

# CONDENSATION OF Electrons

By Mary Wissinger

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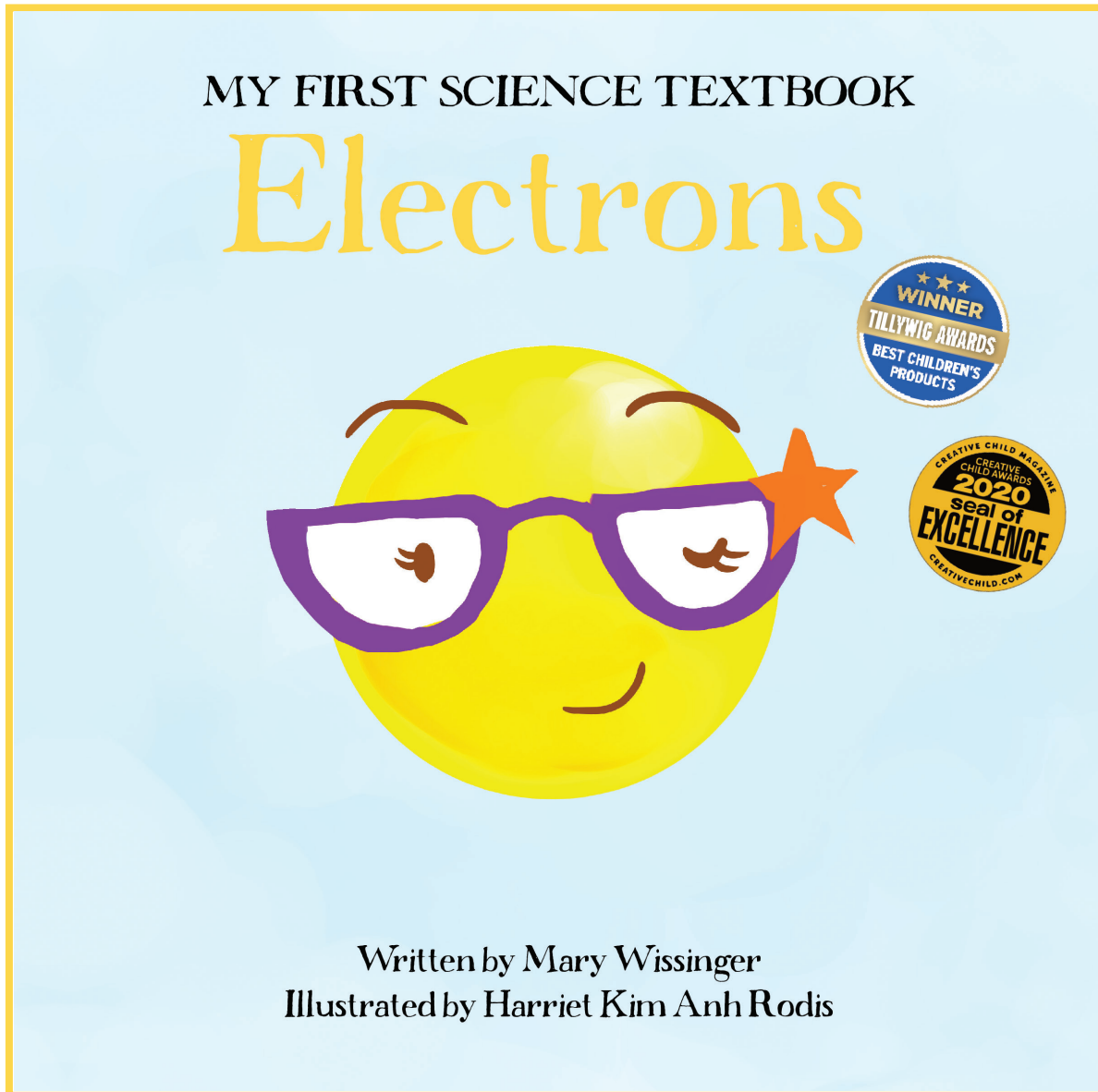
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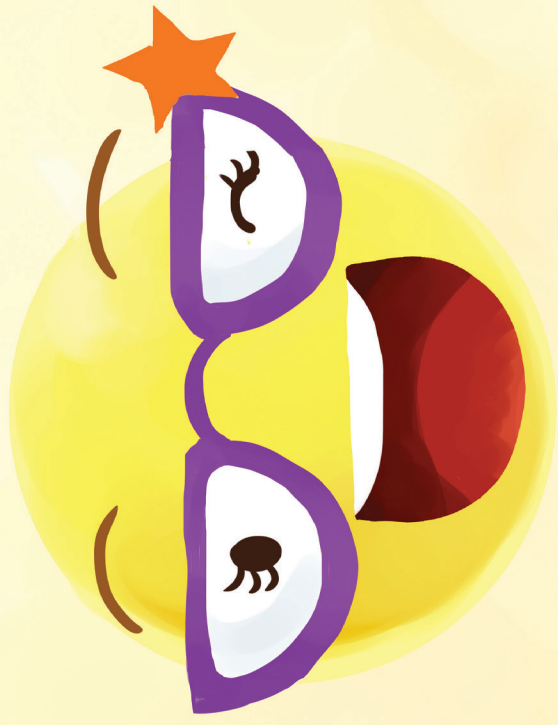
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I'm **Ellie** the **Electron**,  
a particle with class.

I'm negatively charged  
and have very little mass.



More **electrons** could fit on this dot



than there are people on the planet.





Pick which you'd like to calculate—  
my speed or my location.



14

You can't know both at once.  
It's an uncertain situation.



15

When it's cold and dry in winter,  
**electrons** build up when you walk.





If we were in a race, we could circle the world in eighteen seconds.

## Glossary

**ATOMS:** The building blocks for all matter in our universe. They are so small that you can't see them, and are made up of even smaller particles called protons, neutrons, and electrons.

**DOUBLE SLIT EXPERIMENT:** A demonstration showing that electrons can act like both waves and particles at the same time—a concept known as wave-particle duality.

**CHARGE:** An electric charge is a property of matter. There are two types of electric charges: positive and negative. Protons have a positive charge and electrons have a negative charge.

**ELECTRICITY:** A type of energy created when electrons move from one atom to another in the same direction. Electricity is the flow of electrons.

**ELECTRONS:** Very teeny particles with a negative electric charge. Electrons travel around the nucleus of every atom.

**HEISENBERG UNCERTAINTY PRINCIPLE:** A rule discovered by physicist Werner Heisenberg, which tells us that the location and the speed of a particle, like an electron, can't be measured at the same time.

**MASS:** A measure of how much matter is in an object. Mass is usually measured in kilograms (1 kg = a little over 2 pounds). Mass is different from weight because the mass of an object never changes, but its weight will change based on its location in the universe.

**NEUTRONS:** Very teeny particles with no electric charge, found in the nucleus of most atoms.

**NUCLEUS:** The center of an atom, made up of protons and neutrons.

**PARTICLES:** Tiny, singular bits of matter that can range in size from subatomic particles, such as electrons, to ones large enough to be seen, such as particles of dust floating in sunlight.

**PROBABILITY:** Probability is the likelihood that something will happen. It is impossible to know exactly where an electron will be inside an atom, because electrons are always moving very fast, but scientists can calculate the probability of an electron being in a certain area. An atomic orbital, or electron cloud (pictured as the ring around the nucleus), is the part of an atom where an electron is likely to be.

**PROTONS:** Very teeny particles with a positive electric charge. Protons are in the nucleus of every atom.

**STATIC SHOCK:** When an object or person has a negative charge from extra electrons, and they touch an object that has a positive charge from too few electrons, electricity jumps between the two. You might feel a static shock when you touch something made of metal.

**SUBATOMIC PARTICLE:** A particle that is smaller than an atom and exists within it, like protons, neutrons, or electrons.

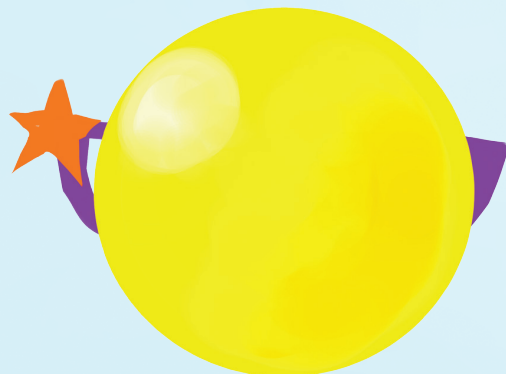
**WAVES:** A repeated up-and-down pattern of movement that lets energy travel from one place to another. Sound waves, light waves, and ocean waves are examples of different types of waves.



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Ellie the Electron's story is the stuff of chemistry legend, full of mystery and excitement. Join this sparky little particle on her adventures in the subatomic world!



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—Jen Lee, M.S., Senior Adjunct Professor of Chemistry,  
Atlantic Cape Community College, NJ

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