
本集内容

The quantum revolution 量子革命

学习要点

有关“experiments（实验）”的词汇

边看边答

What can the 'quantum random number generator' be used for?

文字稿

So much modern technology already relies on light. But there's still more potential locked away in these beams. In a lab in Cambridge, this team says it's working on the next 'light revolution'.

许多现代科技已经依赖于光。但光束里还藏有更多的潜力。在英国剑桥的一间实验室里，这个团队表示他们正在研究下一场“光革命”。

Dr Carmen Palacios-Berraquero, Nu-Quantum

First, we had lamps, then we had lasers, which completely revolutionised our lives and our technology, and now we may be at the **cusp** of the third stage in the history of light. We have single photon sources – devices that can emit one particle of light at a time.

卡门·帕拉西奥斯 - 贝拉凯罗博士 Nu-Quantum 公司

“一开始，人类发明了灯，后来发明了激光，这些事物彻底改变了我们的生活和技术，现在，我们可能就在光的第三个历史阶段的**临界点**。关键就是单光子源，即可一次发射一个光粒子的装置。”

And that is the key here – being able to separate off those individual light particles. I'll explain why that's important in a second, but first, here's how they do it.

单光子源的关键就在于能够分离出单个的光粒子。我马上就会解释这为什么很重要，但先来看看研究人员是怎样实现这个过程的。

Richard Westcott, BBC correspondent

On this disc here – you can't see it – is a crystal that is one atom thick, and it's got little **defects** on it – the size of an atom. And when you fire a laser at those defects, they ping out individual photons – individual particles of light. And you can actually see them here – these bright yellow areas are the defects where the photons are coming out.

理查德·韦斯科特 BBC 通讯员

“虽然你看不到，但这张光碟上有一个薄如原子的晶体，晶体上有一些原子大小的小**瑕疵**。当你向这些瑕疵发射激光时，它们会发出单个光子，单个的光粒子。你其实可以在屏幕上看到它们，光子就是从这些亮黄色区域的瑕疵处发射出来的。”

This is where it gets weird. By singling out photons, you can unlock what's known as the 'quantum world', where very, very small things behave very differently.

接下来，事情就变得不同寻常了。通过挑出单个光子，你可以打开所谓“量子世界”的大门，在那里，极小的东西表现得与众不同。

You'll need to pay attention to this bit.

你得好好听一听这个部分。

Dr Carmen Palacios-Berraquero, Nu-Quantum

So there are two main properties that we can **harness**. The first one is 'superposition' and the second one is 'entanglement'. 'Superposition' is a particle being in two states at the same time – so being up and down at the same time. 'Entanglement' – is two particles being **inextricably** linked. So, no matter where they are in the Universe – whatever happens to one affects the other one.

卡门·帕拉西奥斯 - 贝拉凯罗博士 Nu-Quantum 公司

“我们可以**利用**两个主要的特性。第一个是‘量子叠加态’，第二个是‘量子纠缠’。‘量子叠加态’指一个粒子同时处于两种状态，即同时处于上、下两种量子态。‘量子纠缠’指两个粒子**密不可分地**联系在了一起。所以，无论两者在宇宙中的哪个位置，其中一个有所改变，那么另一个也会受到影响。”

So, say one is up – the other one has to be down – or the other way around. When we put two... these two effects together, we can build something like a quantum computer – which is orders of magnitude more powerful than anything that we can compute today.

“比如，一个粒子处于上量子态，另一个必为下量子态，反之亦然。当我们把这两种作用放在一起时，就可以建造一个类似量子计算机的东西，它比我们现在能计算的任何事物都强大几个数量级。”

Carmen's tech singles out the photons. You then need Matthew's sensors to detect them. So what about practical uses?

卡门的技术把单个光子挑了出来。接下来，你需要用马修的传感器来检测它们。这些技术的实际用途是什么？

The quantum world is the only place you can generate a genuinely random number.

量子世界是唯一能产生真正的随机数的地方。

So the team's now building a 'quantum random number generator' to encrypt things securely online.

因此，该团队正在构建一个“量子随机数生成器”，从而可以安全地在线加密。

Dr Matthew Applegate, Nu-Quantum

We are at the start of the quantum revolution, if you like – this is going to be like the Industrial Revolution we believe. What we've done is develop room-temperature components which are much simpler than the current state of the art – which will unlock the great potential of quantum technologies.

马修·阿普尔博士 Nu-Quantum 公司

“我们正处于量子革命的伊始，我们认为它会像工业革命一样带来巨大的影响。我们所做的是开发了比目前最新技术还要简单得多的室温组件，这将开启量子技术的巨大潜力。”

From next level computing to better cameras – more accurate clocks, and a more secure internet – the surreal quantum world is hard to **grasp**, but the benefits are simple.

从更高级的计算机技术到更好的相机，再到更精确的时钟和更安全的互联网，虽然超现实般的量子世界让人难以理解，但它的好处却一目了然。

词汇

cusps 尖点，分界点

defects 瑕疵，缺陷

harness 利用

inextricably 不可分割地

grasp 理解

视频链接

<https://bbc.in/3s5z0BY>

问题答案

The 'quantum random number generator' can be used to make things more secure online.