



*Little Leonardo's™ Fascinating World of Astronomy* introduces kids to the amazing study of that big, wide-open space above us—the Universe! Through fascinating facts and stunning illustrations of all things space, children will be encouraged to grab a telescope, get outside, and make a Universe discovery of their own.

With original Renaissance man Leonardo da Vinci as inspiration, these charming primers are the perfect way to encourage your brilliant child's interest in the fascinating worlds of the educational STEAM curriculum: Science, Technology, Engineering, the Arts, and Mathematics.

Sarafina Nance is an astrophysicist, women's health advocate, writer, speaker, and science communicator whose work has been featured in the *BBC*, *National Geographic*, *SF Chronicle*, and elsewhere.



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LITTLE LEONARDO'S™ Fascinating World of ASTRONOMY

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GIBBS SMITH

LITTLE LEONARDO'S™  
Fascinating World  
of **ASTRONOMY**



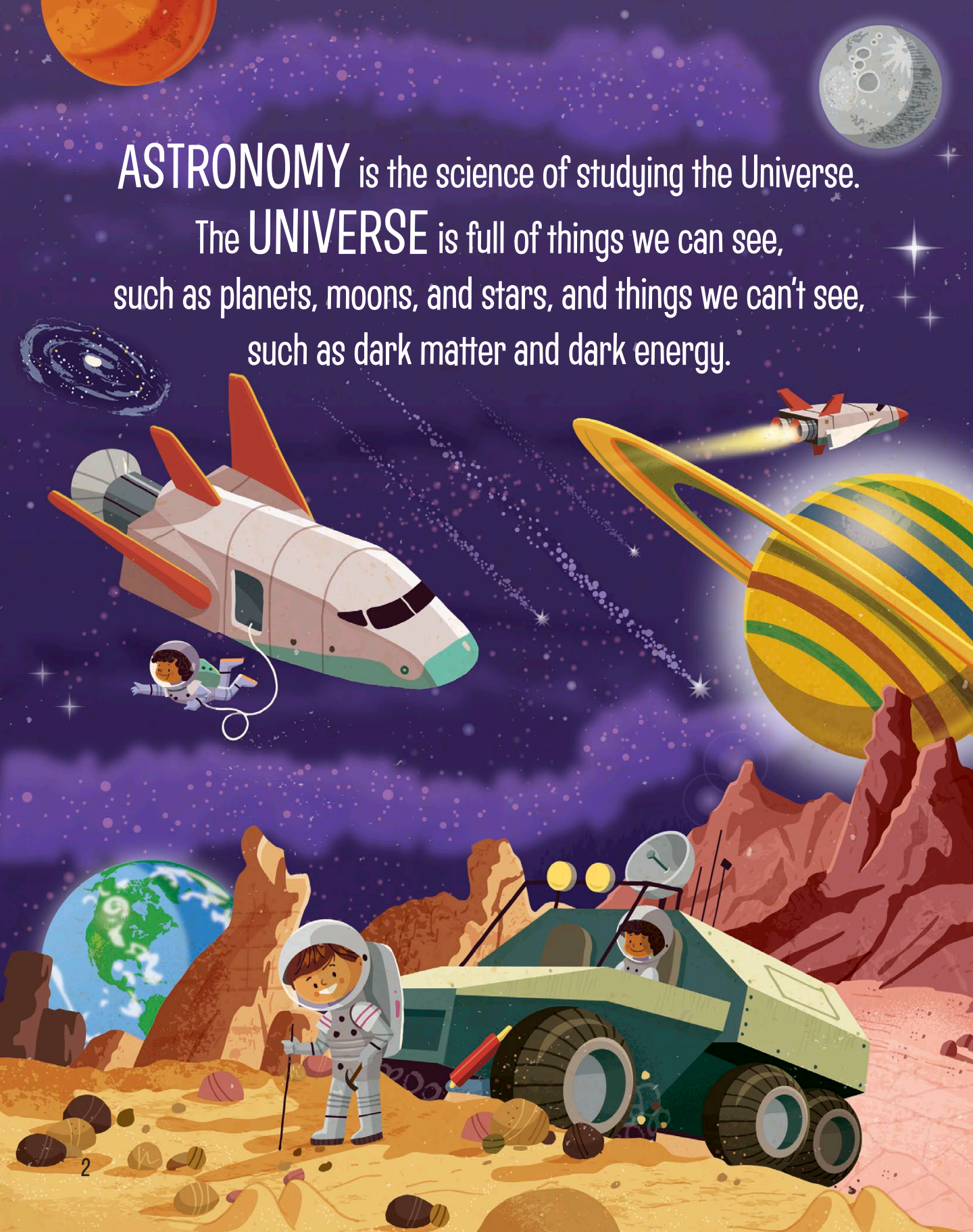
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**ASTRONOMY** is the science of studying the Universe.

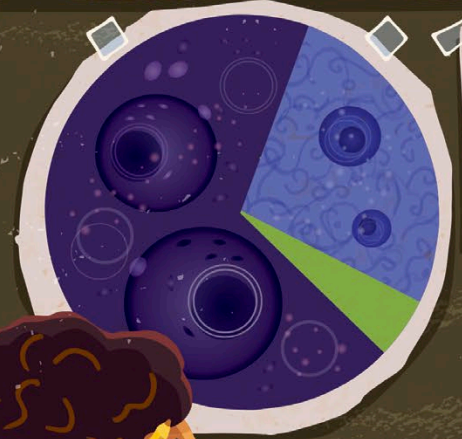
The **UNIVERSE** is full of things we can see, such as planets, moons, and stars, and things we can't see, such as dark matter and dark energy.



Everything you can see, touch, taste, and smell is actually just a teeny tiny part of the Universe. The rest of the Universe is made up of invisible matter, called **DARK MATTER**, and a mysterious force making the Universe get bigger and bigger over time, called **DARK ENERGY!**



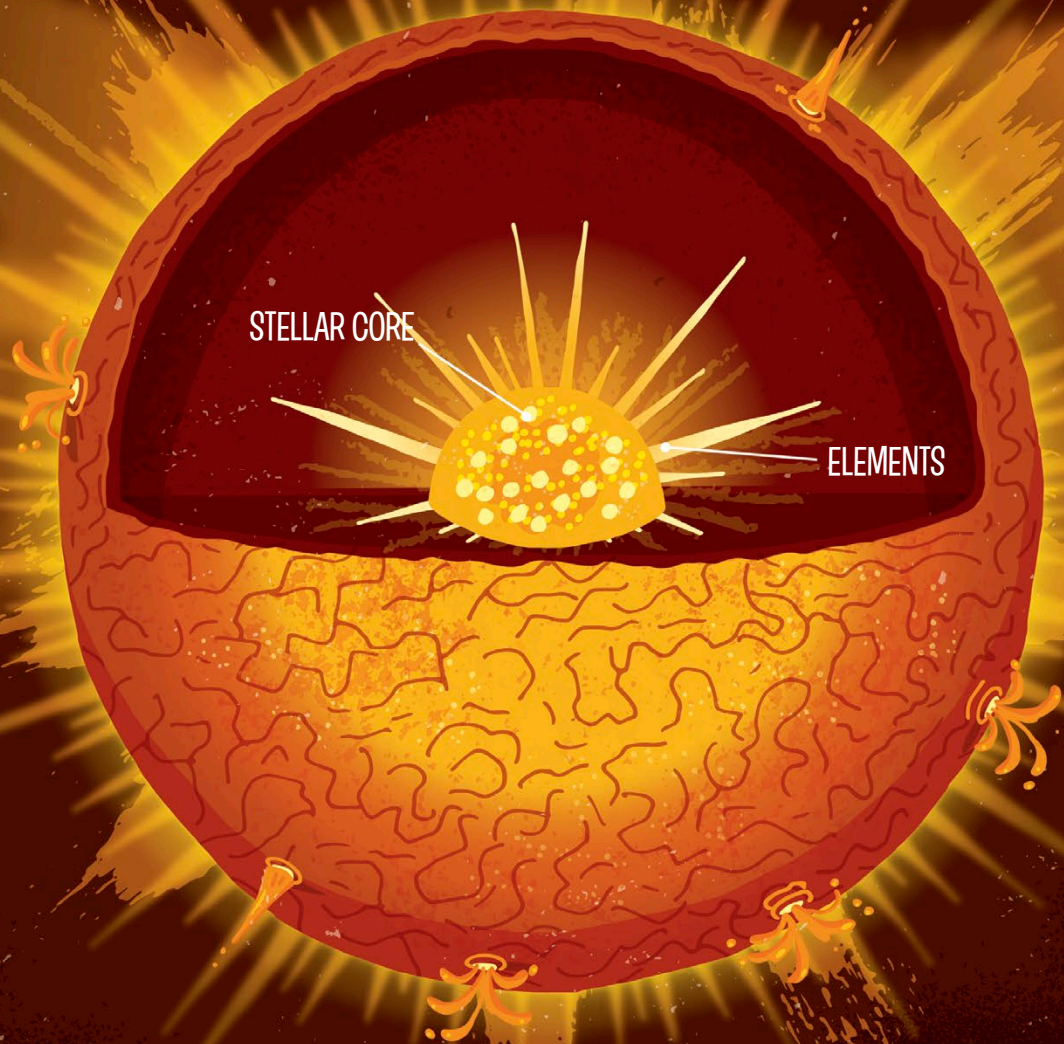
### Composition of the Universe



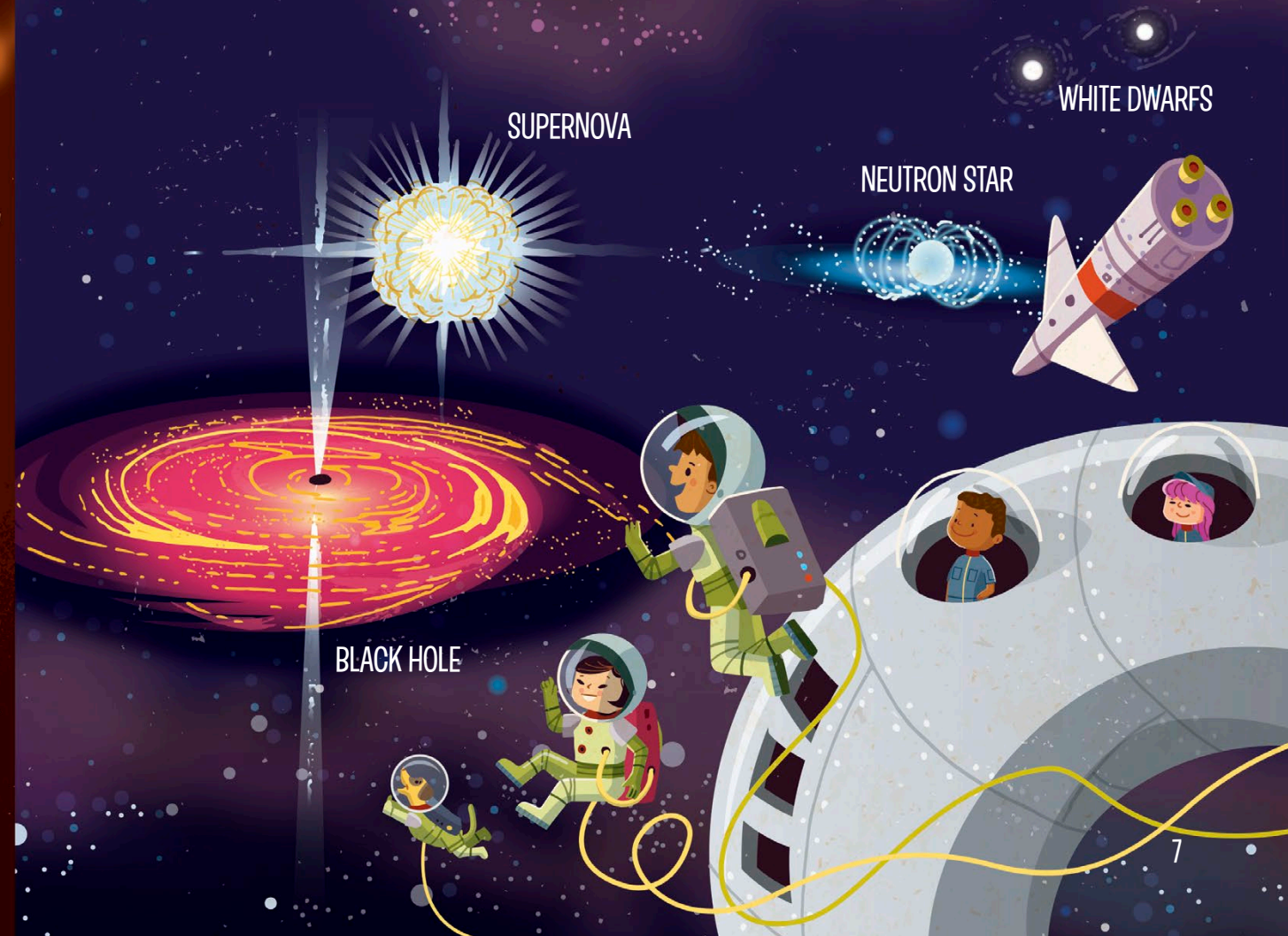
- 68% Dark Energy ???
- 27% Dark Matter ??
- 5% Normal Matter 🌱👤🌲



Deep inside the star, within the **STELLAR CORE**, tiny particles called **ELEMENTS** slam into each other to create light. This light, or starshine, is proof that some stars are alive.

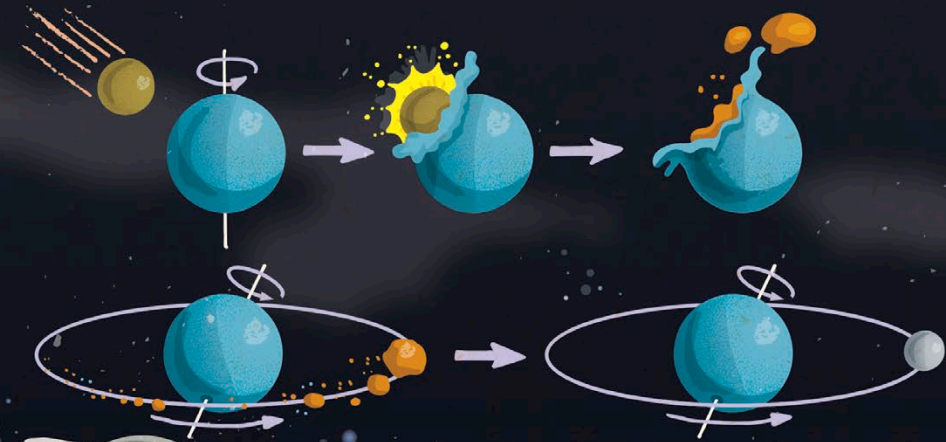


At the ends of their lives, stars can't shine any longer. Stars like our Sun fizzle out and fade away, shrinking to become **WHITE DWARFS**. And bigger stars explode as **SUPERNOVAE**. Some explosions leave behind a **NEUTRON STAR**, others collapse into **BLACK HOLES**, and the rest explode entirely, leaving nothing behind.





The Earth has one **MOON**, which orbits Earth and is thought to have formed through the **BIG SPLASH**. The Big Splash occurred when the Earth was just forming and a nearby small planet crashed into it. Our Moon is thought to have formed from the mixture created when the two planets combined.




Although our planet only has 1 Moon, Jupiter has 79 and Saturn has 82 moons!

Some planets are made of gas, like Jupiter, and some are made of rock, like Earth. Some planets, such as **55 CANCRI E**, are even made of diamond!







Humans learn all about the objects in the night sky by using **TELESCOPES**. The main job of a telescope is to collect light. The bigger the telescope is, the more light it collects and the farther away it can see. The biggest telescopes can spot the most distant objects in our Universe, such as the first-ever galaxies and stars.

Light comes in many different forms. In fact, human eyes are only able to see a small portion of all the light in the Universe.



# GLOSSARY

**55 CANCRI E:** A planet made of diamond orbiting a star like the Sun.



**ASTRONOMY:** The field of science that uses math, physics, and other sciences to study objects and phenomena outside of the Earth's atmosphere.

**BIG SPLASH:** A theory for the formation of our Moon, which suggests that the Moon formed from the collision of a small planet with the Earth.



**BINARY SYSTEMS:** A system formed when two objects in space, such as stars, orbit each other.

**BLACK HOLES:** Formed when massive stars explode, and their leftover cores collapse into a tiny region of space.



**DARK ENERGY:** The mysterious, invisible force propelling the Universe to grow and expand.

**DARK MATTER:** The invisible matter that makes up 27% of the contents of the Universe.



**ELEMENTS:** Tiny particles that are the building blocks of all matter in the Universe.

**EXOPLANETS:** Planets outside of our solar system that orbit stars other than the Sun.

**GALAXIES:** Groups of stars, gas, dust, and moons that are bound by gravity and move together in the Universe.



**GAMMA RAYS:** The light in our Universe with the most energy.



**HARBOR:** To support the growth of something. To give shelter and become a refuge.

**LIGHT:** A type of energy created in the cores of stars, which exists in small particles called photons.



**MILKY WAY:** A wide irregular band of light that stretches completely around the celestial sphere. Also our home galaxy.

**MOON:** A small planet-like object that orbits the Earth.



**NEUTRON STAR:** The leftover cores of dead stars that explode as supernovae.



**ORBIT:** The motion of objects traveling around another object, held together by gravity.

**PLANETS:** Large objects that orbit around stars.



**RADIO WAVES:** Light in our Universe that is used for radio telecommunications.

**SAGITTARIUS A\*:** The supermassive black hole at the center of the Milky Way, which holds our galaxy together.

**SOLAR SYSTEMS:** Systems of stars and orbiting planets.



**STAR:** A celestial object made up of gas and energy that shines when alive.



**STELLAR CORE:** The innermost part of a star, where light is created.

**SUPERNOVAE:** An explosion of a massive star when it is at the end of its life.

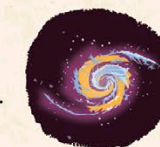


**TELESCOPES:** The primary tool that astronomers use to study the Universe. Telescopes collect light, allowing astronomers to see distant objects.



**ULTRAVIOLET WAVES:** Light in our Universe that is responsible for sunburns.

**UNIVERSE:** Everything we can touch, taste, see, smell, measure, and explore, for all time.



**WHITE DWARFS:** The leftover cores of dead stars that are not massive enough to explode as supernovae or collapse into black holes.

