LUCY & STEPHEN HAWKING

AND THE BIG BANG Going back to the beginning

of time . . .

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About the Book

Ever wanted to travel into space?

Meet George. He's an ordinary boy with an incredible secret – the power to go on intergalactic adventures!

Join him as he battles a sinister rebel-scientist, who's hell bent on sabotaging the most exciting – and dangerous – experiment of the century.

A deadly bomb is ticking.

The whole world is watching.

Can George stop the second **BIG BANG**?

LUCY & STEPHEN HAWKING



Illustrated by Garry Parsons

RHCP DIGITAL

To Willa, Lola and George, Rose, George, William and Charlotte

Note:

Some words and phrases in this book are <u>underlined</u>. These are links you can click to read more information. You can always find your way back to where you were in the story by clicking the link at the end of the section.



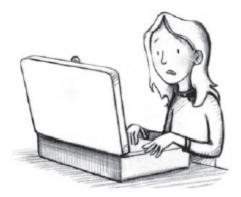
WHERE'S THE BEST place in the Universe for a pig to live? Annie was typing onto the keyboard of Cosmos, the supercomputer. 'Cosmos will know!' she declared. 'He must be able to find Freddy somewhere better than that grotty old farm.'

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 and 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 mum, Susan, arrived to collect them 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. 'Whatever is the matter with the pair of you?'

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

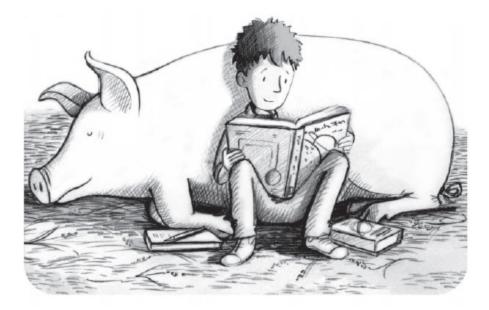
Freddy was George's pet pig. He had been a Christmas present from George's gran when he was a piglet. George's parents were eco activists, which also meant they weren't very keen on presents. They didn't like the way all the discarded, broken and unwanted toys left over from Christmas built up into huge 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 straight back again, and everyone would get cross and 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 back garden of an ordinary terrace house with a narrow strip of land and scrubby vegetables growing between the two fences separating it from the neighbouring gardens. But George's parents had kind hearts really, so Freddy, as George named the pig, had carried on living in his pigsty in the garden until he reached a gigantic size – he was now more like a baby elephant than a pig. George didn't care how large Freddy got – he was very fond of his pig and spent long hours in the garden, 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 neighbours - the scientist Eric, his wife, Susan, and their daughter, Annie – came back from living in the USA. 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 mum and dad always looked stressed and tired, and George felt bad about asking them for anything at all. So once Annie came back from the USA, 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 socking great pig taking up most of the back garden. '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 holiday. 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 in the summer holidays. It was a bit like him and Annie moving up to secondary 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, trotters splayed out on either side, his eyes dull and his cheeks sunken. The other pigs were gambolling around, looking cheerful and fit. 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. The summer holidays 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 mum into driving them there and picking them up again afterwards.



George and Annie had asked the workers what was wrong with Freddy. They'd looked worried too. The vet had come: Freddy wasn't ill, she'd said; he just seemed very unhappy, as though he was pining away. After all, he had grown up in George's quiet back garden, 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 gawp at him.

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

The helpers looked a bit 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 back garden. '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 yours,' 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.

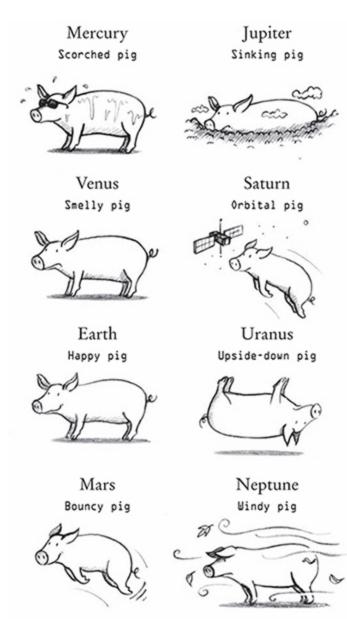
'We need to find somewhere nice for Freddy,' said Annie firmly.

Ping! Cosmos's screen came to life again and started flashing with different coloured 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 read-out of your pig's existence on each planet within <u>our solar system</u>. 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 labelled MERCURY . . .





'BUT I DON'T think Freddy could actually live on any of those planets,' objected George after they had looked through Cosmos's tour of the solar system for pigs. 'He'd boil on Mercury, get blown away on Neptune or sink through layers of poisonous gas on Saturn. He'd probably wish he was back on the farm.'

'Apart from on Earth . . .' murmured Annie. 'That's the only planet in our solar system that's suitable for life.' Her nose was scrunched up, meaning she was thinking hard. 'It's just like for humans,' she said suddenly. 'You know how my dad was talking about finding a new home for human beings, in case our planet becomes uninhabitable?'

'You mean, if we get struck by a huge comet or global warming takes over?' said George. 'We won't be able to live on this planet if there are volcanic eruptions or it becomes a huge, dry desert.' George knew all about <u>the frightening</u> <u>things</u> that might happen to planet Earth if humans didn't start taking better care of it from his eco-activist parents.

'Exactly! My dad says humans need to look for a new home,' said Annie, 'just like Freddy does. Pigs need about the same conditions as people, so if we can find a place in the Universe that's suitable for human life, then Freddy would be fine there as well.'

'So all Cosmos has to do is find a new home for humanity and we've found somewhere to keep my pig?'

'Precisely!' said Annie happily. 'And we can visit him in space from time to time, so he doesn't get lonely and sad again.' They both fell silent. They knew that their master plan was rather less than perfect.

'How long is it going take us to find somewhere for Freddy in space?' asked George eventually. 'Your dad has been searching and searching for a new place for human beings to start a colony, and he still isn't sure he's found the right place.'

'Um, yeah,' admitted Annie. 'We might – just *might* – want to think about finding Freddy somewhere a bit closer to home, just for now.'

'Somewhere on planet Earth would be good,' agreed George. 'But how are going to get him to his new home – in space or on Earth? How are we going to carry a great big pig around?'

'Now that is the great geniosity of my brilliant plan!' cried Annie, perking up. 'We're going to use Cosmos. If Cosmos can send us on great big journeys across the Universe, then he can take a pig just a short hop across planet Earth. Cosmos, am I right?' she demanded.

'Annie, you are,' confirmed Cosmos. 'I am so clever and intelligent that I can do any or all of the things you have mentioned.'

'But is he *supposed* to?' asked George. 'I mean, isn't your dad going to be a bit cross if he finds we've used his supercomputer to transport a pig?'

'Unless you order me to do so,' said Cosmos slyly, 'I would have no reason to inform Eric that we have taken a porcine adventure together.'

'See?' said Annie. 'If we ask Cosmos to take Freddy to somewhere he'll be safe, then Cosmos will do it.'

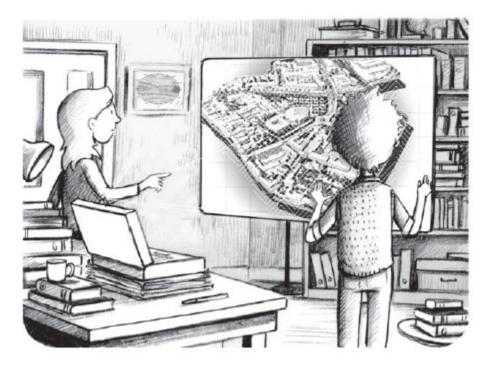
'Hmm,' said George, still sounding doubtful. He'd been on journeys before where Cosmos had been allowed to pick the destination, and he wasn't sure that the supercomputer always got it right. George didn't want to push his pig through the portal – the amazing doorway into space that Cosmos could open up – and find he'd been sent to a sausage factory. Or the top of the Empire State Building. Or a remote tropical island which would be too hot for Freddy – not to mention too lonely.



'Cosmos,' he said politely, 'could you show us the places you'd take Freddy before you actually send him there? Oh, and for the moment, until we find somewhere permanent, they all have to be close enough for us to cycle to, because I don't think we ought to keep using you – we might get caught.'

'Processing your request,' replied Cosmos. When Annie's family had come back from the USA, Cosmos had suffered a mega breakdown. Eric had managed to fix him, but he had

returned with a much more user-friendly attitude. Now, his circuits chuntered for a few seconds, and then an image appeared, floating in the air in the centre of Eric's study, connected to Cosmos by two thin beams of light.



'It's a map!' said George. 'It looks like . . . Hang on! It's Foxbridge!'

'Indeed,' said Cosmos. 'It is a three-D image. Anything Google can do, I can do better.' He harrumphed. 'The cheeky upstarts.'

'Oh my, it's beautiful!' sighed Annie. Every feature of the ancient and distinguished university town of Foxbridge was drawn in loving detail on Cosmos's map – each tower, rampart, spire and quadrangle represented in perfect miniature.

In a corner of one of the courtyards, a little red light was flashing.

'That's my dad's college!' said Annie in surprise. 'Where that light is flashing. Why are you showing us Dad's college?' 'My files tell me that pigs need a quiet, dark space with fresh air and some sunlight,' said Cosmos. 'The place marked is an empty wine cellar at the base of an old tower. It has a ventilation system, so the air is clean, and a small skylight. It hasn't been used for many years, so your pig should be safe and comfortable there for a few days, provided you take the precaution of bringing some straw with him from the farm.'

'Are you sure?' said George. 'Won't he feel a bit cooped up?'

'For a short while your pig will enjoy perfect peace and quiet,' replied Cosmos. 'It will be a mini break for him until you decide where you would like him to be permanently housed.'

'We have to get him out of that farm!' exclaimed Annie. 'And quickly! He's having a horrid time and we must, must, *must* save him!'

'Can we see the cellar?' asked George.

'Certainly,' said Cosmos. 'I will open a small window onto the cellar so that you can verify the information I have given you.'

The map melted into thin air and was replaced by a rectangle of light as Cosmos created his portal: Annie and George had gone through it many times to journey into space. On those occasions, Cosmos had made a door. But if he just wanted to show them something, he drew a small window for them to look through.

'This is so exciting!' exclaimed Annie while they waited. 'Why did we never think of using Cosmos to travel around the Earth before?'

The rectangle went dark. George and Annie peered at it more closely.

'Cosmos, we can't see anything!' said George. 'I thought you said there would be some daylight. We don't want Freddy to think he's gone to prison!' Cosmos sounded confused. 'I have checked the coordinates, and this is the right location. Perhaps the window has been covered.'

'Jeepers!' whispered Annie. 'The darkness – it's moving!' Through the window, the blackness seemed to be swaying from side to side.

'Listen!' she hissed. 'I can hear voices.'

'Not possible,' replied Cosmos. 'My data tells me that the cellar is no longer in use.'

'Then what are all those people doing there?' said Annie in a hollow voice. 'Look!'

Staring through the window, George realized she was right. What they were seeing was not a dark room where no light penetrated. It was a throng of tightly packed people, all wearing black clothes. He could just make out shoulders and backs – the crowd seemed to be facing away from them.



'Can they see us?' whispered Annie.

'If they turn round, they will see the portal window,' said Cosmos, who had conducted a brief scan of the room. 'Although it is entirely inconsistent with logic, probability and reason, the cellar appears to be filled with human beings.'

'Alive ones?' said Annie in a terrified voice. 'Or dead ones?'

'Breathing and functional ones,' said Cosmos.

'What are they doing?'

'They are—'

'Turning round,' interrupted George in horror. 'Cosmos, close the portal!'

Cosmos snapped the window shut so fast that no one in the cellar noticed the tiny flash of light. Even if they had, none of them would have guessed that their secret meeting had just been witnessed by two very puzzled kids and an agitated supercomputer in an ordinary suburban house somewhere on the edges of Foxbridge.



However, a voice from inside the cellar drifted into the room where Annie and George sat, motionless and shocked. 'All hail the False Vacuum!' it said. 'Bringer of life, energy and light.' In Cosmos's hurry to shut down the portal before anyone saw it – and them – he had closed the visual monitor but not the audio port, so they could hear but not see the events in the cellar. A deathly hush followed. Annie and George hardly dared to breathe. Then, as though they were listening to a particularly horrible radio show, the voice continued.

'These are dangerous times!' it hissed. 'We may be living through the last days before the Universe itself is ripped to shreds by a bubble of cosmic destruction. Criminal scientists at the Large Hadron Collider will soon begin their new, high-energy experiment. We failed to stop them from using the Collider last time. But now, the situation is far more serious. The moment these crazy fools switch on their machine, a cosmic catastrophe will be unleashed which will exterminate the entire Universe! Their plans to take the work at the Large Hadron Collider to the next level could reduce us all to nothing.'

Annie and George heard the densely packed crowd in the room hiss and boo at these words.

'Quiet!' said the voice. 'Please – our distinguished scientific expert will explain.'

A new voice spoke. This time it was an older, softly spoken one. 'These dangerous lunatics are led by a Foxbridge scientist called Eric Bellis.'

Annie squeaked and clapped her hand over her mouth. Eric Bellis was her dad!

'Bellis is masterminding the high-energy collision experiment using the ATLAS detector at the Large Hadron Collider – the LHC. It is about to enter its most dangerous phase. If Bellis achieves the collision energy he intends, then I calculate that there is a significant probability of causing the Universe to spontaneously decay by creating a piece of the True Vacuum.

'If the tiniest bubble of the True Vacuum is created in a <u>particle collision</u> at the LHC, the bubble will expand – at the speed of light – replacing the False Vacuum and obliterating all matter! All atoms on Earth will dissolve in less than a twentieth of a second. Within eight hours, the

solar system will be gone. Of course, it does not end there . . .'

But the voices from the cellar were fading now as Cosmos struggled to hold the connection.

'The bubble will continue to expand for ever,' the voice went on in a menacing whisper. 'Bellis will have accomplished the unthinkable – the destruction of the entire Universe!' With the last 'ssssss' of 'Universe' left hanging in the air, the voice was silent once more.

For a moment George, Cosmos and Annie froze. Cosmos snapped out of it first.

DANGEROUS ENVIRONMENT FOR PIG RELOCATION! flashed up across his screen in big red letters several times. 'We're not sending Freddy there!' agreed Annie, who looked rather dazed. 'We're not having our pig spend time with those creepy people! Specially not if they're going to be rude about my dad!'



George gulped. What had those black-clad people been talking about? 'Cosmos, Annie,' he said urgently, 'who *were* they?'



'WHO WERE WHO?' said a voice as Eric himself pushed open the door to his study, a steaming mug of tea in one hand and a pile of scientific papers jammed under his tweedjacketed arm. 'Hello, Annie and George!' he said. 'Enjoying the last day of the school holidays?'



The two friends stared blankly back at him.

'Oh dear! I'll take that as a "no", shall I?' said Eric. 'Is something wrong?' He smiled at them both. Eric couldn't stop smiling these days. If George had to describe Annie's father at the moment, he would have used the words 'incredibly happy'. Or 'incredibly busy'. In fact, the busier Eric was, the happier he seemed. Since he had moved back from the USA, where he had been working on a space mission to try and find traces of life on Mars, the scientist always seemed to be in a rush and always seemed to be enjoying himself. He was happy at home with his family, he loved his new job as Professor of Mathematics at Foxbridge University, and he was super-excited about the big experiment he was running at the Large Hadron Collider in Switzerland.

The project at the LHC was the continuation of work started by scientists hundreds of years earlier. The aim was to discover what the world was made of, and how the tiny fundamental pieces had fitted together to form the contents of the Universe. To do this, Eric and the other scientists were trying to find a theory which would allow them to understand everything about the Universe. They gave it the simple name the '<u>Theory of Everything</u>': it was the greatest goal in science. If they could only find it, scientists would be able to understand not only the beginning of the Universe but possibly even how – and why – the Universe we live in came about.

With this astonishing prospect in sight, thanks to the new results from the LHC, it wasn't surprising that Eric was in a good mood. Such a good mood, in fact, that he didn't even object to the kids using Cosmos when they weren't supposed to.

'I see you've been on my computer!' He raised an eyebrow, but he didn't look cross. 'I hope you haven't got strawberry jam between the keys again,' he said mildly, leaning over to look at Cosmos. 'Where's the best place in the Universe for a pig to live?' Eric read off the screen. 'Ah!' His face cleared. 'Now I understand.' He ruffled Annie's hair. 'Your mum said you were both worried about Freddy.'

'We were looking for somewhere else for him to go,' said Annie.

'And what did you find?' asked her father, pulling up a rickety old swivel chair so he could sit between Annie and George, who were still gazing wide-eyed at Cosmos's screen.

'Erm . . . well, Cosmos looked around the solar system but we didn't find anywhere,' said George.

'I bet you didn't,' murmured Eric. 'Can't quite imagine Freddy on Pluto.'

'So we thought about taking him to a planet that would be suitable for human life, but we haven't found one yet,' continued George.

'Then we looked in Foxbridge instead – to find somewhere close to home to keep Freddy for a few days,' Annie burst out. 'But we found a group of horrible people in a basement, saying that your experiment at the Large Hadron Collider would exterminate the Universe!'



Suddenly Eric looked furious. 'Cosmos!' he barked. 'What have you been doing?'

'I was only trying to help,' said Cosmos sheepishly.

'Gallumphing galaxies!' Eric didn't look quite so happy now. 'What were you thinking of, allowing the kids to eavesdrop on those idiots?'

'They said that you're going to destroy the False Vacuum . . .' said George slowly. 'And that this will make the Universe dissolve. Is this true?'

'No! Of course not! It's a crazy theory,' said Eric crossly. 'Don't pay them any attention! They're just trying to frighten people because they don't like the work we're doing at the great experiment in Switzerland.'

'But they were at your college!' squeaked Annie.

'College schmollege,' said Eric dismissively. 'They could be anywhere – it doesn't make them any more credible.'

'So you *do* know who they are?'

'Not entirely,' admitted Eric. 'They've concealed their identities because it's a secret organization – all we know is that they call themselves "Theory of Everything Resists Addition of Gravity".'

'Theory of Everything Resists Addition of Gravity . . .' repeated Annie. 'That's T-O-E-R-A-G. That makes TOERAG! Is that really their name?'

Eric laughed. 'It's certainly the perfect one for them! They are absolutely a bunch of total toerags.'

'What do they want?'

'Last year,' said Eric, 'TOERAG, as I'm now going to call them, wanted us to abandon the Collider. They said we would create a black hole if we started the experiment. Well, we ignored them and turned it on. As we're all still here today, you can tell the world wasn't actually swallowed up by a black hole. After that we thought they'd give up. But now they've seized on this "vacuum" nonsense to prevent us from starting our next experiment, which uses more energy than the ones we've conducted in the past.'

'But why?' said George. 'Why would they keep on dreaming up mad theories?'

'Because they don't want us to succeed,' Eric explained. 'Our goal is to understand the Universe at the deepest level. So we need to know not just *how* the Universe behaves, but *why*. Why is there something rather than nothing? Why do we exist? Why this set of particular laws and not some others? This is the ultimate question of life, the Universe and everything. And some people simply don't want us to find that out.'

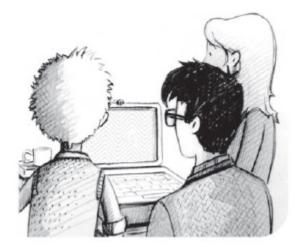
'So this "bubble of destruction" stuff – it really *is* all nonsense?' George double-checked, just to be sure.

'Complete cosmic cobblers!' exclaimed Eric. 'But' – a frown crept over his brow – 'despite that, more and more people seem to believe what TOERAG are saying. So we changed the plans for our new experiment, just in case TOERAG decided to surprise us with something nasty.'

'So when does it start?' asked George.

'We already started it!' said Eric. 'The accelerator is up, the detectors are online, and we even achieved our design luminosity a few weeks ago.' The scientist shook his head sadly. 'We're keeping it as quiet as we can to stop TOERAG from interfering. Those losers . . . Now, back to the real stuff – where are we going to put Freddy? Cosmos?'

As though trying to make up for his earlier mistake, Cosmos quickly brought up a new image on his screen. It was a beautiful scene, which showed the sun hanging low over a peaceful wooded valley, with gently swaying trees, wild flowers, and colourful butterflies dancing across the hedgerows.



'This would be a good place for your pig,' quavered Cosmos.

'What about it?' Eric said briskly to George and Annie. 'Does that look all right? Would you be happy about Freddy living here?'

'It looks lovely—' George managed to squeeze in. *Where is it?* he wanted to ask, but Eric, who was obviously in a great hurry, had already moved on to the next task.

'Great!' said the scientist, tapping a few commands onto the keyboard. 'Now, kids, this is a bit complicated but I think I can make a double portal.'



Before the two friends could say anything, Cosmos had opened up a portal to Freddy's farm and Eric had hopped through into the pig pen. The giant pig looked so shocked to see Eric appear out of nowhere that he didn't resist when he was gently pushed through another doorway that Cosmos had created. He trotted away happily into the wooded valley that was still displayed on the screen.

George and Annie watched agog as Freddy disappeared through one doorway from the farm, only to reappear in the valley, scampering through the thick grass, his snout twitching excitedly in the fresh country air, eyes sparkling once more.

Eric backed out of the portal doorway and smartly closed it down. 'We'll go back in to check up on Freddy very soon,' he said. George noticed a faint dusting of straw on his corduroy trousers. 'I'd better do something about the farm too – stop them from panicking that a pig has escaped and is on the loose.'