

## Could the Large Hadron Collider help solve the mystery of dark matter?

### 宇宙奧秘：大型強子對撞機能否解開暗物質之謎？

#### 本集內容

Could the Large Hadron Collider help solve the mystery of dark matter? 宇宙奧秘：大型強子對撞機能否解開暗物質之謎？

#### 文字稿

Dr Clara Nellist, Particle Physicist, Cern  
“We can't see it. We don't know what it is.”

克萊拉·奈莉絲特博士 歐洲核子研究組織（Cern）粒子物理學家  
“我們看不見它，也不知其為何物。”

Dark matter is one of the unsolved mysteries of the Universe.

暗物質是宇宙中尚未被解開的謎團之一。

Scientists are hoping the Large Hadron Collider might finally shed some light on it.

科學家們希望大型強子對撞機終將揭開這個謎團。

The Large Hadron Collider has already made one huge discovery – the Higgs boson.

科學家已利用這台大型強子對撞機做出一項重大發現，希格斯玻色子。

Scientists say they may finally have unlocked the secrets of the Universe.

科學家們稱，他們可能終於破解了宇宙的秘密。

Ten years on, it's been upgraded and is even more powerful.

十年過去了，大型強子對撞機已經升級，功能也更強大。

What is the Higgs boson?

到底什麼是希格斯玻色子？

Without the Higgs boson and its energy field, nothing would exist.

沒有希格斯玻色子及其相關的質量場，任何事物都不存在。

No galaxies, no stars, no planets, no life on Earth.

沒有星系、恆星、行星，地球上也沒有生命。

Named after Peter Higgs, who predicted it over 45 years earlier, it explains how subatomic particles gain mass.

希格斯玻色子以彼得·希格斯命名，他早在 45 年前就預言該粒子的存在，希格斯玻色子解釋了亞原子粒子是如何獲得質量的。

At an atom's heart are smaller particles like protons and neutrons.

原子的中心有更小的粒子，如質子和中子。

Inside these, are smaller particles still.

在這些粒子中，還有更小的粒子。

The Higgs boson and its associated energy field act like a cosmic glue that sticks to electrons and quarks, giving them substance.

希格斯玻色子及其相關質量場就像黏附在電子和夸克上的宇宙膠水，賦予它們物質。

Dr Clara Nellist, Particle Physicist, Cern

“When particles interact with the Higgs field, they get mass, and the Higgs boson is what we can discover in our experiments to show that the Higgs field exists.”

克萊拉·奈莉絲特博士 歐洲核子研究組織（Cern）粒子物理學家

“當粒子和希格斯場相互作用時，就會獲得質量，希格斯玻色子是我們可以在實驗中發現的，它的發現可推測出希格斯場的存在。”

Scientists say this is how particles gained mass after the Big Bang.

科學家們說，這就是大爆炸後粒子獲得質量的方式。

This is why it was nicknamed the 'God' particle.

希格斯玻色子也因此又被稱為“上帝”粒子。

How do the Large Hadron Collider experiments work?

大型強子對撞機實驗是如何進行的？

The Large Hadron Collider at Cern is a 27km loop of powerful electromagnets.

歐洲核子研究組織的大型強子對撞機是一個長達 27 公里的強大電磁線圈。

It fires protons close to the speed of light in opposite directions.

它向相反方向發射接近光速的質子。

They crash together, breaking into smaller particles.

質子對撞，破碎成更小的粒子。

The data collected may shed light on more mysteries of the Universe, like dark matter.

實驗收集的資料可能會揭示更多宇宙奧秘，如暗物質。

Dr Clara Nellist, Particle Physicist, Cern

"Dark matter makes up between 80 to 85 per cent of the matter in our Universe. We can't see it. We don't know what it is. If it is a particle, perhaps it can be created in the collisions here at Cern. But it could be something else entirely."

克萊拉·奈莉絲特博士 歐洲核子研究組織（Cern）粒子物理學家

“暗物質占宇宙中物質的 80%到 85%，我們看不見它，也不知其為何物，如果它是粒子，也許可以在歐洲核子研究組織所展開的碰撞實驗中產生，但它也可能完全是另一種東西。”

The Universe still contains so many mysteries.

宇宙中仍有諸多奧秘。

Scientists like Clara could help make the next big discovery.

像克萊拉這樣的科學家可以幫助做出下一個重大發現。

Dr Clara Nellist, Particle Physicist, Cern

"I was here when we discovered the Higgs boson."

克萊拉·奈莉絲特博士 歐洲核子研究組織（Cern）粒子物理學家

“當我們發現希格斯玻色子時，我就在這裡。”

Professor Peter Higgs, Nobel Prize-winning scientist

"An incredible thing that has happened in my lifetime."

彼得·希格斯教授 諾貝爾獎獲得者 科學家

“這是在我有生之年發生的一件不可思議的事情。”

Dr Clara Nellist, Particle Physicist, Cern

"The memory of that discovery drives me on in working in these teams to try and find what dark matter is or other secrets of our Universe."

克萊拉·奈莉絲特博士 歐洲核子研究組織（Cern）粒子物理學家

“對希格斯玻色子這一發現的回憶給予我動力，激勵我繼續在團隊中工作，試圖揭開暗物質的本質和宇宙中的其他秘密。”

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