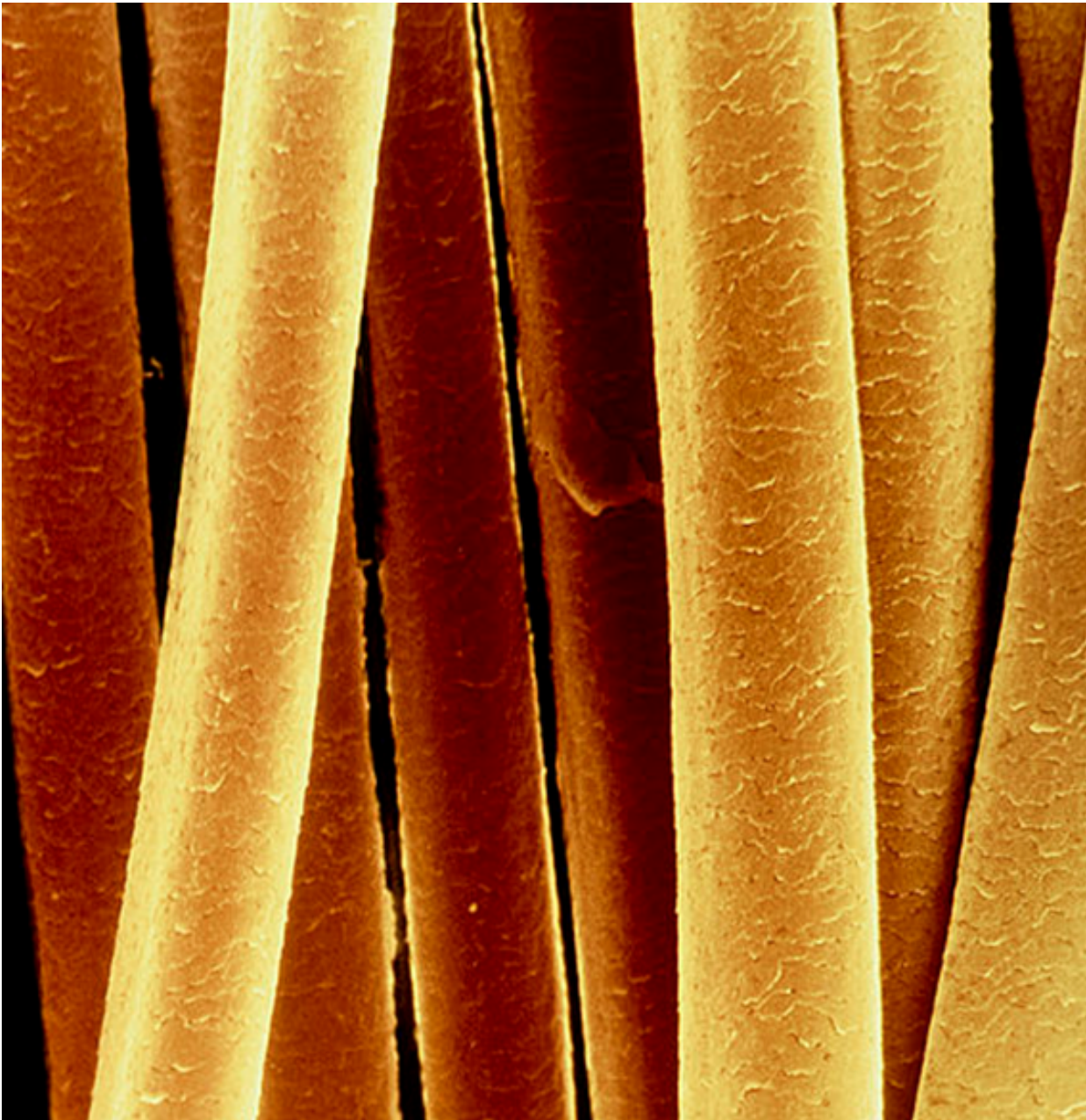


Pollen on Sunflower

“ But God gives it a body just as He wished, and to each of the seeds a body of its own. ”

1 Corinthians 15:38

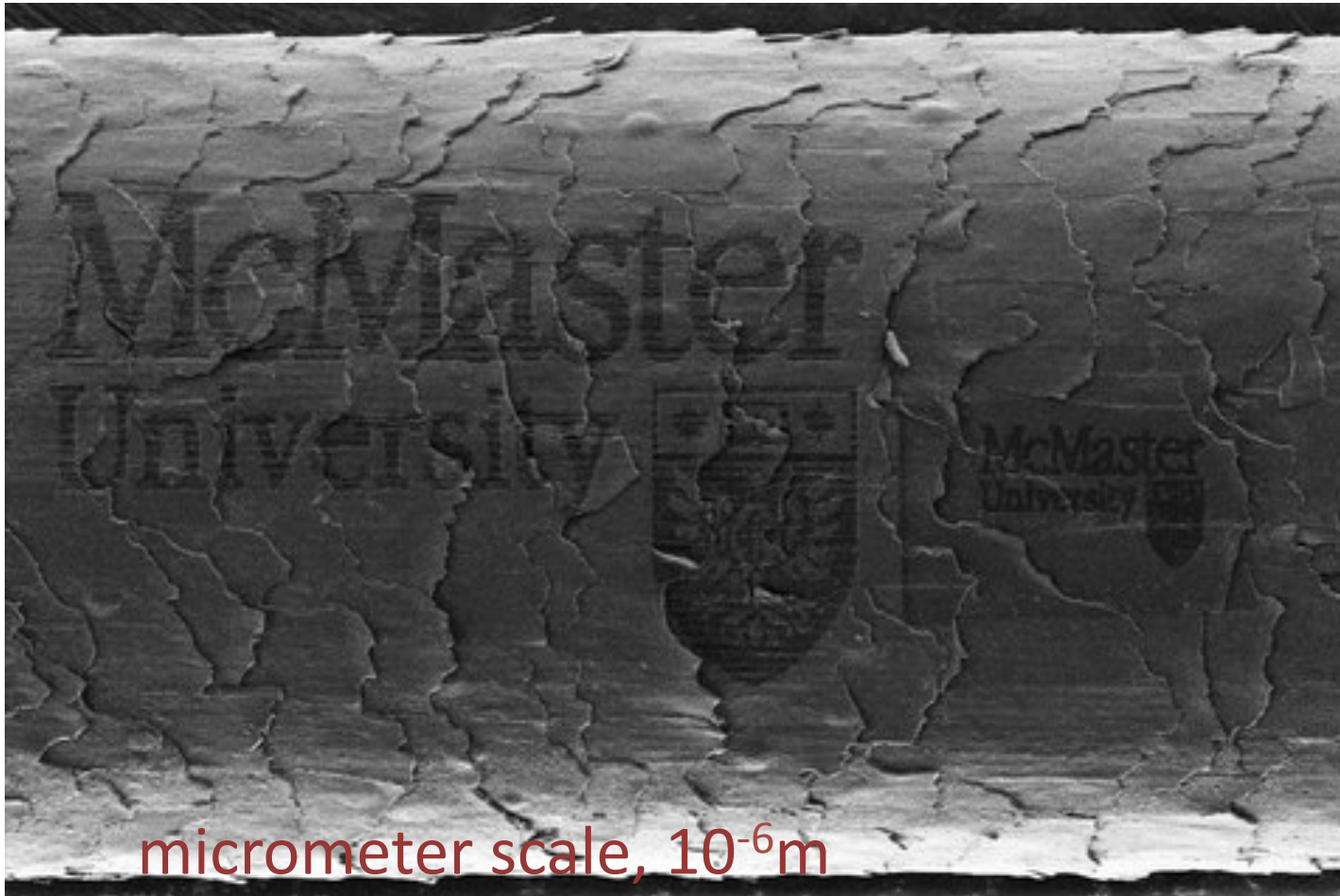
NASB, 1995



“And even the very hairs of
your head are all numbered.”
Matthew 10:30 NIV, 2011

micrometer
scale, 10^{-6}m

Human hair
 $50\text{ }\mu\text{m}$ diameter



Human hair
50 μm

<http://gadgets.boingboing.net/2008/04/03/universtiy-logo-carv.html>

Julia Huang used a focus ion beam microscope (FIB) to shoot a beam of gallium ions at the surface of a human hair to etch the school's logo onto a human hair.

“and standing behind Him at His feet, weeping, she began to wet His feet with her tears, and kept wiping them with the hair of her head, and kissing His feet and anointing them with the perfume”. Luke 7:38 NASB, 1995



(Photo: J. Waterbury, Woods Hole/NASA Astrobiology Institute)

Blue-green algae (Cyanobacteria) 0.1 mm

“you built a reservoir inside the city to hold the water flowing down from the old pool. But you paid no attention to God, who planned all this long ago and who caused it to happen.” Isaiah 22:11 GNT, 1992

millimeter scale, 10^{-3}m



http://www.msnbc.msn.com/id/33045773/ns/us_news-environment/t/stinky-blue-green-algae-blamed-dog-deaths/

“Against whom has the king of Israel come out? Who are you pursuing? A dead dog? A flea? 1 Samuel 24:14 NIV, 2011

millimeter scale, 10^{-3}m



<http://www.ento.okstate.edu/ddd/insects/fleas.htm>



<http://www.cylearn.org/Pearson/html/Lesson1.html>

“Take a lesson from the ants, you lazybones. Learn from their ways and become wise! “ Proverbs 6:6 NLT, 2007

Ant 4 – 6 mm
millimeter scale, 10^{-3}m



<http://www.earth-issues.com/2011/03/can-ants-forecast-earthquakes/>

Schreiber et. al. monitor anthills in Germany to compare ant activity to earthquake activity

centimeter scale, 10^{-2}m

Honey bee 1-2 cm

“How sweet are Your words to my taste! Yes, sweeter than honey to my mouth!” Psalm 119:103 NASB, 1995



Apple 7 -9 cm

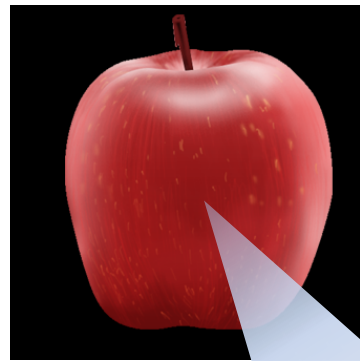
centimeter scale, 10^{-2}m

“If you were to remove all the empty space from all the atoms that make up the six billion+ people in the world, then the whole of humanity would occupy less volume than an apple:” John Topley

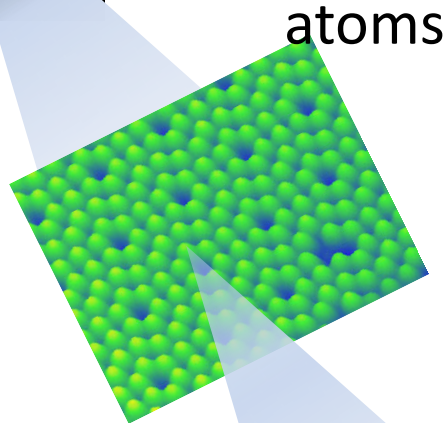
A word aptly spoken is like apples of gold in settings of silver Proverbs 25:11 NIV, 1984



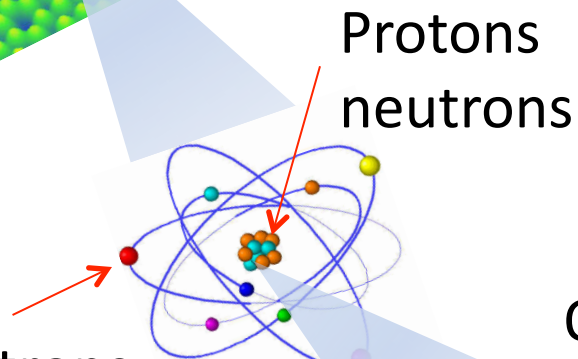
<http://johntopley.com/2007/08/04/atomic/>



apple

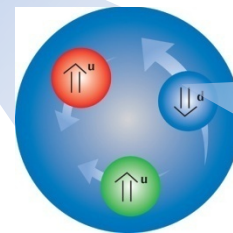


atoms

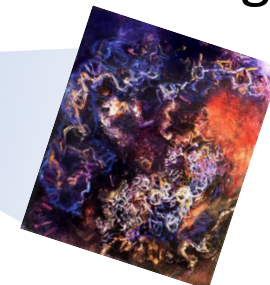


Protons
neutrons

Electrons



Quark



Strings

- Human curiosity knows no limit. Scientific thinking continually provides new theories and discoveries which bring the world not visible to the naked eye closer to our realm of understanding.

“Where then does wisdom come from?
And where is the place of
understanding?” Job 28:20 NASB 1995

“Jesus, finding a young donkey, sat on it; as it is written, “ John 12:14 NASD, 1995

Small donkey 70-80 cm high
centimeter scale, 10^{-2}m



- Blue whale 33.6 meters long, human 2 meters tall.

“And the LORD appointed a great fish to swallow Jonah, and Jonah was in the stomach of the fish three days and three nights.” Jonah 1:17 NASB, 1995



Meter
scale

American Museum of Natural History in New York. Milstein Family Hall of Ocean Life.
<http://parkablogs.com/content/day-9-day-museum>

“Now the Lord is the Spirit, and where the Spirit of the Lord is, there is liberty.” 2 Corinthians 3:17 NASB, 1995

Statue of Liberty 93 m high



Old Main at Howard Payne
Meter scale



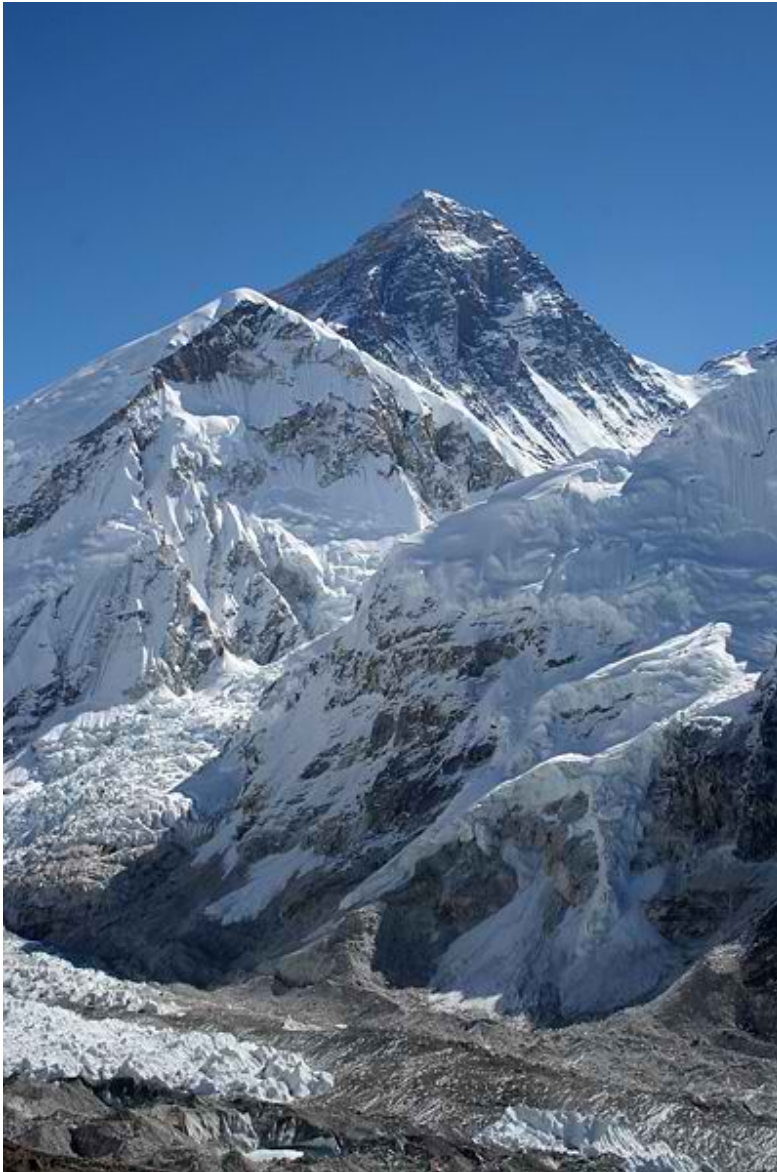
<http://www.top50states.com/statue-of-liberty-facts.html>

The dome of Enchanted Rock rises 1.2 kilometers above ground more than 10x higher than the Statue of Liberty



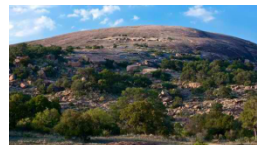
“The LORD is my rock, my fortress, and my savior; my God is my rock, in whom I find protection. He is my shield, the power that saves me, and my place of safety.” Psalm 18:2
NLT, 2007

Fredericksburg TX
kilometer 10^3 scale



Mount Everest 8.8 km high,
largest mountain on Earth.
Located in the Himalayas
on the Nepal/Tibet boarder.
It is more than 7x higher
than Enchanted Rock

kilometer 10^3 scale



“For behold, He who forms mountains and creates the wind And declares to man what are His thoughts,
He who makes dawn into darkness And treads on the high places of the earth, The LORD God of hosts is
His name.” Amos 4:13 NASB, 1995

- 100 million blue whales would fit inside Mount Everest



8.8 km high

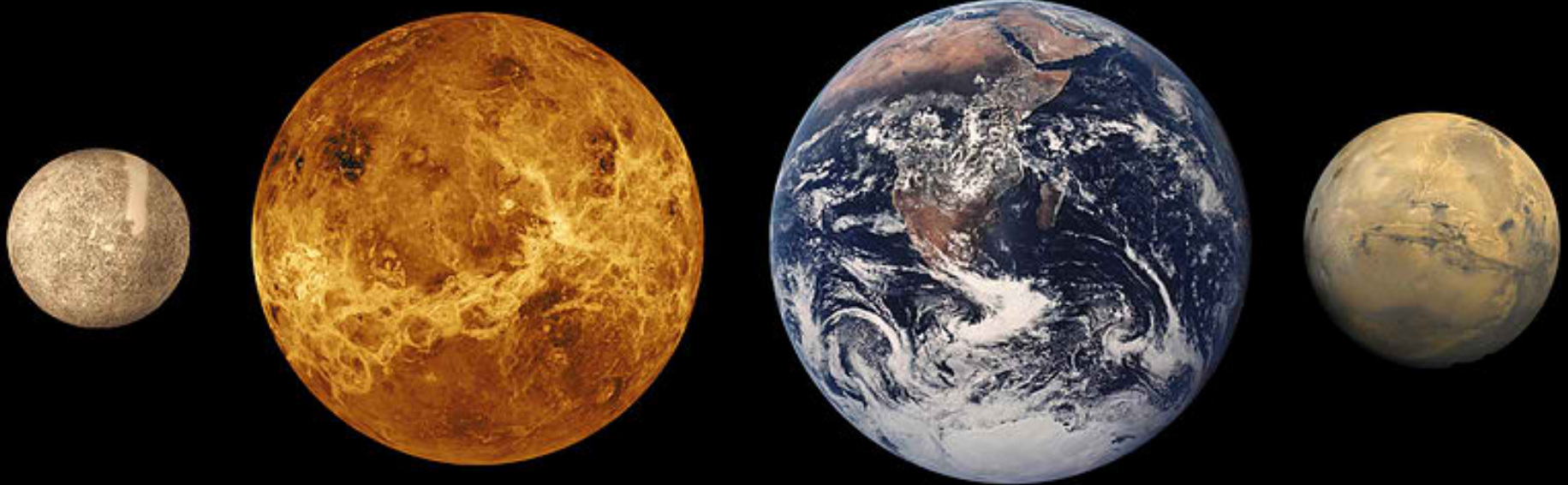


kilometer
 10^3 scale

Pavel Novak Wikimedia Commons

“In whose hand are the depths of the earth, The peaks of the mountains are His also.” Psalm 95:4 NASB, 1995

NASA



Megameter 10^6 scale

Mercury

4.5 Mm

Venus

12.1 Mm

Earth

12.7 Mm

Mars

6.8 Mm



Moon 3.5 Mm
400x wider than
Mt. Everest is high

“There are also bodies in the heavens and bodies on the earth. The glory of the heavenly bodies is different from the glory of the earthly bodies.”
1 Corinthians 15:40 NLT, 2007



- 100 Mt. Everest's stacked on top of each other would be but a whisker to the Earth.

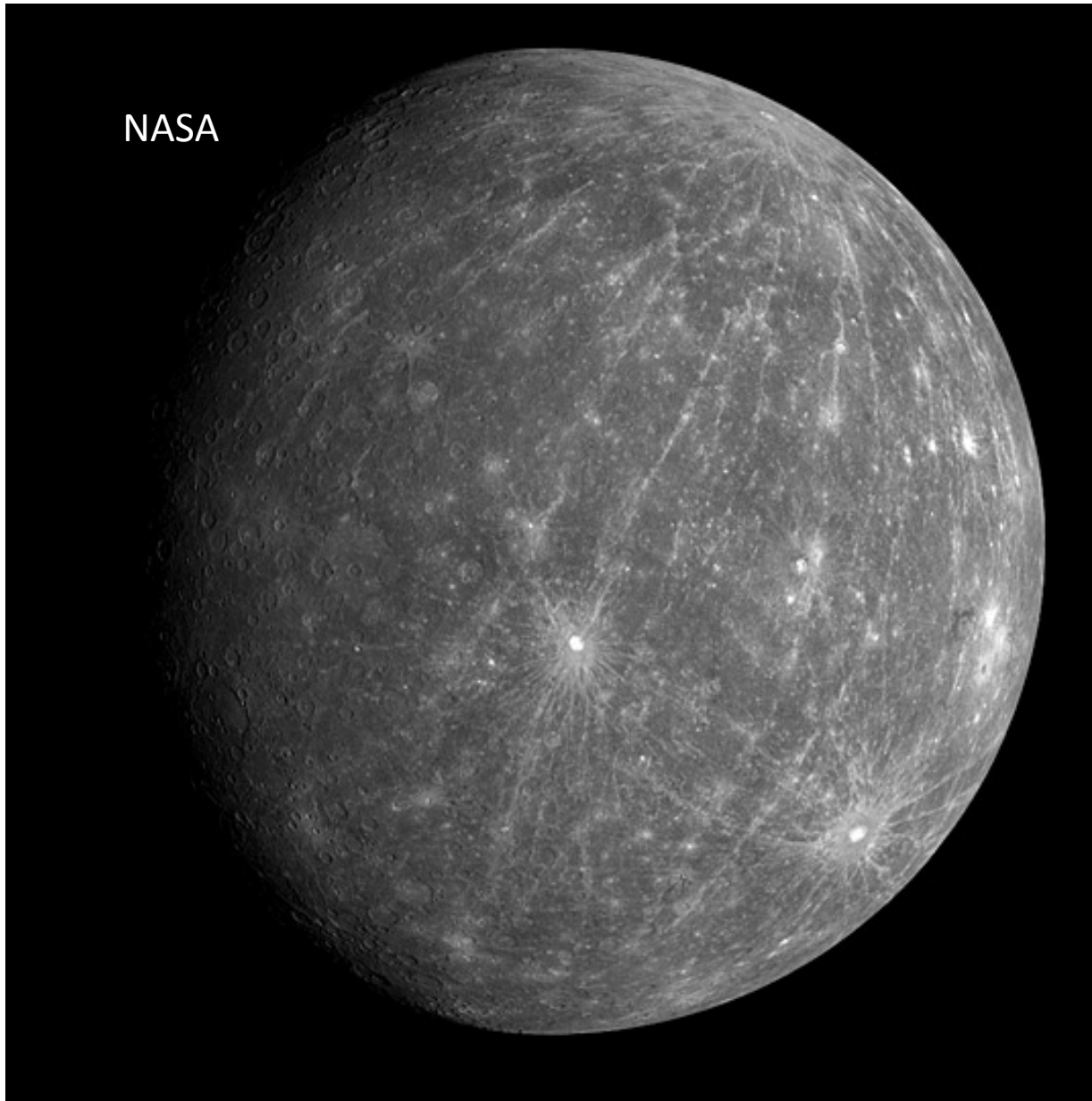
Megameter 10^6 scale



"For this is what the LORD says— he who created the heavens, he is God; he who fashioned and made the earth, he founded it; he did not create it to be empty, but formed it to be inhabited— he says: "I am the LORD, and there is no other.""

Isaiah 45:18 NIV, 1984

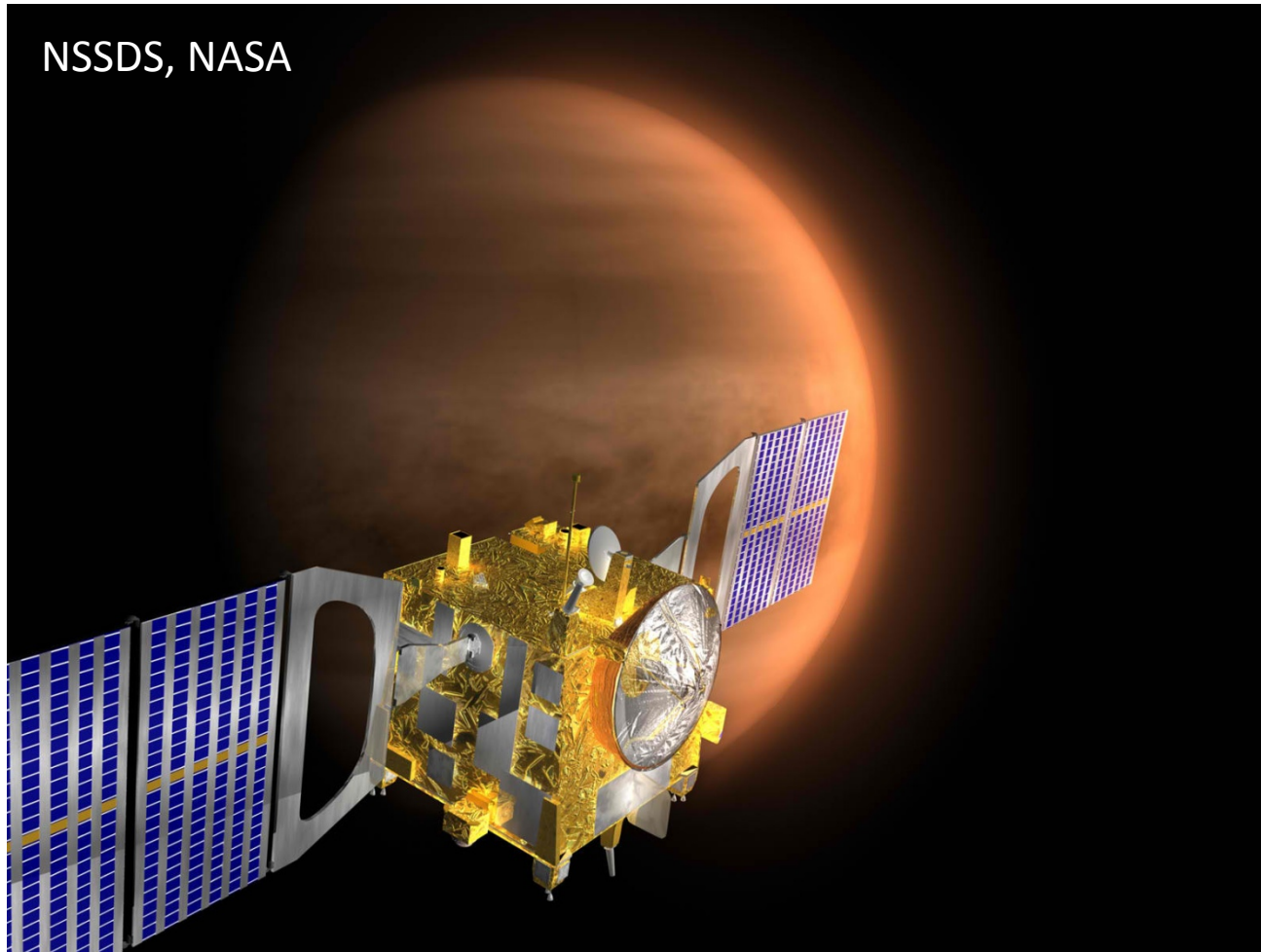
Megameter 10^6 scale



- Mercury 4.5 Mm in diameter
- Messenger zoomed just 250 km above Mercury's surface October, 2008

"You are looking only on the surface of things. If anyone is confident that he belongs to Christ, he should consider again that we belong to Christ just as much as he." 2 Corinthians 10:7 NIV, 1984

- Venus Express, European Space Agency (ESA) mission, left for Venus in December 2005 and is now sending data back to Earth

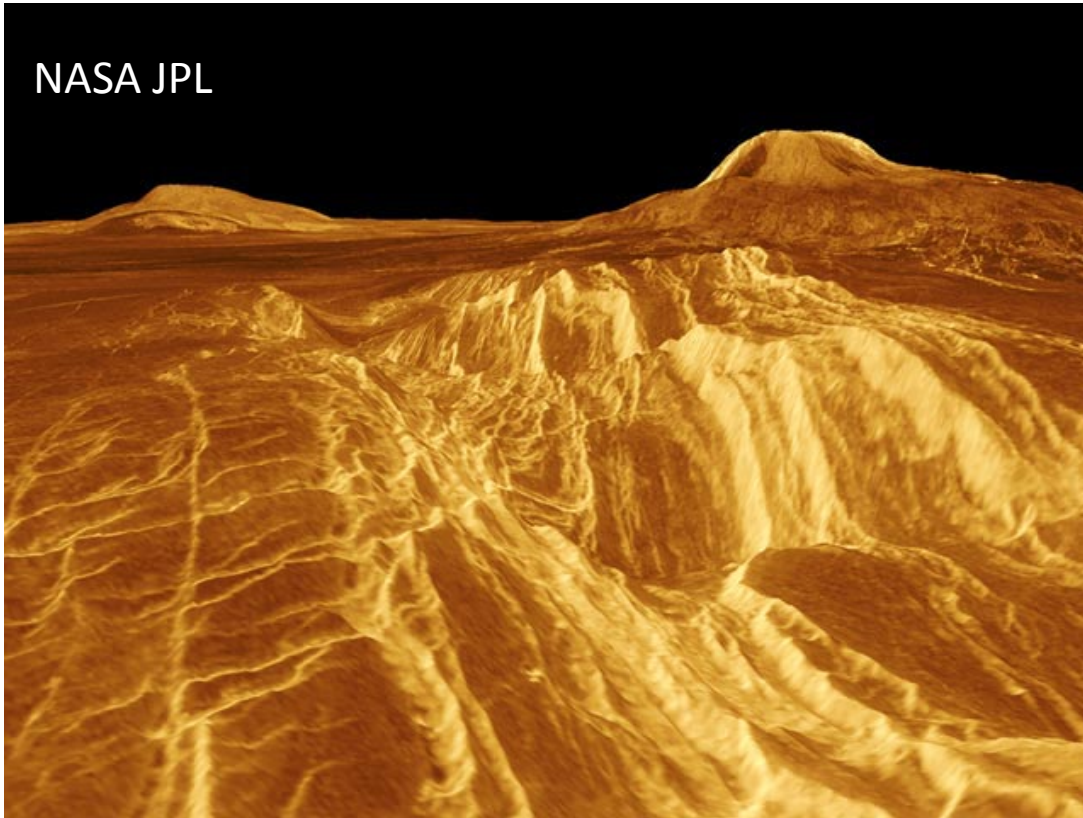


Venus
12.5 Mm in
diameter

“All its land is brimstone
and salt, a burning waste,
unsown and unproductive,
and no grass grows in it,
like the overthrow of
Sodom and Gomorrah,”
Deuteronomy 29:23a
NASB, 1995

Megameter 10^6 scale

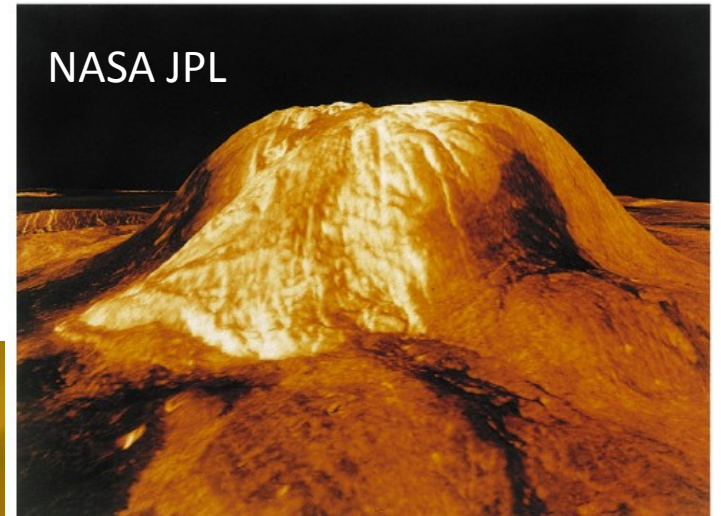
NASA JPL



“How you have fallen from heaven,
O morning star, son of the dawn!
You have been cast down to the
earth, you who once laid low the
nations! “ Isaiah 14:12, NIV, 1984

kilometer
 10^3 scale

NASA JPL



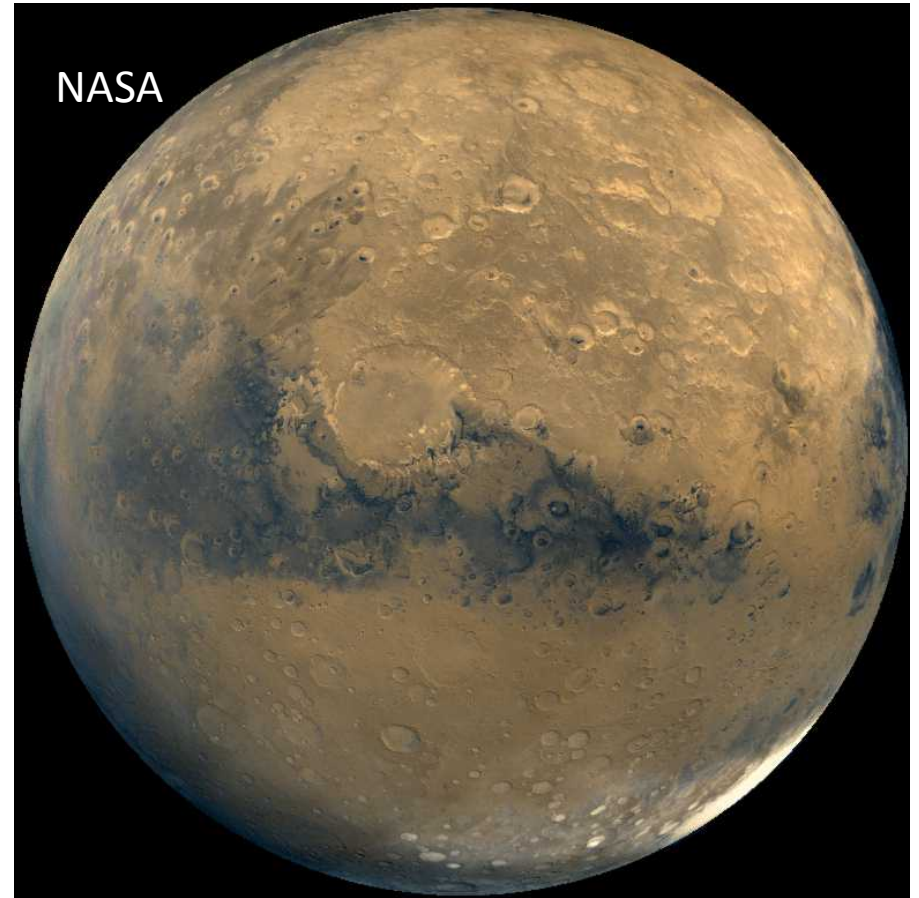
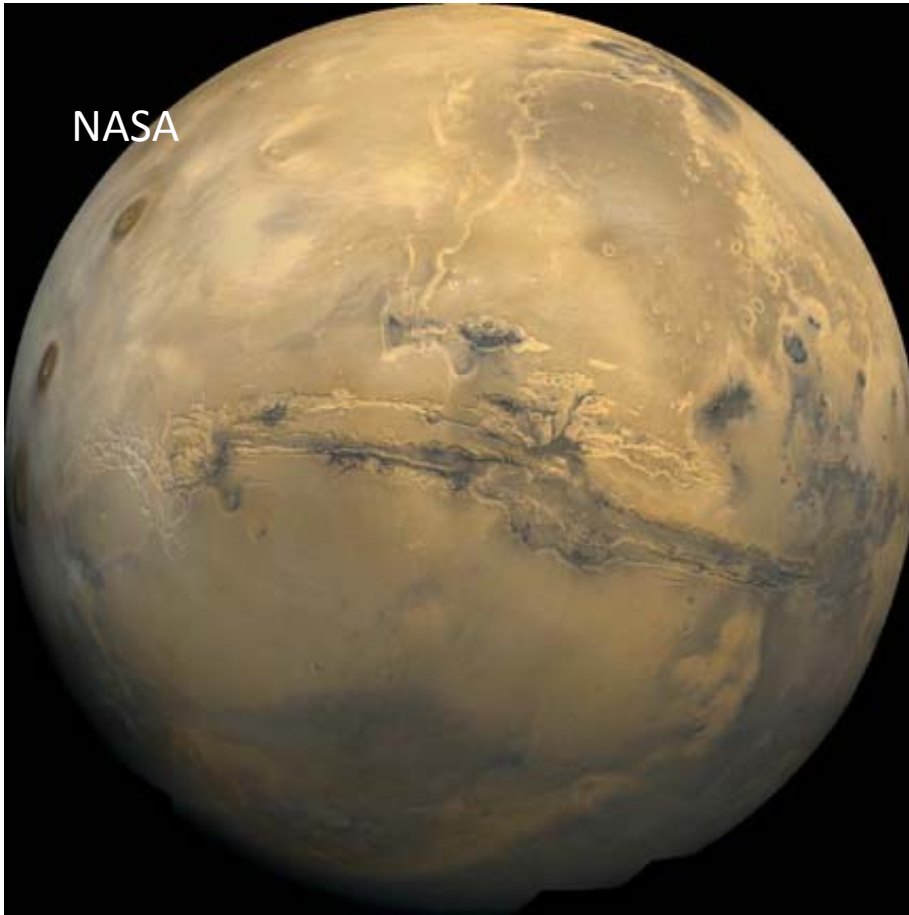
Gula mons
volcano

- Surface
of
Venus



ESA's Venus Express Satellite, J. Whatmore

MARS 6.8 Mm in diameter



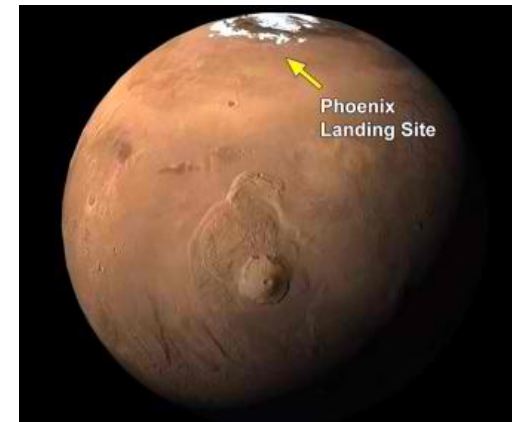
- Pictures from Viking space craft in orbit around Mars
Megameter 10^6 scale

“And I set my mind to seek and explore by wisdom concerning all that has been done under heaven It is a grievous task which God has given to the sons of men to be afflicted with.”
Ecclesiastes 1:13 NASB, 1995



centimeter 10^{-2} scale

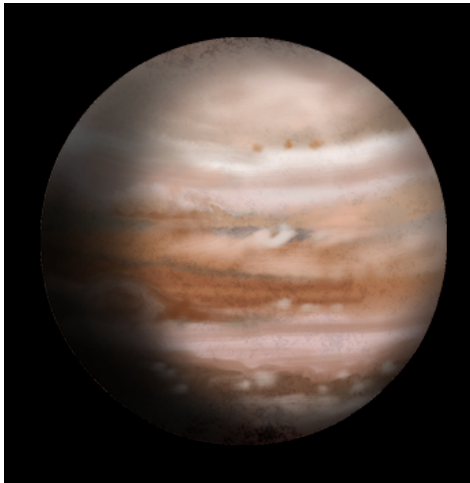
“How is the soil? Is it fertile or poor?
Are there trees on it or not?” Numbers
13:20a NLT, 2007



- Phoenix landed on Mars May 2008.
- This was the first image it returned to Earth.

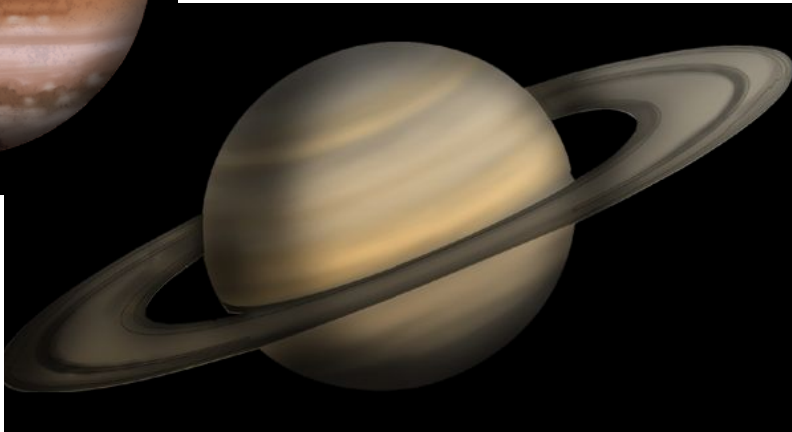
“At that time the disciples came to Jesus and said,
“Who then is greatest in the kingdom of heaven?””
Matthew 18:1 NASB, 1995

Megameter 10^6 scale



Jupiter

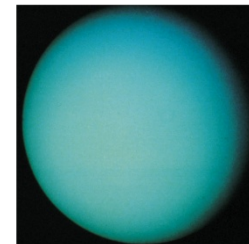
142 Mm



Saturn

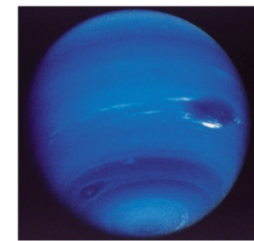
125 Mm

NASA, Hubble



Uranus

51 Mm



Neptune

49.5 Mm



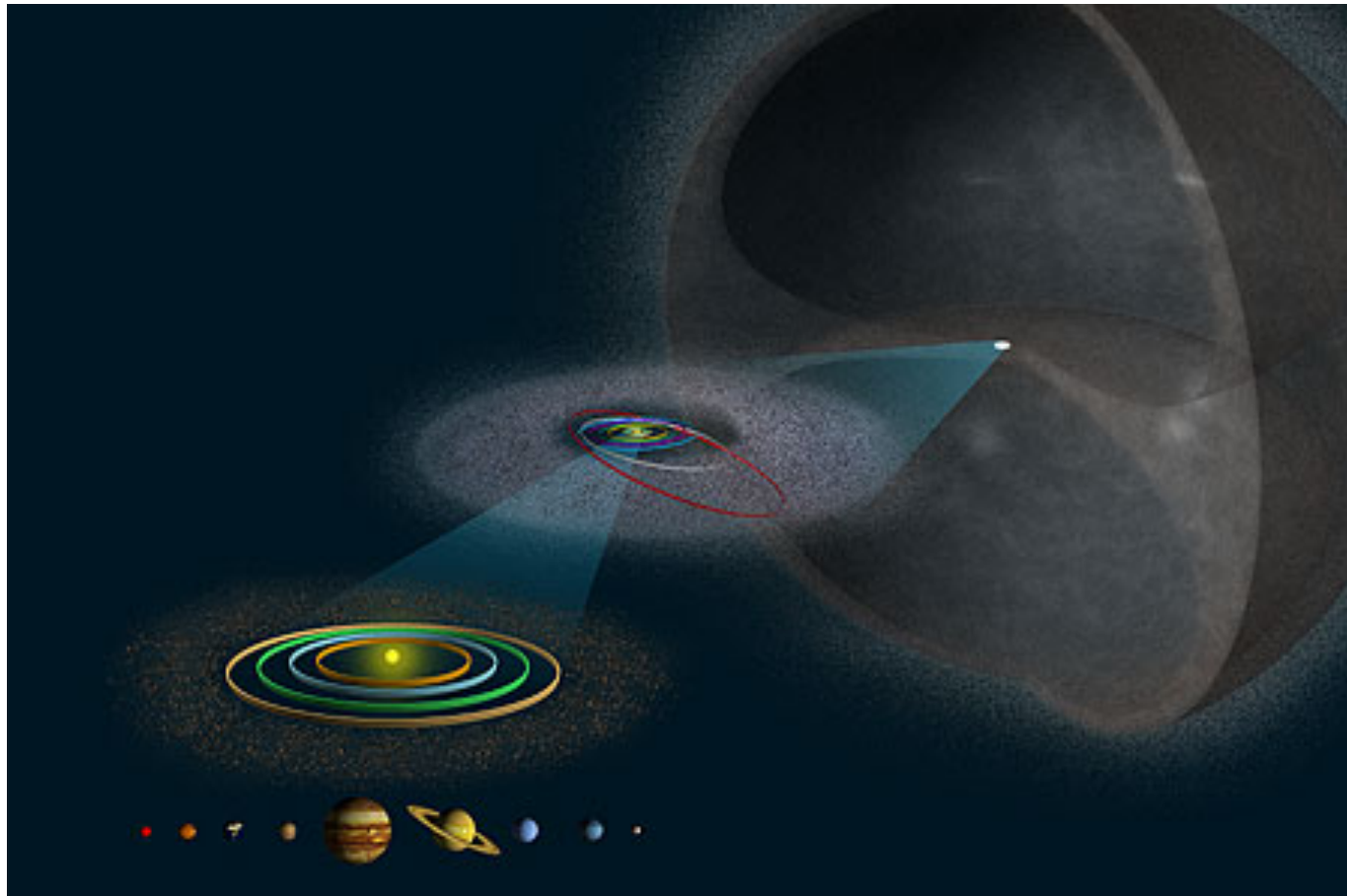
- As we venture out into the Solar system we find Jupiter's diameter is ~14 times that of the Earth

- Finally we find Pluto, ~6 terameters from Earth in the Kuiper Belt. The New Horizon mission should fly past Pluto in July 2015. We keep expanding our Solar System and finding more objects.



“Then he said to them, “Anyone who welcomes a little child like this on my behalf welcomes me, and anyone who welcomes me also welcomes my Father who sent me. Whoever is the least among you is the greatest.”” Luke 9:48 NLT, 2007

- The entire solar system lies inside the Oort cloud, a sphere of comets, 1.8 petameters in diameter. The cloud may contain trillions of loose lumps of dust and volatile gases which act as a protective shield. **petameter 10^{15} scale**

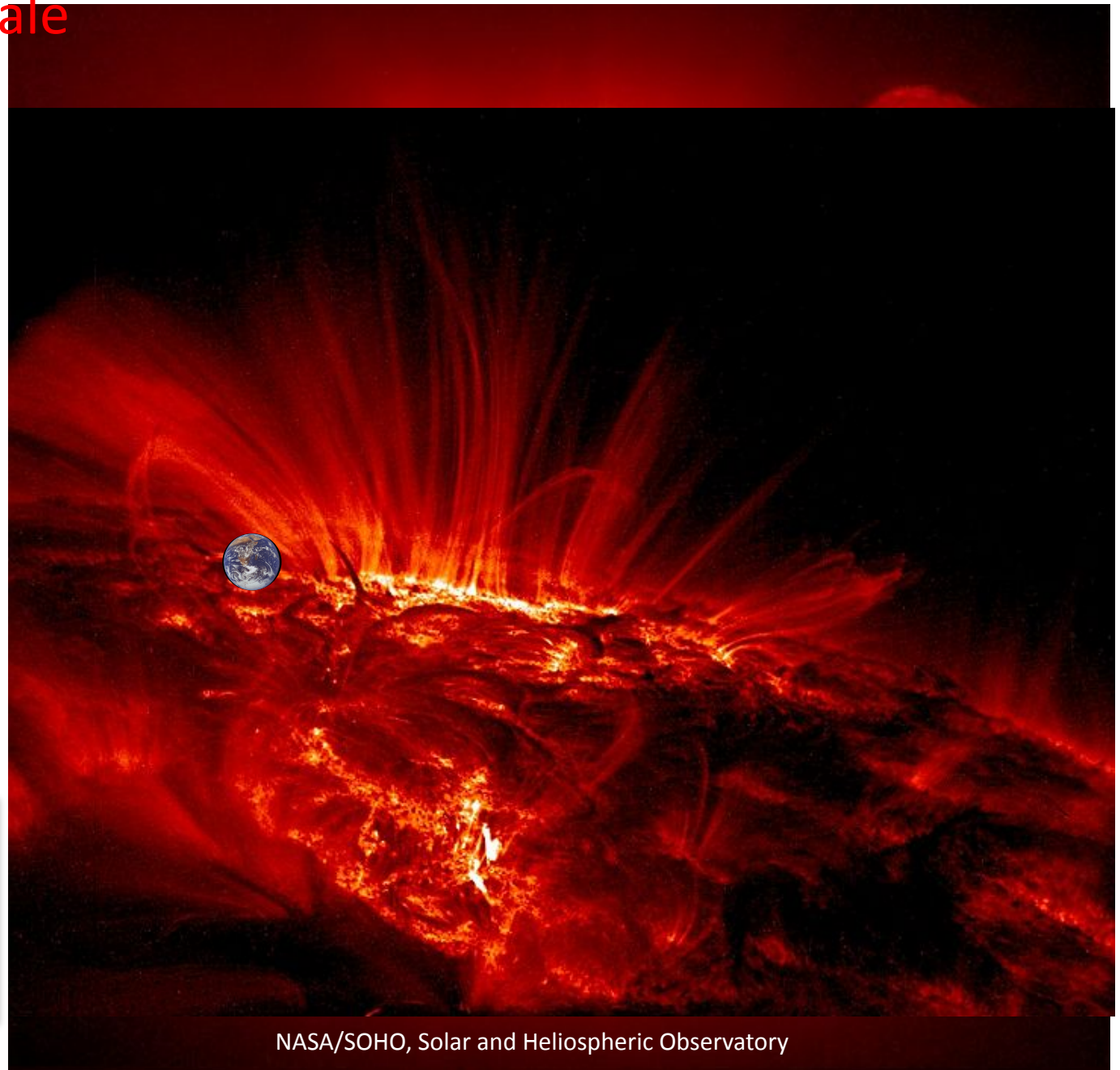


“but in these last days he has spoken to us by his Son, whom he appointed heir of all things, and through whom he made the universe. ” Hebrews 1:2 NIV, 1984

gigameter 10^9 scale

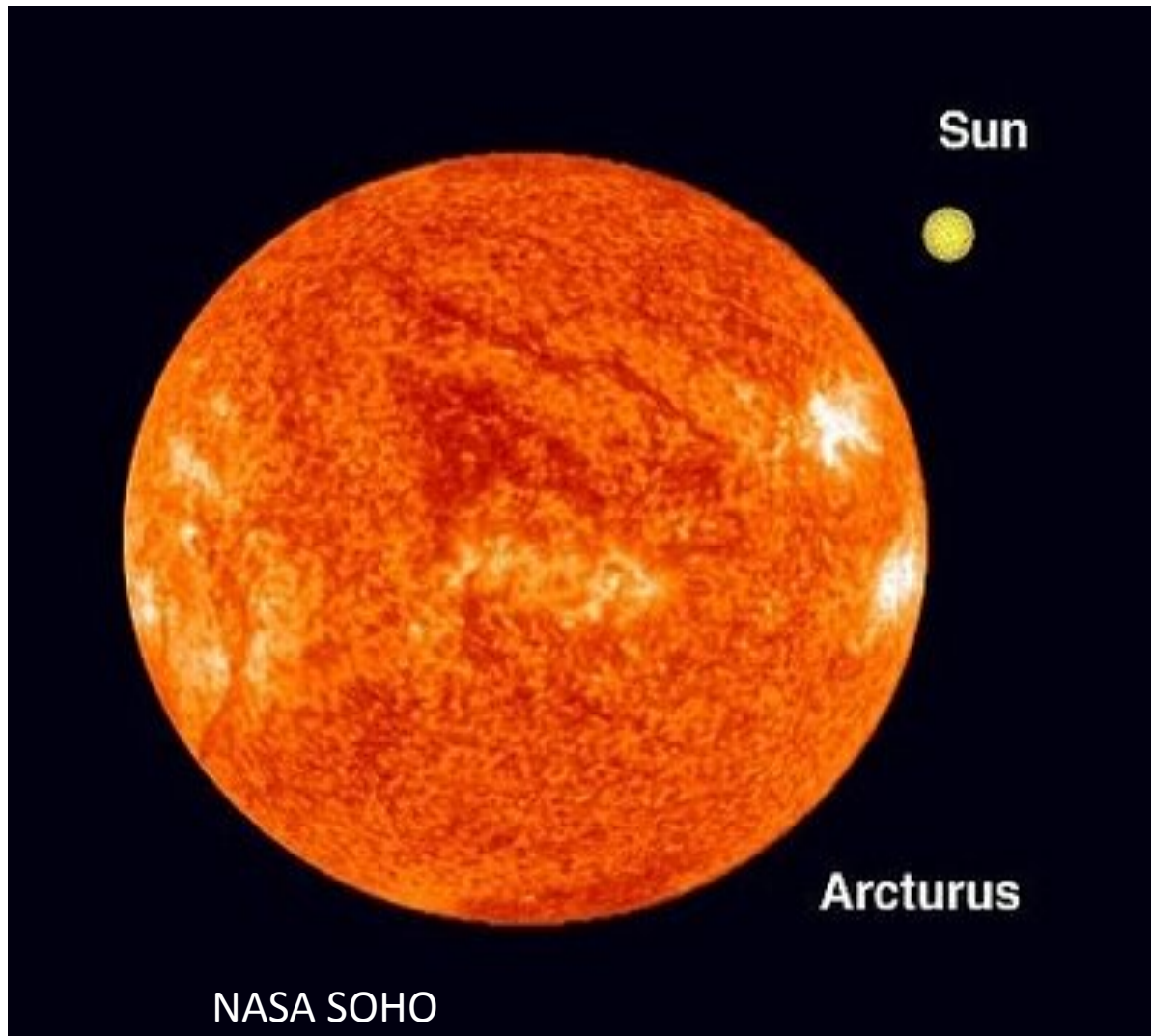
- ...the Sun
- 1.39 gigameters in diameter
- 1 million Earths could fit inside the sun 🌍

“From the rising of the sun to its setting
The name of the LORD is
to be praised.” Psalm
113:3 NASB, 1995



NASA/SOHO, Solar and Heliospheric Observatory

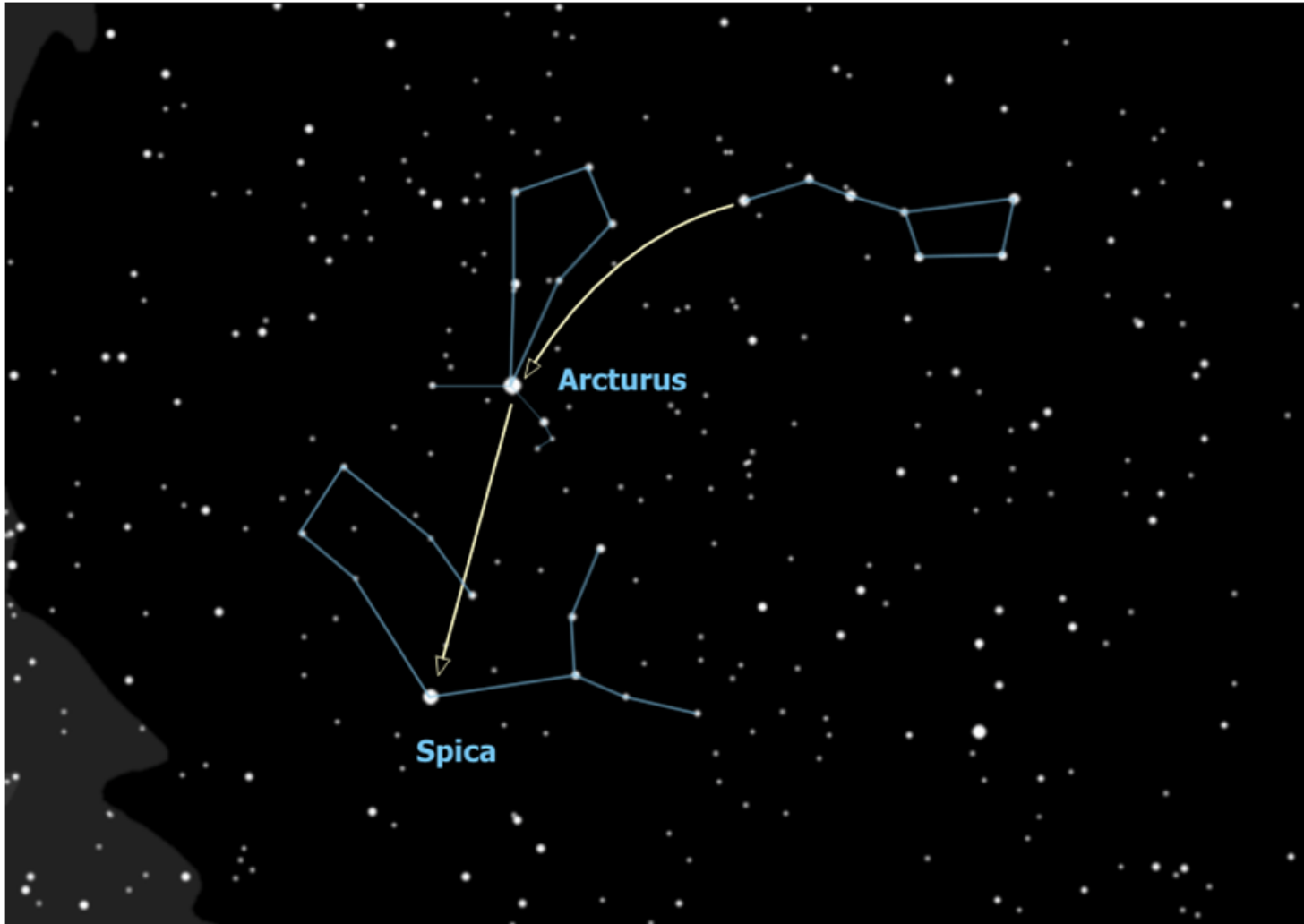
gigameter 10^9 scale



- Arcturus, a red giant, is 23 times bigger than the sun at 32 gigameters in diameter

“ When I look at the sky, which you have made,
at the moon and the stars, which you set in their places”
Psalm 8:3 NLT, 2007

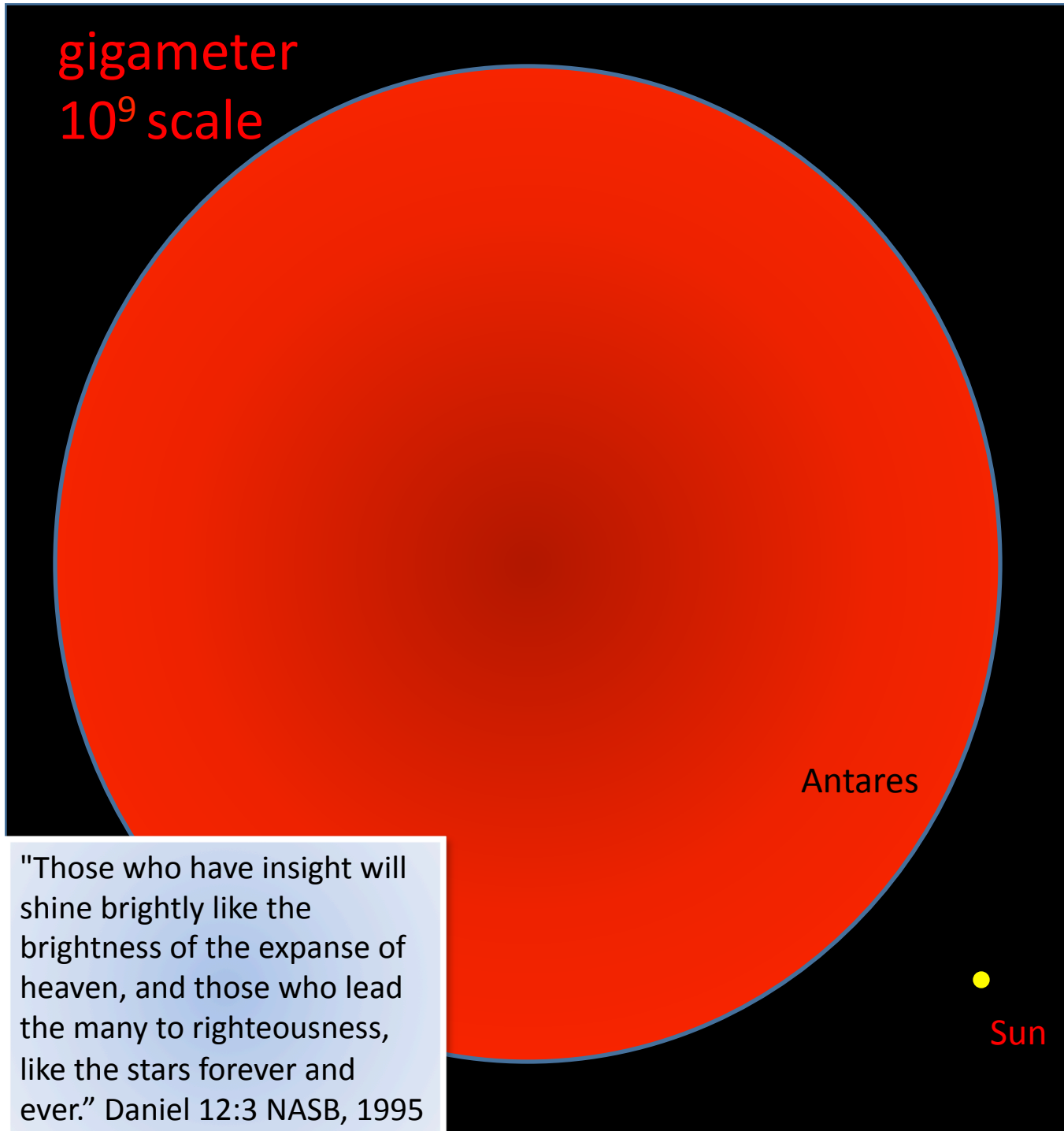
gigameter 10^9 scale



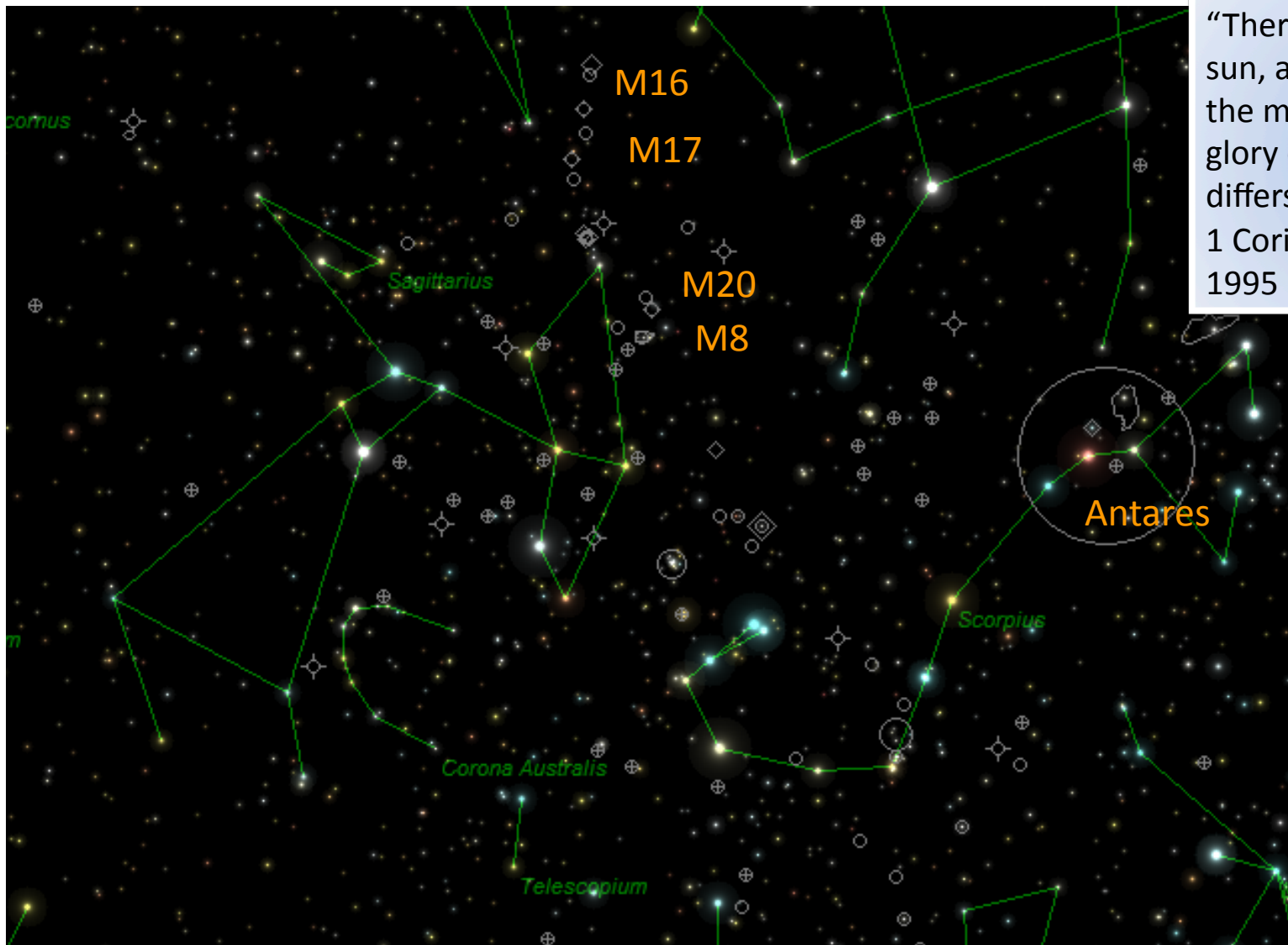
“You alone are the LORD. You have made the heavens, the heaven of heavens with all their host, the earth and all that is on it, the seas and all that is in them. You give life to all of them and the heavenly host bows down before You.”
Nehemiah 9:6 NASB, 1995

- And in the summer sky if you find the Big Dipper you can arc to the bright star Arcturus

gigameter
 10^9 scale



- Antares is 325 times bigger than the sun at 455 gigameters in diameter and far surpasses Arturus in brilliancy
- Fifty million of our suns could fit inside of Antares

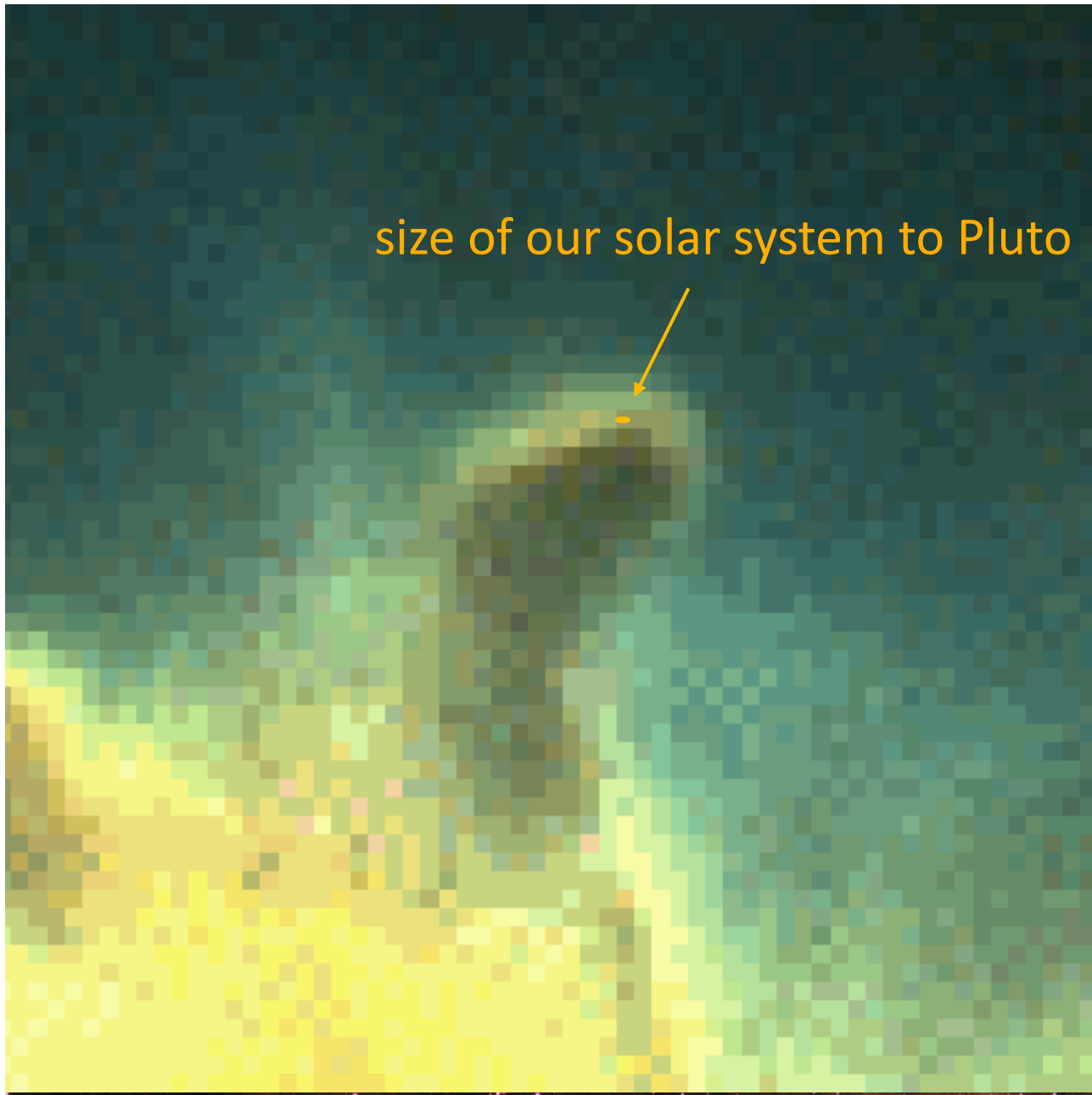


"There is one glory of the sun, and another glory of the moon, and another glory of the stars; for star differs from star in glory."
1 Corinthians 15:41 NASB, 1995

Sky Chart III,
2008

- Antares is the red star in Scorpio, South in the Summer sky.
- Yet Antares isn't that big look in Sagittarius, it contains M16 the Eagle Nebula **gigameter 10^9 scale**

- M-16 Eagle Nebula 25 petameters in diameter,



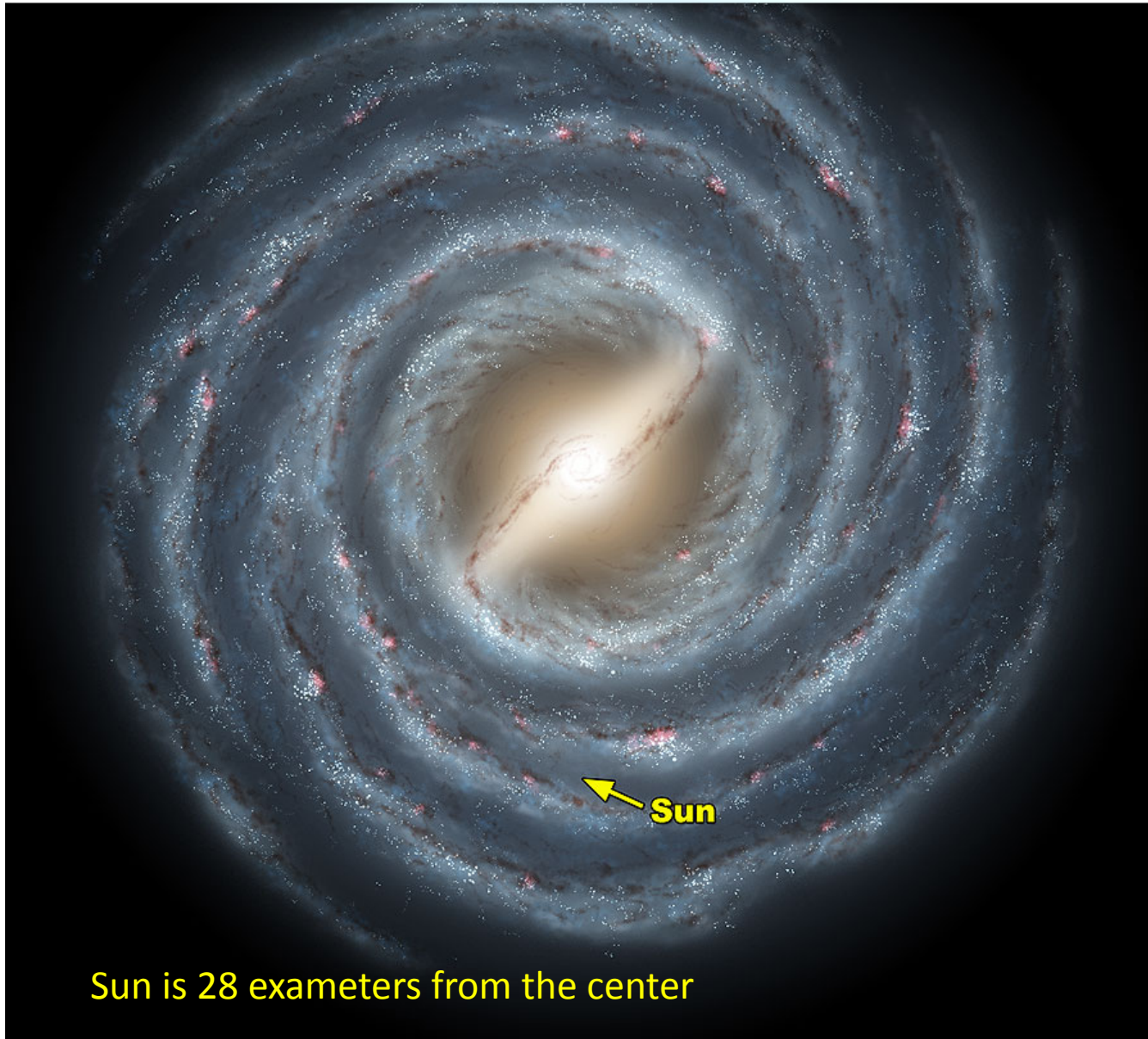
size of our solar system to Pluto

T.A.Rector (NRAO/AUI/NSF and
NOAO/AURA/NSF) and B.A.Wolpa
(NOAO/AURA/NSF)

Gigameter 10^9
scale

“You turn things around! Shall the potter be considered as equal with the clay, That what is made would say to its maker, "He did not make me"; Or what is formed say to him who formed it, "He has no understanding"?” Isaiah 29:16 NASB, 1995

“Indeed, ask now concerning the former days which were before you, since the day that God created man on the earth, and inquire from one end of the heavens to the other. Has anything been done like this great thing, or has anything been heard like it?” Deuteronomy 4:31-33 NASB, 1995



Sun is 28 exameters from the center

Our galaxy the Milky Way

- 100 exameters across
- 10,000,000,000 times bigger than the Eagle Nebula
- Our sun is one of 200-400 billion stars in the Milky Way

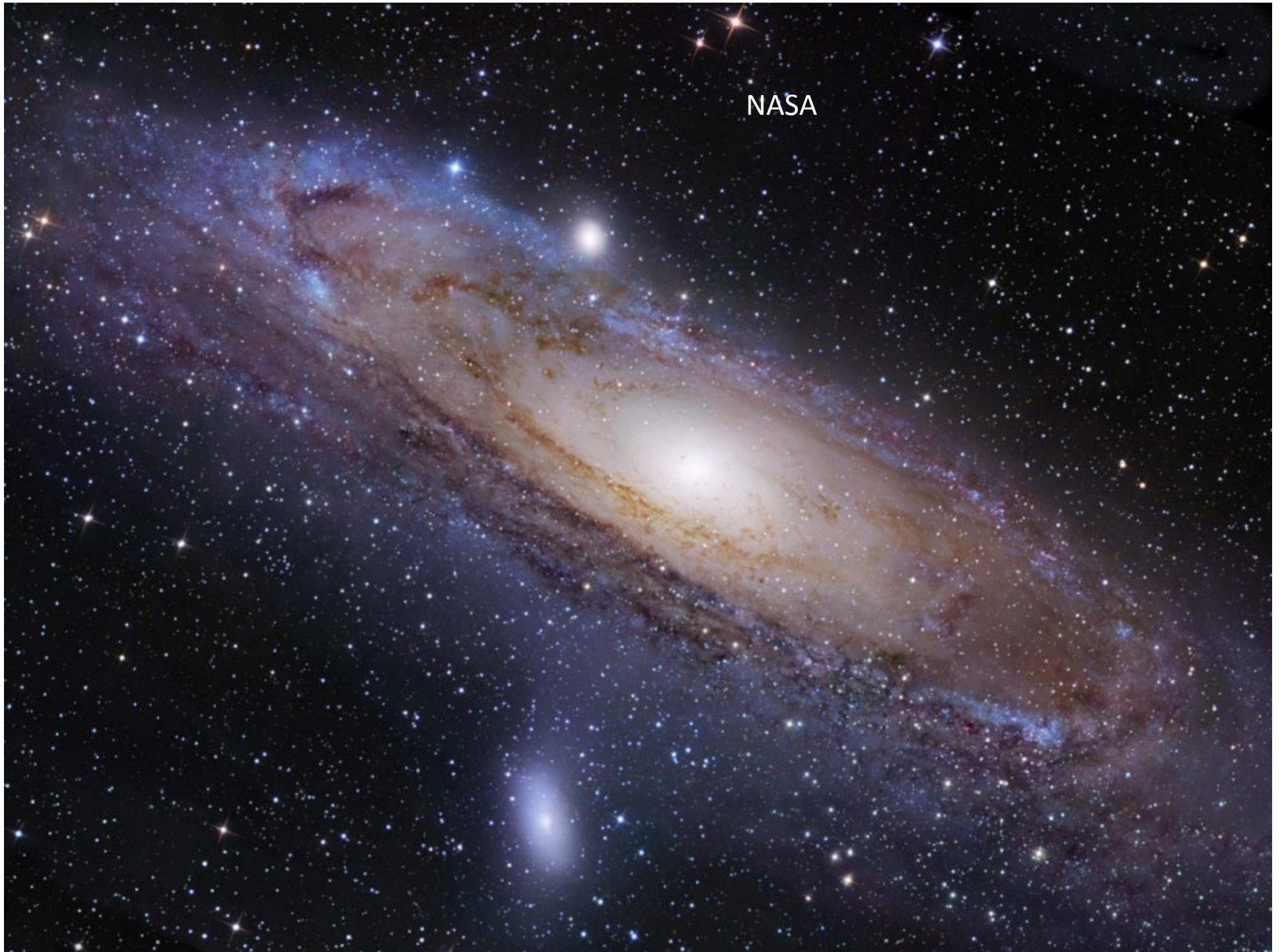
Exameter
 10^{18} scale

Yet with our own eyes we can view this vast expanse if we go but 20 km away from town on a dark night.



“Lift up your eyes on high And see who has created these stars, The One who leads forth their host by number, He calls them all by name; Because of the greatness of His might and the strength of His power, Not one of them is missing.”
Isaiah 40:26 NASB, 1995

Milazinkova
Creative Commons





zettameter
 10^{21} scale

exameter
 10^{18} scale

- M 31 Andromeda Galaxy 24 zettameters away
- 250 exameters across

"After these things I heard something like a loud voice of a great multitude in heaven, saying, "Hallelujah! Salvation and glory and power belong to our God;" Revelation 19:1 NASB, 1995

- The night sky is full of stars we can see from Earth using a backyard telescope or binoculars and a 100 or so nebula and galaxies. Yet it is difficult to grasp their actual distance and size

The universe appears just too extensive



“Who does great things, unfathomable, And wondrous works without number.” Job 9:10 NASB, 1995

Yet even now, we find expanding results and new discoveries.

The Hubble Deep Field, 2003



The longest, deepest exposure ever taken.

What was an empty piece of sky,
is now revealed. The Milky Way
is just one of 100,000,000,000
galaxies!

NASA STScI, the Hubble Space Telescope and the Hubble Deep Field Team.

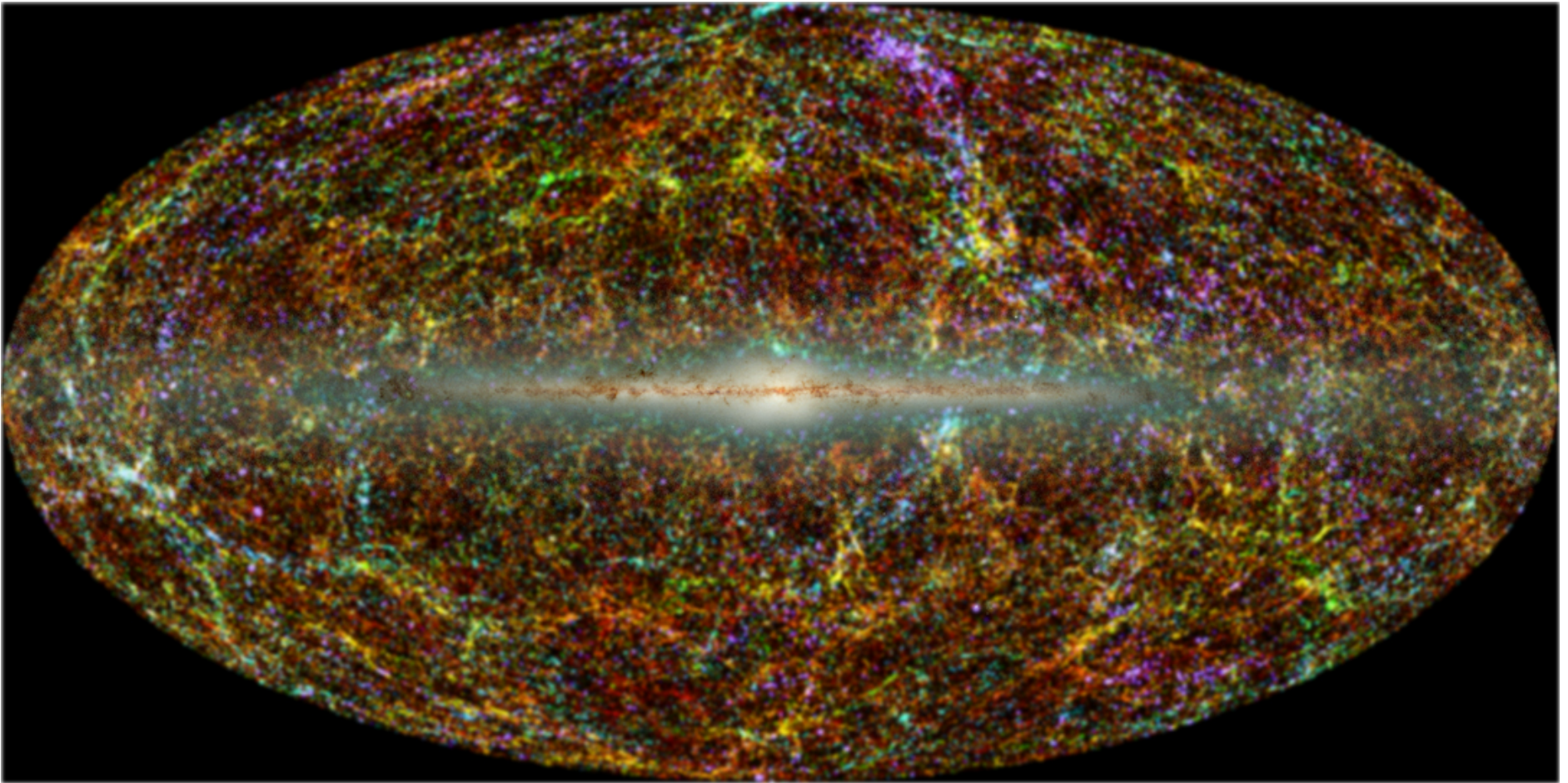
“Have you ever come on anything quite like this extravagant generosity of God, this deep, deep wisdom? It's way over our heads. We'll never figure it out. Is there anyone around who can explain God? Anyone smart enough to tell him what to do? Anyone who has done him such a huge favor that God has to ask his advice?

Everything comes from him;
Everything happens through him;
Everything ends up in him.

Always glory! Always praise!

Yes. Yes. Yes. “ Romans 11: 33-36
MSG, 2002

NASA, 2MASS Redshift Survey , NSF, Harvard, NOAO



- This IR all-sky map shows 1.5 million galaxies, blue (nearest), through green to red (most distant). The Milky Way blocks part of the map.

“Without question, this is the great mystery of our faith: Christ was revealed in a human body and vindicated by the Spirit. He was seen by angels and announced to the nations. He was believed in throughout the world and taken to heaven in glory.” 1 Timothy 3:16 NIV, 1984

And yet, filled with billions of galaxies, the universe is almost totally empty. The distances from one galaxy to another are beyond our imagination.

And the Creator of this universe is God, who with a Word spoke it all into being, who is present everywhere in this universe and beyond, who upholds it all with his mighty power.

Great is our God and greatly to be praised!



“The LORD merely spoke, and the heavens were created. He breathed the word, and all the stars were born. .. and let everyone stand in awe of him. For when he spoke, the world began! It appeared at his command.” Psalm 33:6, 8b, 9



“¹ In the beginning was the Word, and the Word was with God, and the Word was God. ² He was in the beginning with God. ³ All things came into being through Him, and apart from Him nothing came into being that has come into being. ⁴ In Him was life, and the life was the Light of men.... ¹² But as many as received Him, to them He gave the right to become children of God, *even* to those who believe in His name,” John 1:1-4, 12 NASB, 1995

So when you approach God today though his Son, Jesus, come with humility, a profound sense of wonder, and a sober understanding of his magnitude.

How big is God? He's big enough to care for me!

Thanks to:

“We” all the curious, creative, thinking & exploring scientists

Howard Payne University for their financial support

My Biochemistry and Astronomy students for helping me assign
scripture to the slides

My family for their encouragement

My church family for their prayers.

“And I set my mind to seek and explore
by wisdom concerning all that has been
done under heaven It is a grievous task
which God has given to the sons of men
to be afflicted with.” Ecclesiastes 1:13
NASB, 1995



Howard Payne is a university for those who want a hands-on, practical learning experience. At HPU we invest in one another's success and growth through teaching, learning and service.