



## George and the Big Bang

By Stephen Hawking, Lucy Hawking

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This engaging adventure features essays by Professor Stephen Hawking and other eminent physicists about the origins of the universe and ends with a twenty-page graphic novel that explains how the Big Bang happened—in reverse!

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## **George and the Big Bang By Stephen Hawking, Lucy Hawking Bibliography**

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### Editorial Review

Review

GEORGE AND THE BIG BANG

Author: Hawking, Lucy

Author: Hawking, Stephen

Illustrator: Parsons, Garry

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Category: Fiction

Series: George

Volume: 3

Like their first two collaborations, the Hawkings' third and final George book offers a hybrid mixture of made-up adventures in space/time interleaved with miniessays on, as one character unoriginally puts it, "life, the Universe, and everything."

Most of the action centers on Switzerland's Large Hadron Collider, where the Order of Science to Benefit Humanity has gathered. The anti-environmentalist group Theory of Everything Resists Addition of Gravity (aka TOERAG, a tortured joke that American readers will miss) have planted a "quantum mechanical bomb" there, with a trigger that, quantum-theory style, remains indeterminate until it's observed. Meanwhile, though conveniently provided with a defusing code, young George and Annie have been imprisoned in an Inverse Schrödinger Trap (with a cat, of course) that will assume a random and therefore almost certainly deadly location somewhere in the universe should they try to leave. The story is interspersed with suitably seriocomic illustrations and pauses every few pages for digestible disquisitions (some by prominent scientists other than Hawking) on the Big Bang, wormholes, Feynman diagrams, major components of the LHC and other topics in Newtonian, quantum and theoretical physics. It is less a single plot than a weakly connected chain of incidents, fetching up where it should in the end.

Labored and wrapped in a thin film of artificial drama as it is, this set of mind-expanding if scattershot exposures to some of science's biggest theories and ideas will once again find a large audience thanks more to its celebrity coauthor than its content. (Science fiction/informational hybrid. 10-12)

*Kirkus Reviews*, May 15, 2012

HAWKING, Lucy & Stephen Hawking. *George and the Big Bang*. illus. by Garry Parsons. 304p. charts. diags. photos. CIP. S & S. 2012. Tr \$18.99. ISBN 978-1-4424-4005-0; ebook \$9.99. ISBN 978-1-4424-4007-4. LC 2011035361.

Gr 4 Up—Once again, George and his friends, next-door neighbor Annie and her scientist dad, Eric, are on an exciting adventure. Eric is using his super-computer, Cosmos, to work on one of the biggest science experiments of all time, namely the Large Hadron Collider, to explore the earliest moments of the universe known as "The Big Bang." When George and Annie decide to use Cosmos to help find a new home for George's pet pig, who was sent to a farm when George's twin sisters were born, they accidentally discover a plot by a group of people who are trying to stop the experiment and destroy the Collider. The children then

must use all the science they know to find a way to save the computer and the lives of the many scientists working on it. This addition to the series does not disappoint, and it stands on its own. The book alternates between the adventure story and factual explanations of the scientific terms and theories discussed. The science can be a bit complicated so the book also contains a series of factual essays written by Stephen Hawking and his colleagues. The series website provides additional information that will help students learn more about the science involved. This is an especially timely story now that the real Large Hadron Collider and the scientists working on it are in the news. Numerous diagrams, charts, and playful black-and-white pencil drawings add clarity and humor and help bring the characters to life.—Carole Phillips, Greenacres Elementary School, Scarsdale, NY (School Library Journal)

"This addition to the series does not disappoint." (School Library Journal)

"This set of mind-expanding...exposures to some of science's biggest theories and ideas will once again find a large audience." (Kirkus Reviews)

#### About the Author

##### Stephen Hawking

Stephen Hawking, a Lucasian Professor of Mathematics at Cambridge, is the preeminent theoretical physicist in the world. His book *A Brief History of Time* was a phenomenal worldwide bestseller. He has twelve honorary degrees and was awarded the Commander of the Order of the British Empire and was made a Companion of Honour. He has three children and one grandchild. Visit him at [Hawking.org.uk](http://Hawking.org.uk).

##### Lucy Hawking

Lucy Hawking, Stephen Hawking's daughter, is a journalist and novelist. She is the coauthor of *George's Secret Key to the Universe*, *George's Cosmic Treasure Hunt*, and *George and the Big Bang*, as well as the author of the adult novels *Jaded* and *Run for Your Life*. She lives in Cambridge with her son.

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#### Chapter One

*Where's the best place in the Universe for a pig to live?* Annie was typing onto the keyboard of Cosmos, the supercomputer. "Cosmos will know!" she declared. "He must be able to find Freddy somewhere better than that shabby old farm."

The farm where Freddy, the pig, now lived was actually perfectly nice—at least, all the other animals seemed happy there. Only Freddy, George's precious pig, was miserable.

"I feel awful," said George sadly as Cosmos, the world's greatest supercomputer, ran through his millions and billions of files to try to answer Annie's question about pigs. "Freddy was so angry he wouldn't even look at me."

"He looked at *me!*" said Annie hotly, glaring at the screen. "I definitely saw him send me a message with his piggy eyes. It was: *HELP! GET ME OUT OF HERE!*"

The day trip to visit Freddy at the farm just outside Foxbridge, the university town where George and Annie

lived, had not been a success. When Annie's mom, Susan, arrived to pick them up at the end of the afternoon, she was surprised to see George red-faced and furious and Annie on the verge of tears.

"George! Annie!" said Susan. "What is the matter with the two of you?"

"It's Freddy!" burst out Annie, leaping into the backseat of the car. "He hates it at the farm."

Freddy was George's pet pig. He had been a Christmas present from George's gran when he was a piglet. George's parents were eco-activists, which also meant they weren't very interested in presents. They didn't like the way all the discarded, broken, and unwanted toys left over from Christmas built up into huge mounds of old plastic and metal, floating across the seas, choking whales and strangling seagulls, or making mountains of ugly junk on the land.

George's gran knew that if she gave George an ordinary present, his parents would give it right back, and everyone would get upset. So if he was to keep his Christmas present, she realized she would have to think of something special—something that *helped* the planet rather than destroyed it.

That's why, one cold Christmas Eve, George found a cardboard box on the doorstep. Inside it was a little pink piglet and a note from Gran saying: *Can you give this young pig a nice home?* George had been thrilled. He had a Christmas present his parents had to let him keep; and, even better, he had his very own pig.

The problem with little pink piglets, however, is that they get bigger. Bigger and bigger, until they are enormous—too large for the backyard of an ordinary row house with a narrow strip of land and scattered vegetables growing between the two fences separating it from the neighboring yards. But George's parents had kind hearts really, so Freddy, as George named the pig, had continued living in his pigsty in the backyard until he reached a gigantic size—he was now more like a baby elephant than a pig. George didn't care how big Freddy got—he was very fond of his pig and spent long hours in the yard, chatting to him or just sitting in his huge shadow, reading books about the wonders of the cosmos.

But George's dad, Terence, had never really liked Freddy. Freddy was too big, too piggy, too pink, and he enjoyed dancing on Terence's carefully arranged vegetable plot, trampling his spinach and broccoli and munching thoughtlessly on his carrot tops. Last summer, before the twins were born, the whole family had been going away. Terence had been super-quick to find Freddy a place at a nearby children's petting farm, promising George that when they all got back, the pig would be able to come home.

Only this never happened. George and his parents returned from their adventures, and George's next-door neighbors—the scientist Eric, his wife, Susan, and their daughter, Annie—came back from living in America. Then George's mother had twin baby girls, Juno and Hera, who cried and gurgled and smiled. And then cried some more. And every time one of them stopped crying, there would be a beautiful half-second of silence. Then the other baby would start up, wailing until George thought his brain would explode and start leaking out of his ears. His mom and dad always looked stressed and tired, and George felt bad about asking them for anything at all. So once Annie came back from America, he started slipping through the hole in the back fence more and more often, until he was practically living with his friend, her crazy family, and the world's greatest supercomputer in the house next door.

But it was worse for Freddy, because he never made it home at all.

Once the baby girls were born, George's dad said they had enough on their hands without a great big pig taking up most of the backyard. "Anyway," he told George rather pompously when he protested, "Freddy is

a creature of planet Earth. He doesn't belong to you—he belongs to nature.”

But Freddy couldn't even stay in his small, friendly petting farm, which had to close at the beginning of this summer vacation. Freddy—along with the other animals there—had been moved to a bigger place where there were unusual breeds of farm animal, and lots of visitors, especially during summer vacation. It was a bit like him and Annie moving up to middle school, George thought to himself—going somewhere much bigger. It was a bit scary.

“Nature, huh!” he snorted to himself as he remembered his dad's comments now. Cosmos the computer was still chewing over the complicated question of the best location in the Universe for a homeless pig. “I don't think Freddy knows he's a creature of planet Earth—he just wants to be with us,” said George.

“He looked so sad!” said Annie. “I'm sure he was crying.”

On their trip to the farm earlier that day, George and Annie had come across Freddy lying flat on his stomach on the floor of his pig pen, legs splayed out on either side, his eyes dull and his cheeks sunken. The other pigs were trotting around, looking cheerful and healthy. The pen was spacious and airy, the farm clean, and the people that worked there friendly. But even so, Freddy seemed lost in a piggy hell of his own. George felt incredibly guilty. Summer vacation had passed and he hadn't done anything about getting Freddy home again. It was Annie who had suggested making the trip to the farm today, badgering her mom into driving them there and picking them up again afterward.

George and Annie had asked the workers what was wrong with Freddy. They'd looked worried too. The vet had examined him: Freddy wasn't sick, she'd said; he just seemed very unhappy, as though he was pining away. After all, he had grown up in George's quiet backyard, and had then moved to a small farm with just a few children coming to pet him. In the new place he was surrounded by noisy, unfamiliar animals and had lots of visitors every day: It was probably a big shock. Freddy had never lived with his fellow pigs before. He was totally unused to other animals: In fact, he considered himself more as a person than a pig. He didn't understand what he was doing on a farm where visitors hung over the edge of the pig pen to stare at him.

“Can't we take him home?” George had asked.

The helpers looked a little perplexed. There were lots of rules and regulations about moving animals around, and anyway, they felt that Freddy was simply too big now to live in an urban backyard. “He'll feel better soon!” they reassured George. “Just you wait and see—next time you come to visit, it'll be quite different.”

“But he's been here for weeks already,” protested George.

The helpers either didn't hear or chose to ignore him.

Annie, however, had other ideas. As soon as they got back to her house, she started making plans. “We can't bring Freddy back to your place,” she said, switching on Cosmos, “because your dad will just take him straight back to the farm. And he can't live here with us.”

Unfortunately George knew this was true. He looked around Eric's study: Cosmos was perched on the desk, on top of piles and piles of scientific papers, surrounded by wobbling towers of books, cups of half-drunk tea, and scraps of paper with important equations scrawled on them. Annie's dad used the supercomputer to work on his theories about the origins of the Universe. Finding a home for a pig was, it seemed, almost as difficult.

When Annie and her family had first moved into this house, George's pig had made a dramatic entrance, charging through Eric's study, sending books flying into the air. Eric had been quite pleased, because in all the chaos Freddy had actually helped him to find a book he'd been searching for. But these days, George and Annie both knew that Eric wouldn't welcome a spare pig. He had too much work to do to look after a pig.

"We need to find somewhere nice for Freddy," said Annie firmly.

*Ping!* Cosmos's screen came to life again and started flashing with different colored lights—a sure sign that the great computer was pleased with himself. "I have prepared for you a summary of the conditions within our local cosmic area and their suitability for porcine life," he said. "Please click on each box to see a readout of your pig's existence on each planet within our Solar System. I have taken the liberty of providing"—the computer chortled to himself—"an illustration for each planet with my own comments."

"Wowzers!" said Annie. "Cosmos, you are the *best*."

On Cosmos's screen were eight little boxes, each marked with the name of a planet in the Solar System. She checked the one labeled MERCURY . . .

Mercury

Scorched pig

Venus

Smelly pig

Earth

Happy pig

Mars

Bouncy pig

Jupiter

Sinking pig

Saturn

Orbital pig

Uranus

Upside-down pig

Neptune

Windy pig

## OUR SOLAR SYSTEM

The Solar System is the name we give to the family of planets that orbit our star, the Sun.

Our Solar  
System was  
formed around  
4.6 billion  
years ago

### How Our Solar System Was Created

#### Step One:

A cloud of gas and dust begins to collapse—possibly triggered by shock waves from a nearby supernova.

#### Step Two:

A ball of dust formed, spinning round and flattening into a disk as it attracted more dust, gradually growing larger and spinning faster.

#### Step Three:

The central region of this collapsed cloud got hotter and hotter until it started to burn, turning it into a star.

Stars with a mass  
like our Sun  
take around ten  
million years  
to form.

#### Step Four:

As the star burned, the dust in the disk around it slowly stuck together to form clusters, which became rocks, which eventually formed planets, all still orbiting the star—our Sun—at the center. These planets ended up forming two main groups: close to the Sun, where it is hot, the rocky planets; farther out, beyond Mars, the gas planets, which consist of a thick atmosphere of gas surrounding a liquid inner region with, very probably, a solid core.

Because Jupiter  
is the largest, it  
may have done  
most of the  
cleaning up  
itself.

#### Step Five:

The planets cleaned up their orbits by gobbling up any chunks of material they came across.



## Step Six:

Hundreds of millions of years later, the planets settled into stable orbits—the same orbits that they follow today. The bits of stuff left over ended up either in the asteroid belt between Mars and Jupiter, or much farther out beyond Pluto in the Kuiper belt.

## Are There Other Solar Systems Like Ours?

An  
exoplanet  
is a planet in  
orbit around a  
star other than  
the Earth's  
Sun.

For several hundred years astronomers suspected that other stars in the Universe might have planets in orbit around them. However, the first exoplanet was not confirmed until 1992, orbiting the corpse of a massive star. The first planet around a real, brightly shining star was discovered in 1995. Since then, more than four hundred exoplanets have been discovered—some around stars very similar to our Sun!

This is just the beginning. Even if only 10% of the stars in our Galaxy had planets in orbit around them, that would still mean more than *two hundred billion solar systems* within the Milky Way alone.

Some of these may be similar to our Solar System. Others might look very different. Planets in a binary solar system, for example, might see two suns rise and set in the sky. Knowing the distance from their star to the planets—and the size and age of the star—helps us to calculate how likely it is that we might find life on those planets.

Most of the exoplanets we know about in other solar systems are huge—as big as Jupiter or larger—mainly because those are easier to detect than smaller planets. But astronomers are beginning to discover smaller, rocky planets orbiting at the right distance from their star that might be more like planet Earth.

In early 2011, NASA confirmed their Kepler mission had spotted an Earth-like planet around a star five hundred light-years away! At only 1.4 times the size of our home planet, this new planet, Kepler 10-b, may be the most similar to Earth we have found so far.

## Users Review

### From reader reviews:

#### James Reed:

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### **Betty Richey:**

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### **Marilyn Perez:**

This George and the Big Bang is great book for you because the content which can be full of information for you who always deal with world and still have to make decision every minute. This specific book reveal it details accurately using great coordinate word or we can point out no rambling sentences inside. So if you are read this hurriedly you can have whole info in it. Doesn't mean it only offers you straight forward sentences but hard core information with splendid delivering sentences. Having George and the Big Bang in your hand like getting the world in your arm, data in it is not ridiculous 1. We can say that no e-book that offer you world throughout ten or fifteen minute right but this book already do that. So , this can be good reading book. Hello Mr. and Mrs. occupied do you still doubt which?

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