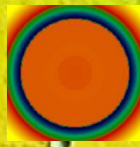


The Amazing Universe

Mark T. Hebner
TheAmazingUniverse.com

Red Super
Giant Star



You are
here

Milky Way Galaxy

THEAMAZINGUNIVERSE.COM

SURFACE OF MARS

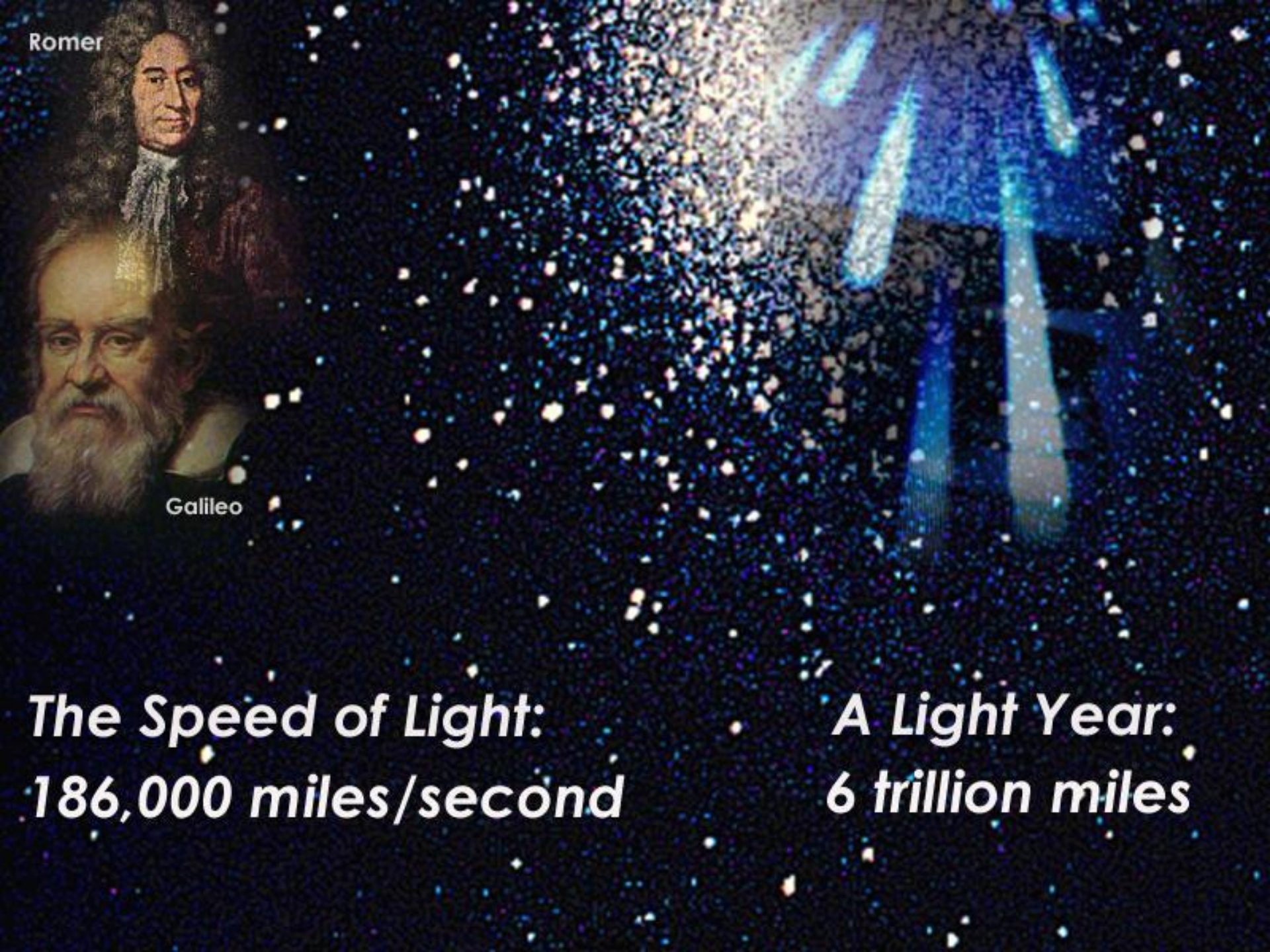


45Years
of Exploration

Why Bother with Space Exploration

- To Understand and Protect our planet
- To Explore the Universe and search for life
- To inspire future generations of explorers





Romer

Galileo

The Speed of Light:
186,000 miles/second

A Light Year:
6 trillion miles

Light Travel Time



Romer

Galileo

Earth to Moon: 1.3 seconds
Sun to Earth: 8.5 minutes
Sun to Mars: 12.5 minutes
Sun to Jupiter: 43 minutes
Sun to Nearest Star: 4.3 years
Sun to Nearest Galaxy: 2 million years
Sun to Furthest Star: 18 billion years

**THERE ARE OVER 100 BILLION
GALAXIES IN THE KNOWN UNIVERSE.**

Andromeda Galaxy

**EACH GALAXY CONTAINING
ABOUT 100 BILLION STARS.**

Sombrero Galaxy

Sombrero Galaxy • M104





TO MAKE THIS UNPRECEDENTED IMAGE OF THE COSMOS, THE HUBBLE TELESCOPE PEERED STRAIGHT THROUGH THE CENTER OF ONE OF THE MOST MASSIVE GALAXY CLUSTERS KNOWN, CALLED ABELL 1689.

LOOK CLOSELY TO SEE THE MANY GALAXIES IN THIS IMAGE. SOME OF THE FAINTEST OBJECTS IN THE PICTURE ARE PROBABLY OVER 13 BILLION LIGHT-YEARS AWAY.

Galaxy Cluster Abell 1689
Hubble Space Telescope • Advanced Camera for Surveys

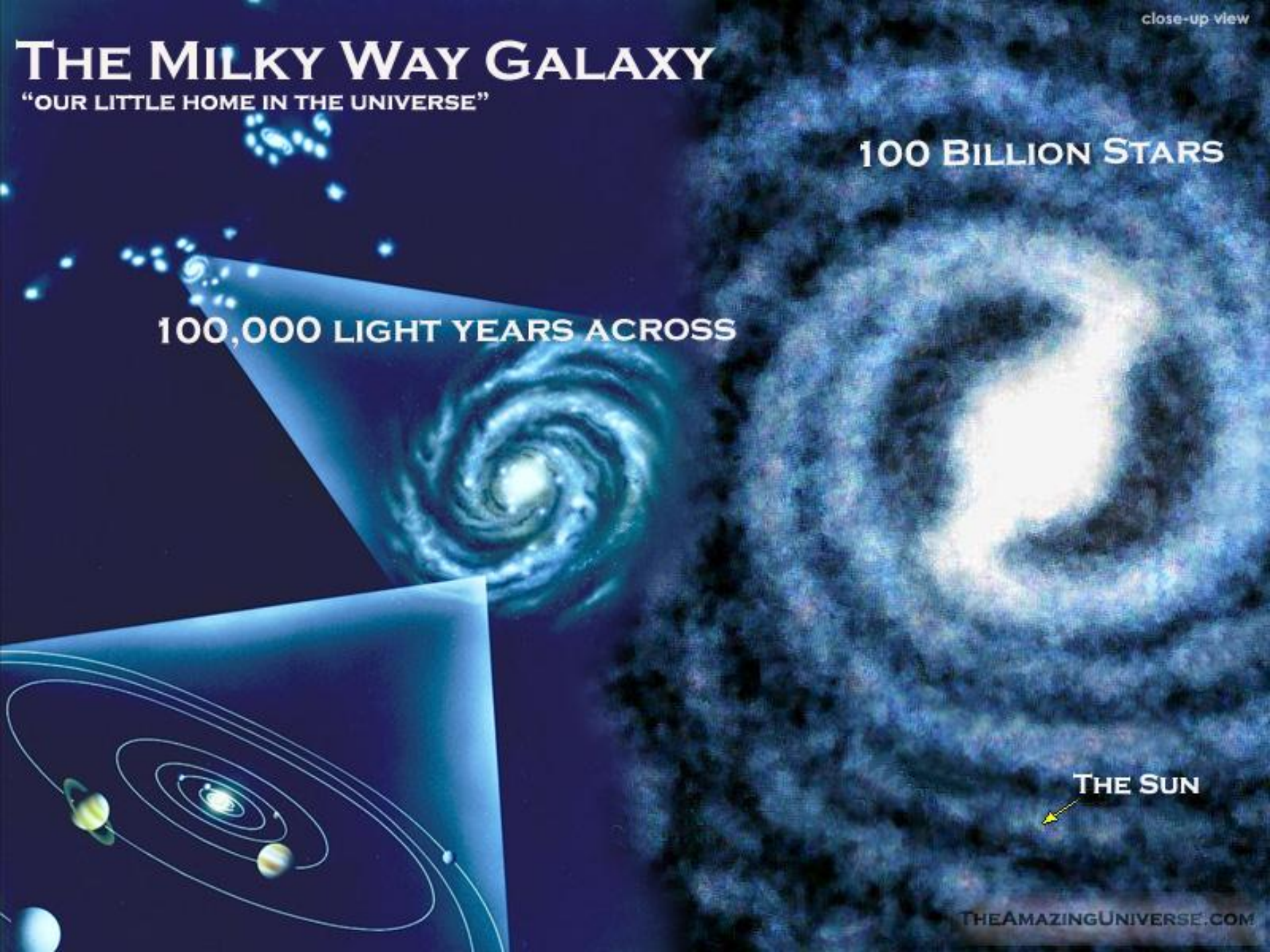
THE MILKY WAY GALAXY

"OUR LITTLE HOME IN THE UNIVERSE"

100 BILLION STARS

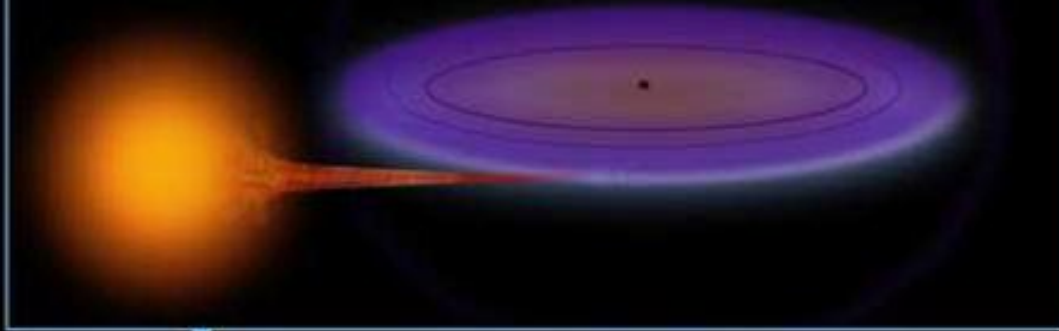
100,000 LIGHT YEARS ACROSS

THE SUN



Black hole's wild ride through the Milky Way

The black hole, liberated from a globular cluster some 7 billion years ago, has been cannibalizing its companion star ever since.



Edge-on view of orbit

Black hole

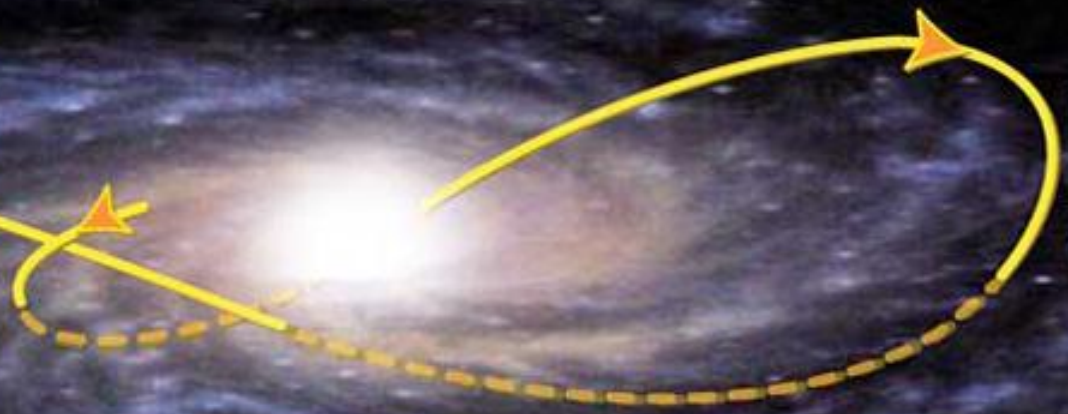
Sun

Milky Way



Our Sun

Black hole's orbit



**A STARS NEAREST NEIGHBOR
IS USUALLY 5 MILLION LIGHT YEARS
AWAY.**

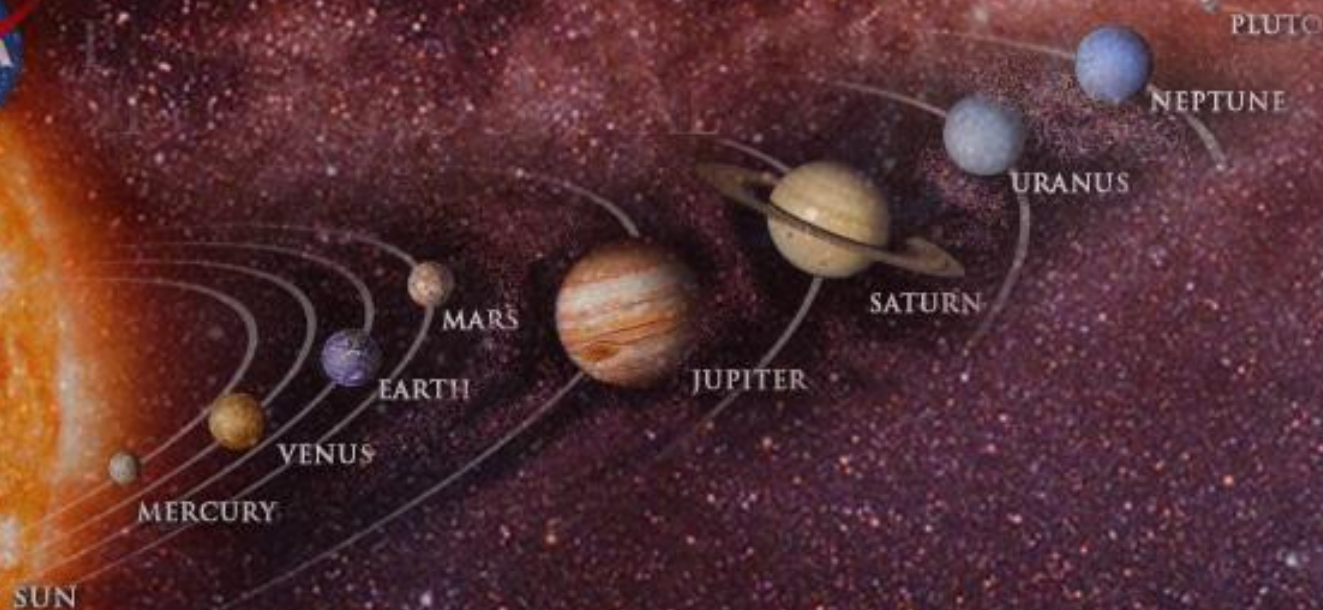
**IF YOU USED BASKETBALLS
TO REPRESENT THE SIZE OF
THE STARS, THE BASKETBALLS
WOULD HAVE TO BE PLACED
5,000 MILES APART.**



**TRYING TO FIND EARTH IN THE
MILKY WAY GALAXY IS LIKE
TRYING TO FIND A SPECK OF
DUST IN NORTH AMERICA.**



**THE SUN IS 93 MILLION MILES FROM EARTH
AND 4 BILLION MILES FROM PLUTO.**



**PLUTO TAKES
247 YEARS
TO MAKE ONE
JOURNEY
AROUND THE SUN**

**PLANET IS GREEK FOR "WANDERERS" BECAUSE
PLANETS MOVE AMONG THE APPARENTLY FIXED STARS.**



JUPITER

ALL THE PLANETS AND
THEIR MOONS OR 1,400
EARTHS WOULD FIT
INSIDE JUPITER.

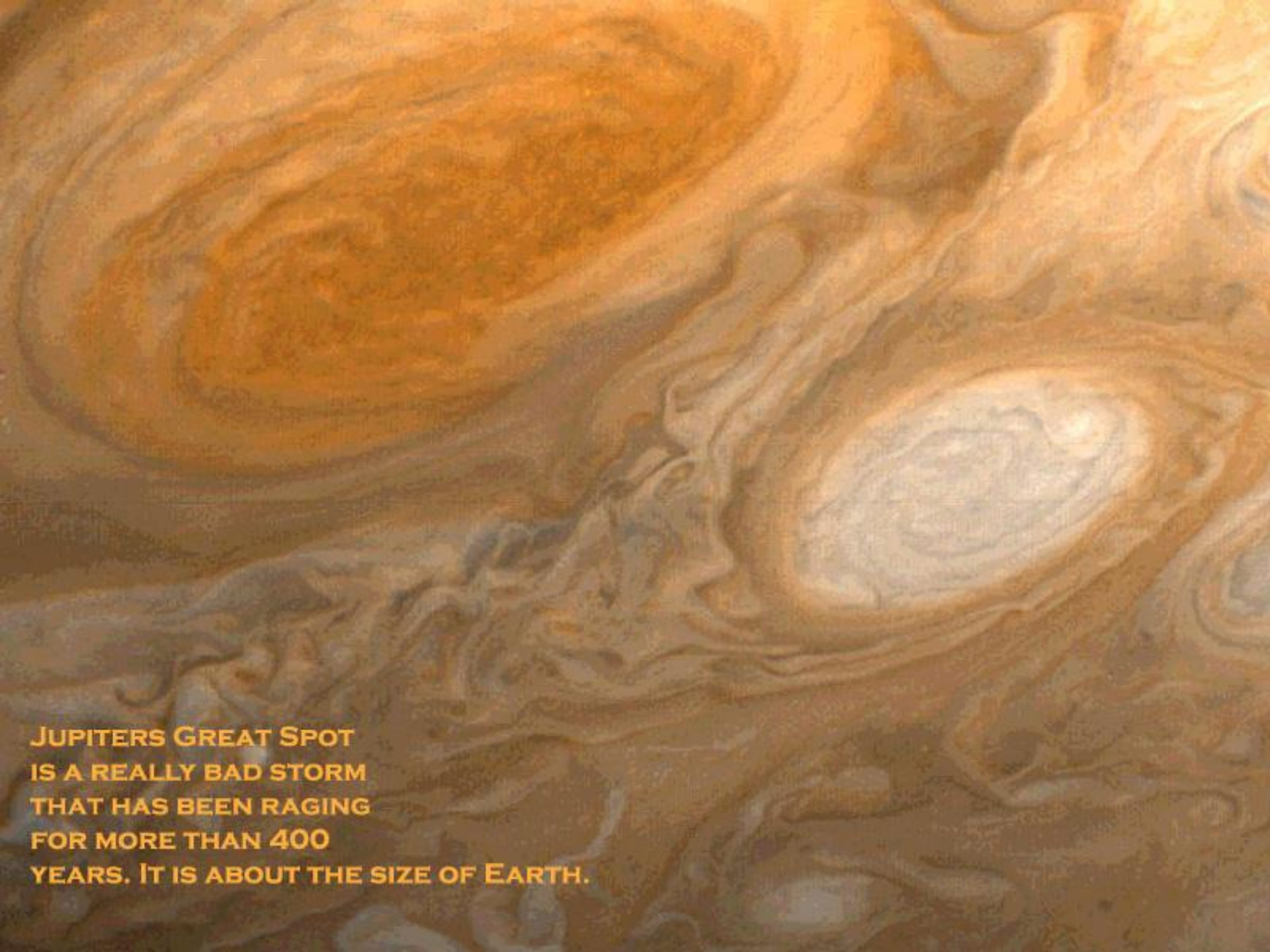
JUPITER IS SPINNING AT 25,000 MILES/HOUR

A DAY IN THE LIFE....

EARTH:	24 HOURS
JUPITER:	10 HOURS
VENUS:	5,832 HOURS
MERCURY:	1,406 HOURS



EARTH

The image is a detailed, artistic representation of Jupiter's Great Red Spot. It features a large, oval-shaped storm system with a prominent, lighter-colored core in the center, surrounded by swirling bands of orange, yellow, and white. The overall texture is fluid and dynamic, capturing the intense atmospheric activity of the planet. The colors are warm and vibrant, with a mix of bright yellows, oranges, and soft whites, creating a sense of depth and movement. The swirling patterns suggest the complex internal structure and long-lasting nature of this massive storm.

**JUPITERS GREAT SPOT
IS A REALLY BAD STORM
THAT HAS BEEN RAGING
FOR MORE THAN 400
YEARS. IT IS ABOUT THE SIZE OF EARTH.**

Sun



Aldebaran

Aldebaran



Arcturus

Sun

Red Supergiant

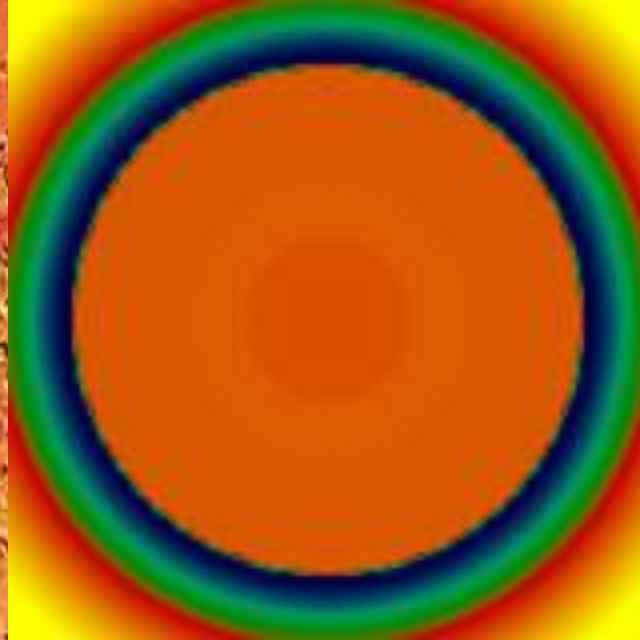
**THERE ARE A FEW RED SUPERGIANT STARS
THAT ARE A MILLION TIMES BRIGHTER THAN OUR SUN.**

Antares Red Supergiant

Phases of
Red Supergiant

THEAMAZINGUNIVERSE.COM

Red Supergiant Star Entropy



Entropy: the degradation of the matter and energy in the universe to an inactive state.

**THE EARTH TRAVELS
1,000 MILES/MINUTE
ON ITS PATH AROUND
THE SUN.**

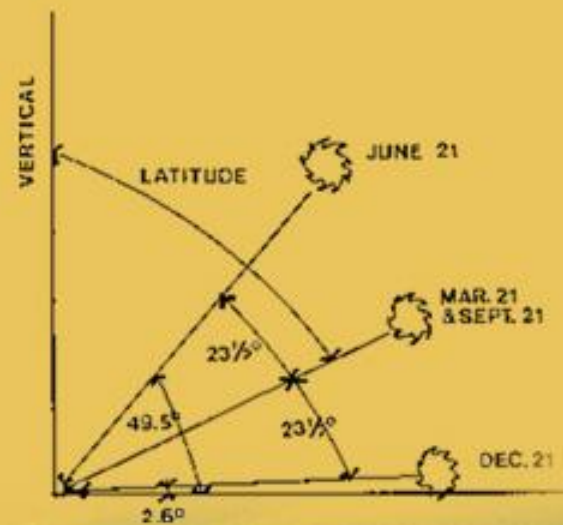


**OUR SOLAR SYSTEM TRAVELS
ABOUT 1,000 MILES/MINUTE
ON ITS PATH AROUND
THE MILKY WAY GALAXY.**



**IT TAKES 200 MILLION
YEARS TO COMPLETE
ONE ROTATION
AROUND THE GALAXY.**

**MIDNIGHT SUN ON SUMMER SOLSTICE
(JUNE 21) AT THE ARCTIC CIRCLE.
THE SUN SHINES FOR 24 HOURS STRAIGHT,
APPEARING TO CIRCLE THE HORIZON.**





A MYSTERIOUS ARC OF LIGHT FOUND BEHIND A DISTANT CLUSTER OF GALAXIES HAS TURNED OUT TO BE THE BIGGEST, BRIGHTEST, AND HOTTEST STAR-FORMING REGION EVER SEEN IN SPACE.

THE SPECTACULAR CLUSTER'S OPULENCE IS DIMMED WHEN SEEN FROM EARTH ONLY BECAUSE IT IS 12 BILLION LIGHT-YEARS AWAY.

Artist's View of Star Birth in the Lynx Arc

NASA, ESA and R. Fosbury (ESA/ST-ECF) • STScI-PRC03-32a

HORSEHEAD NEBULA

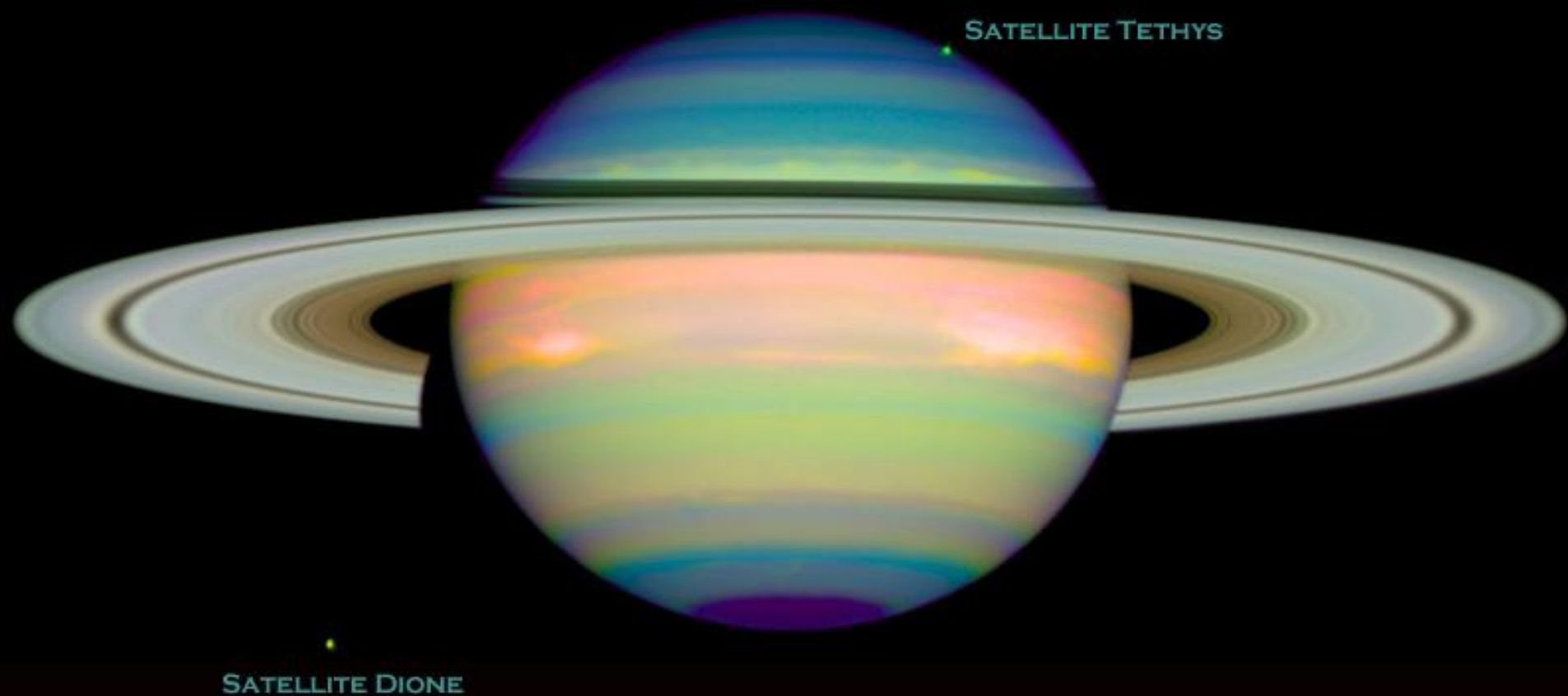


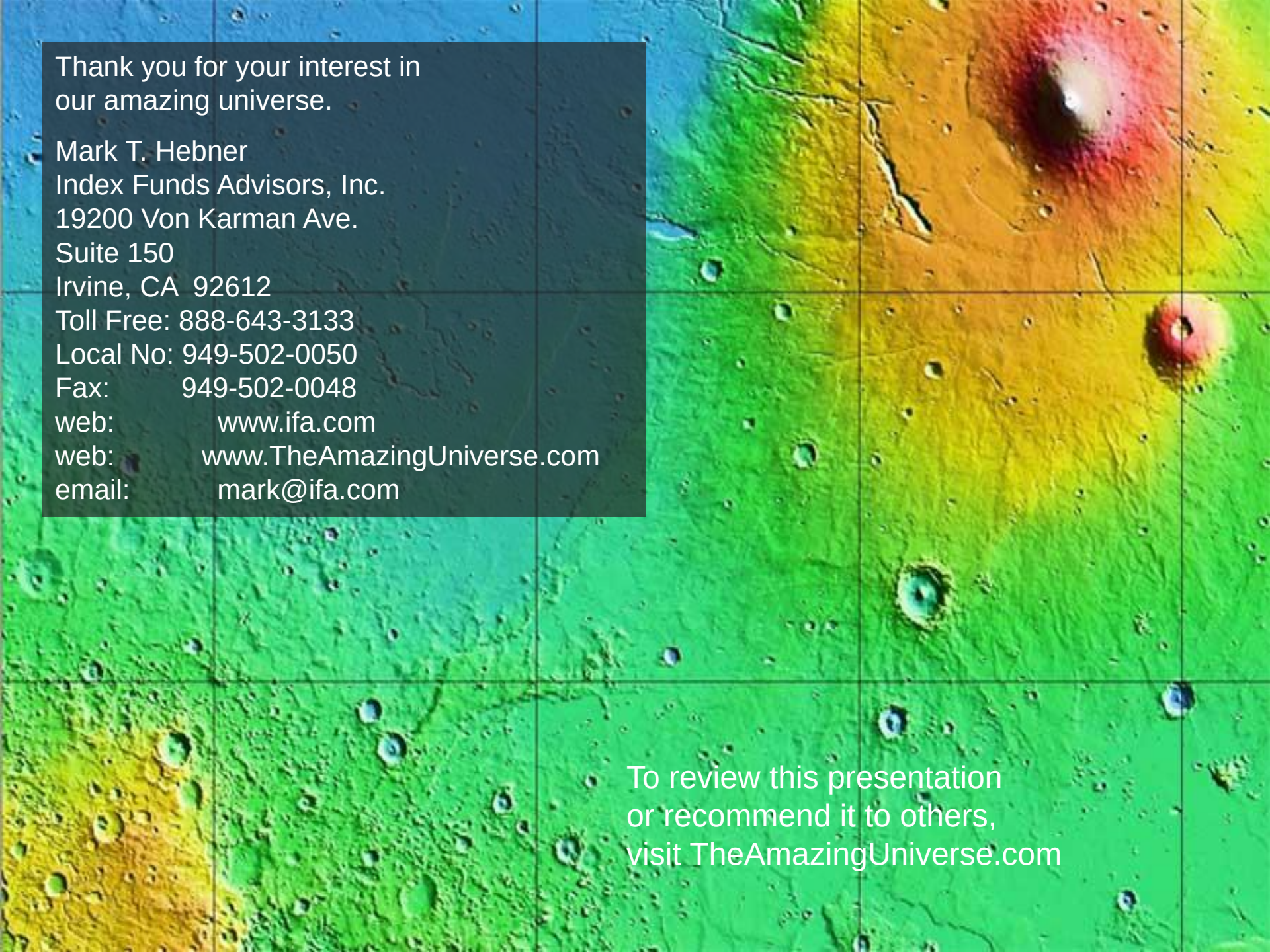
NEBULA: NUMEROUS CLOUDS OF GAS
OR DUST IN INTERSTELLAR SPACE

PELICAN NEBULA



SATURN





Thank you for your interest in
our amazing universe.

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