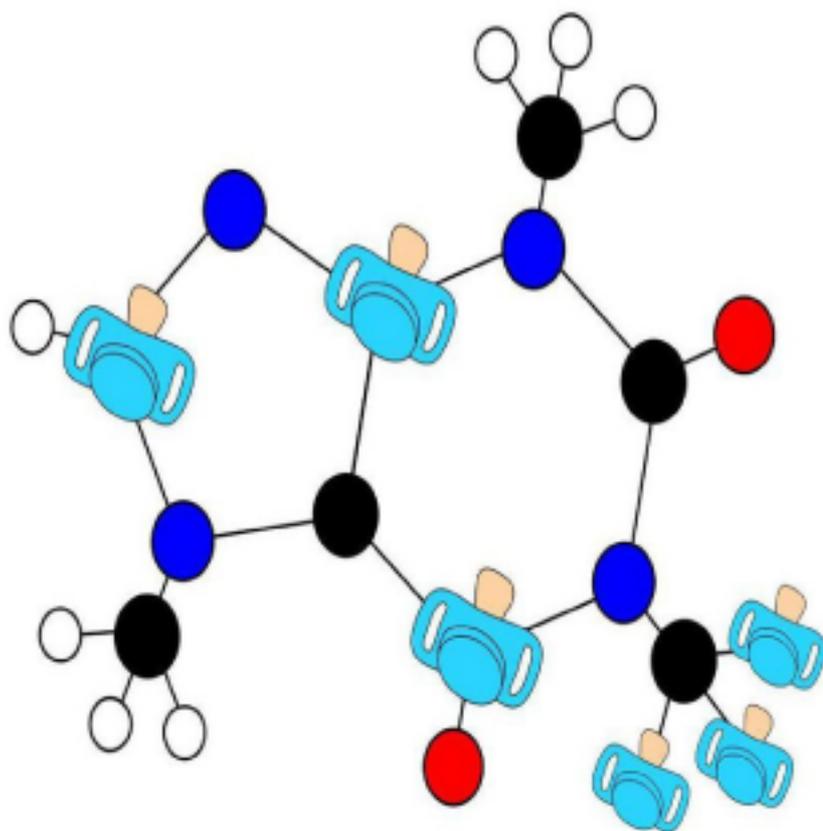


宝宝的量子信息学

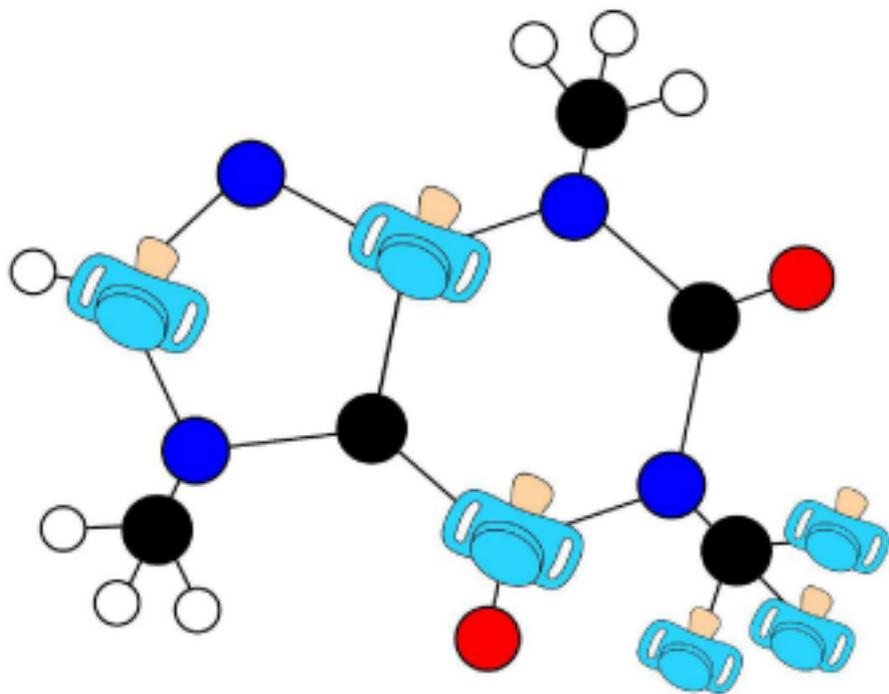
Quantum Information for Babies



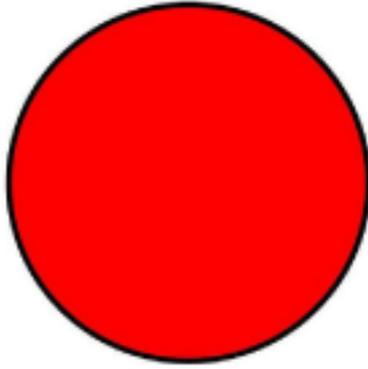
by Chris Ferrie

Edit by AD100

Quantum Information for Babies



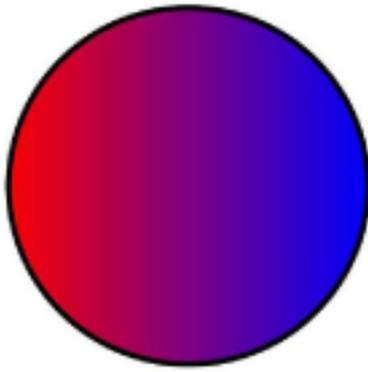
by Chris Ferrie



This is a ball.

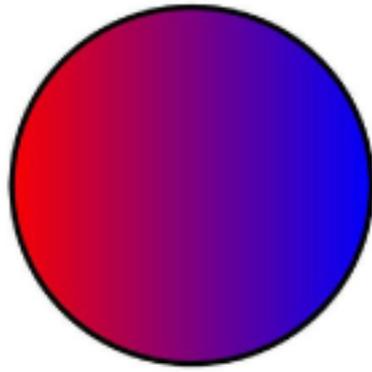
这是一个球。

This ball can be



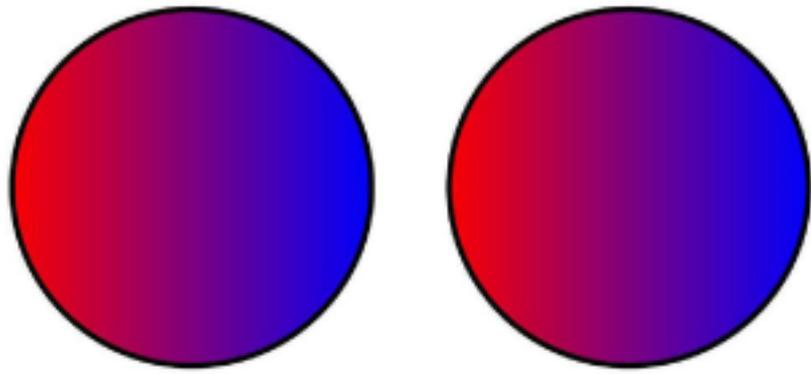
Red or blue.

红色或者蓝色。



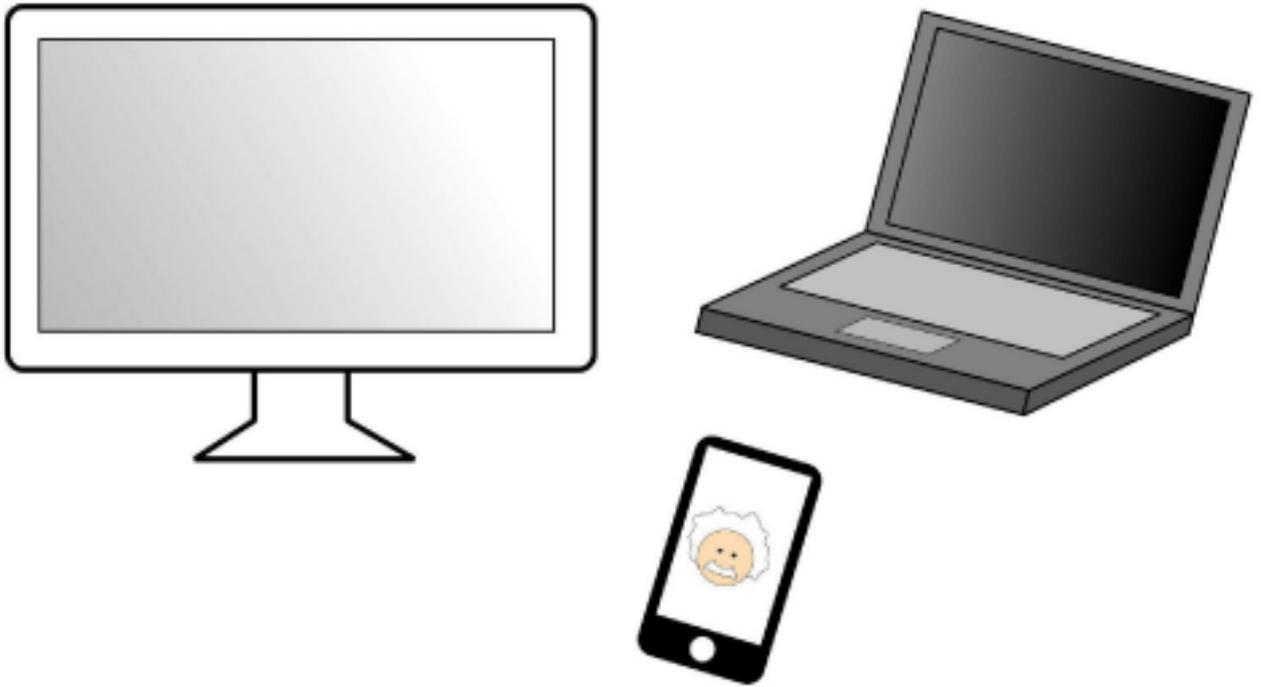
**We need 1 bit of
information to record
the color of this ball.**

**我们需要 1 比特信息
记录这个球的颜色。**



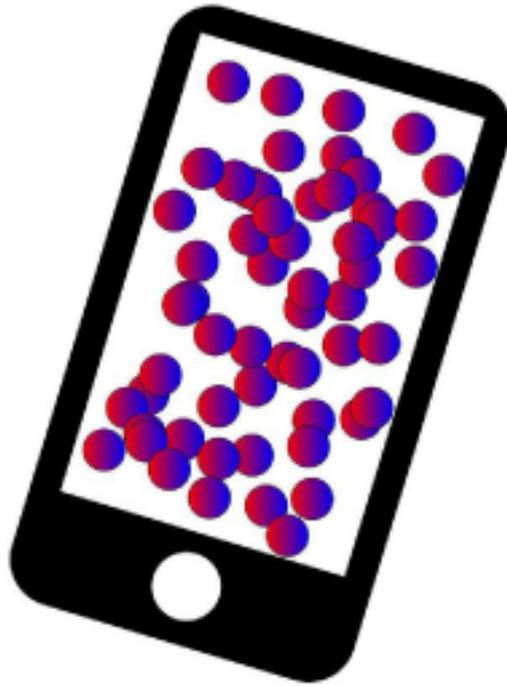
**We need 2 bits of
information to record
the color of two balls.**

我们需要 2 比特信息
记录这两个球的颜色。



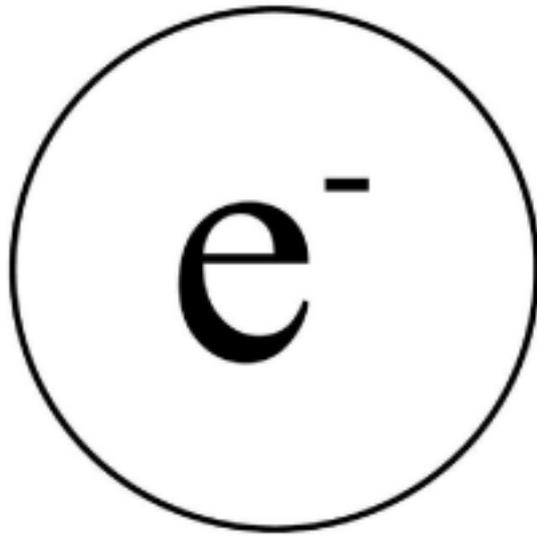
**These are computers
which can store
many bits.**

这些是计算机，
它们能存储
许多比特。



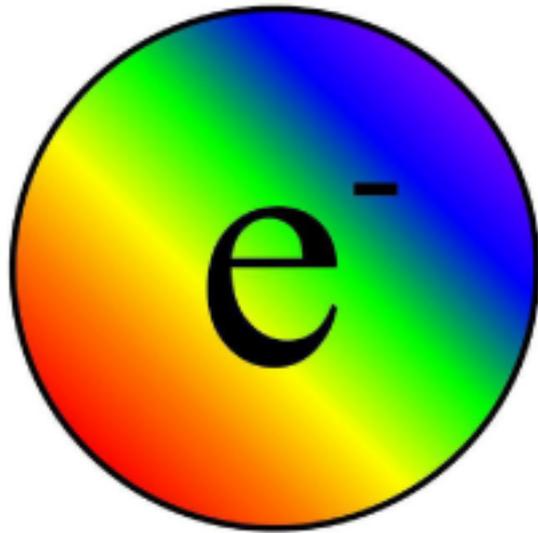
**This phone can store
1 million bits
of information.**

**这个手机能存储
1 百万比特
信息。**



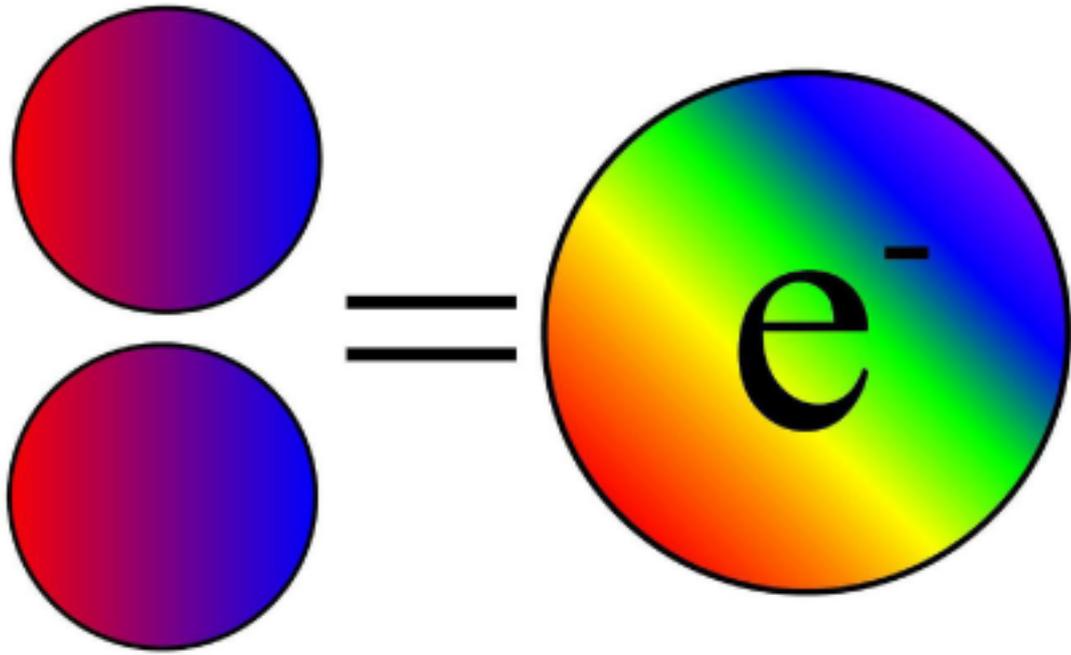
**This is an electron.
A "quantum" ball.**

这是一个电子。
一个“量子”球。



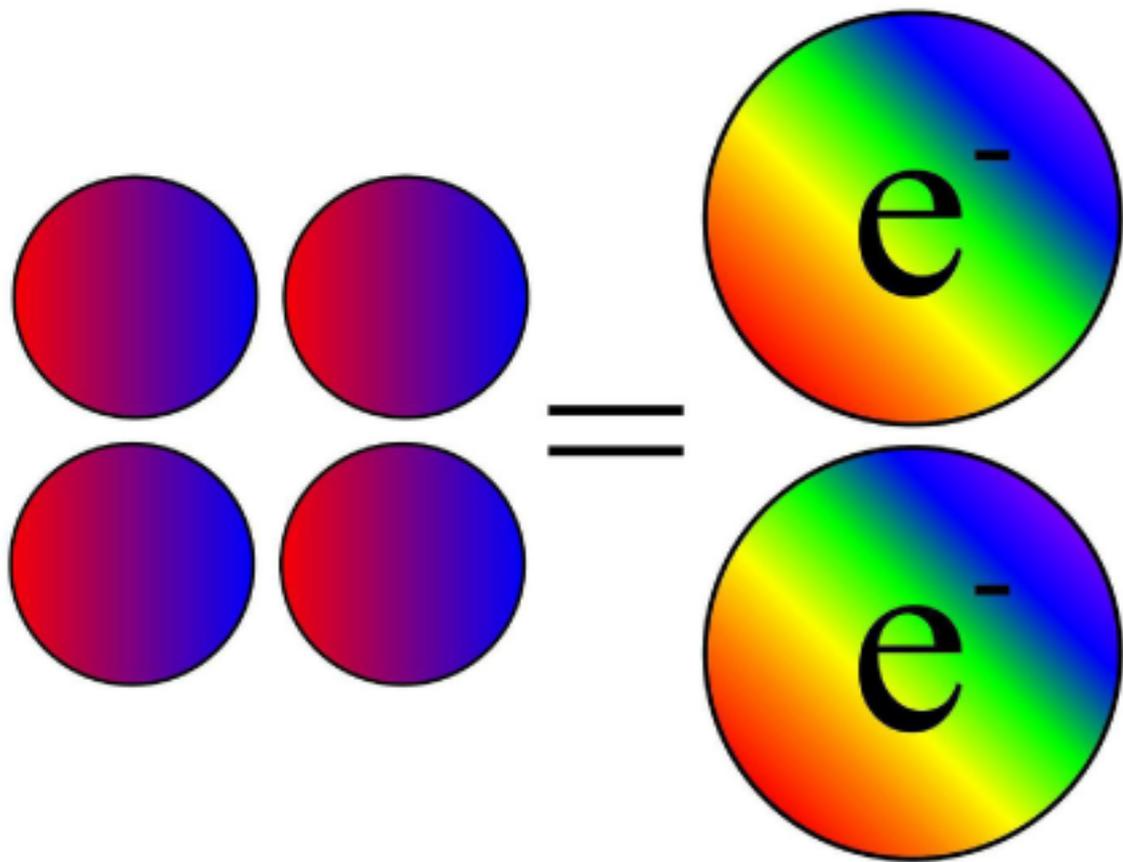
**An electron stores
a quantum bit or
qubit of information.**

一个电子存储
一量子比特或
qubit 信息。



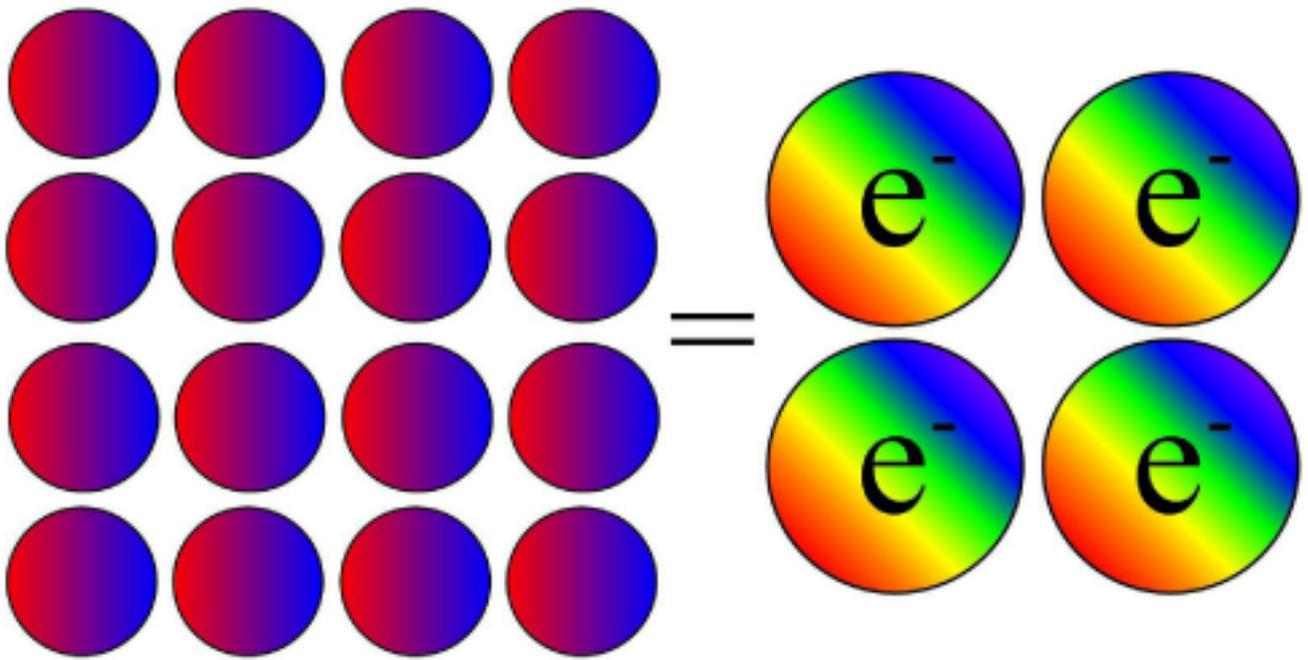
If 2 bits are needed
to describe 1 qubit,

如果需要 2 比特来描
述 1 量子比特，



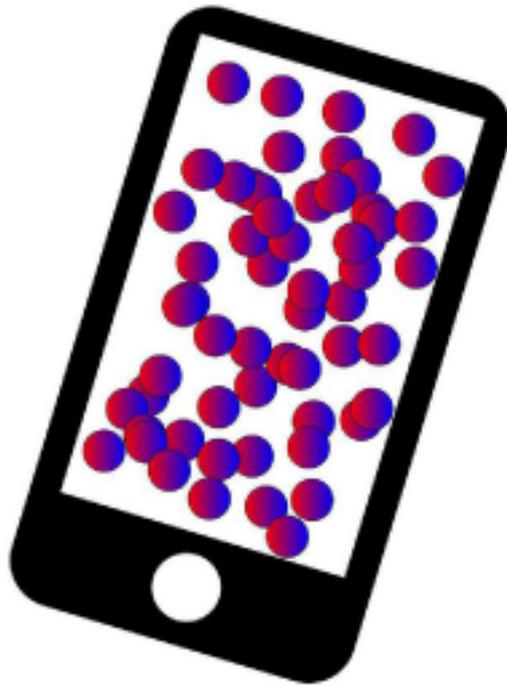
Then **4 bits** are needed
to describe **2 qubits**.

那么需要 **4 比特**
来描述 **2 量子比特**。



And 16 bits are needed
to describe 4 qubits.

并且需要 16 比特
来描述 4 量子比特。



**Remember the phone
that can store
1 million bits?**

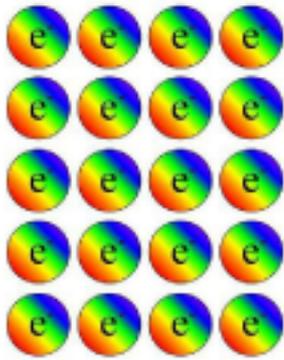
**还记得那个能存储
1 百万比特
的手机吗？**



It can only store
20 **qubits** of
information!

它只能够存储
20 **量子比特**
信息！

20 + 1

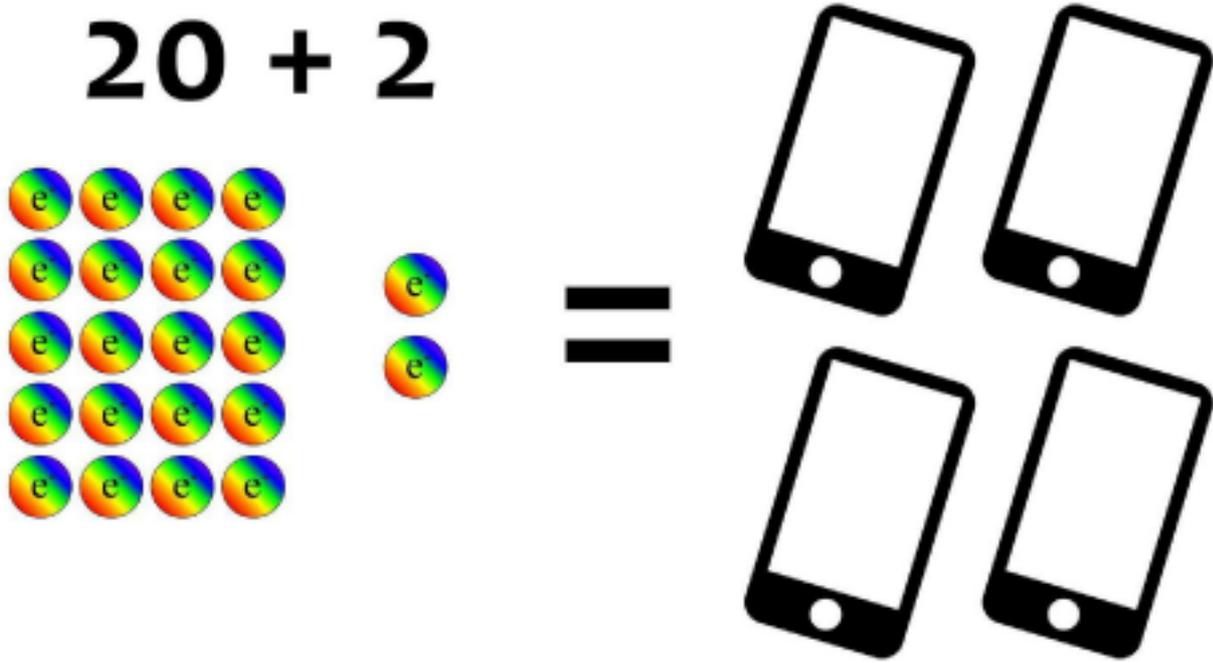


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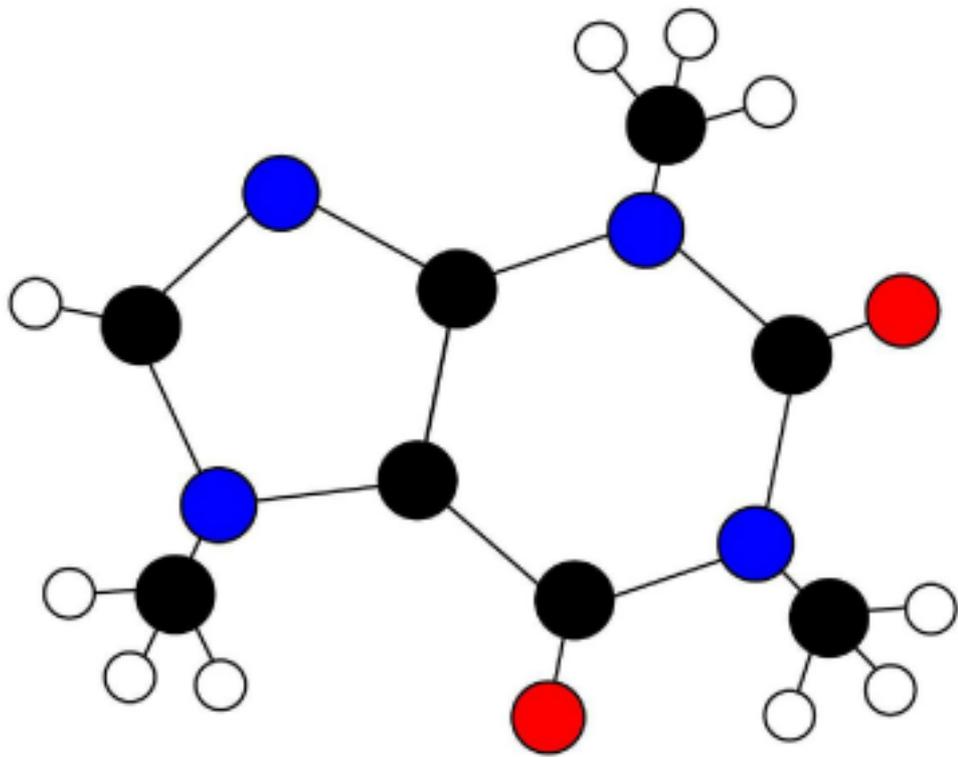
**21 qubits requires
2 phones.**

**21 量子比特需要
2 个手机。**



**22 qubits requires
4 phones.**

**22 量子比特需要
4 个手机。**



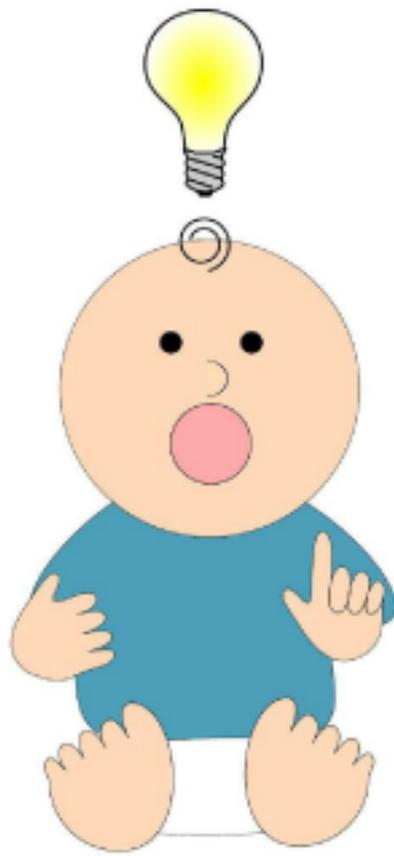
**To store the
information in my
favorite molecule**

想要存储
我喜爱的分子
包含的信息，



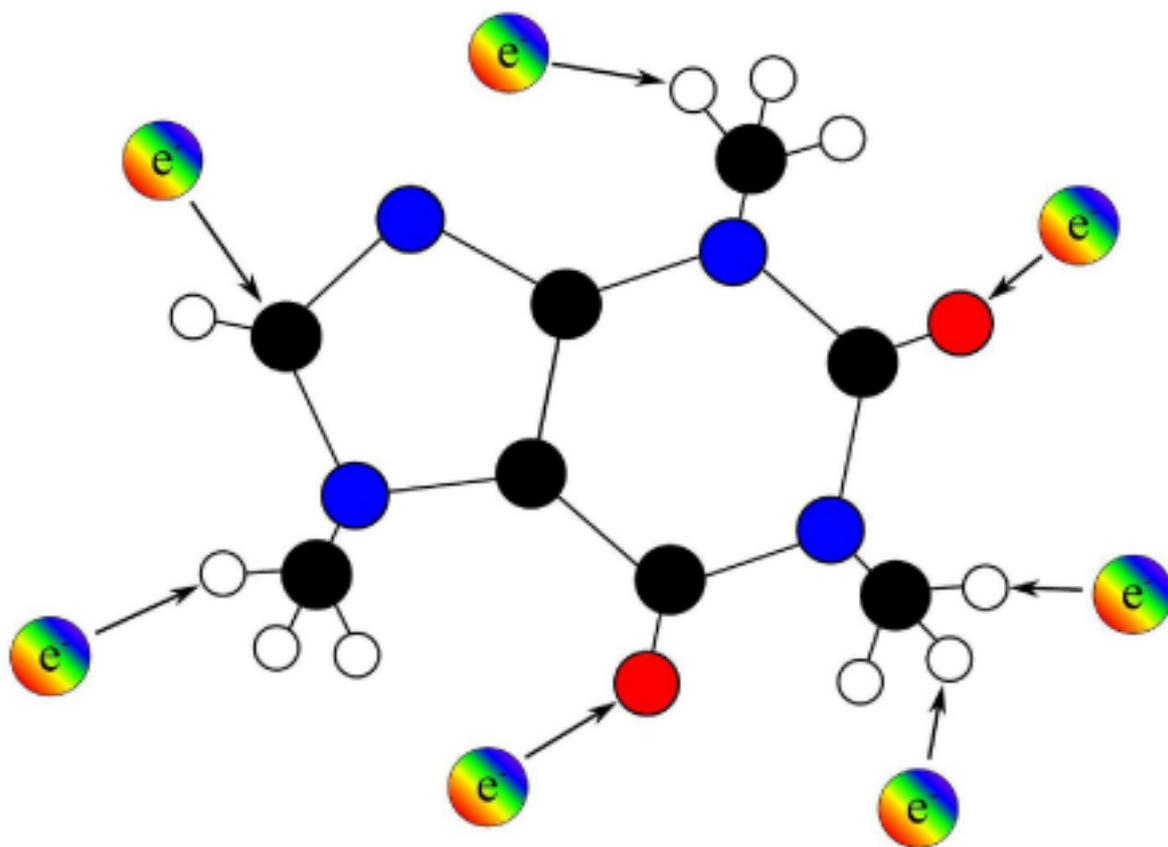
**would require all the
phones on earth!**

**那需要地球上
所有的手机！**



**What's that baby?
You have an idea?**

**宝宝，那怎么办？
你有好主意吗？**



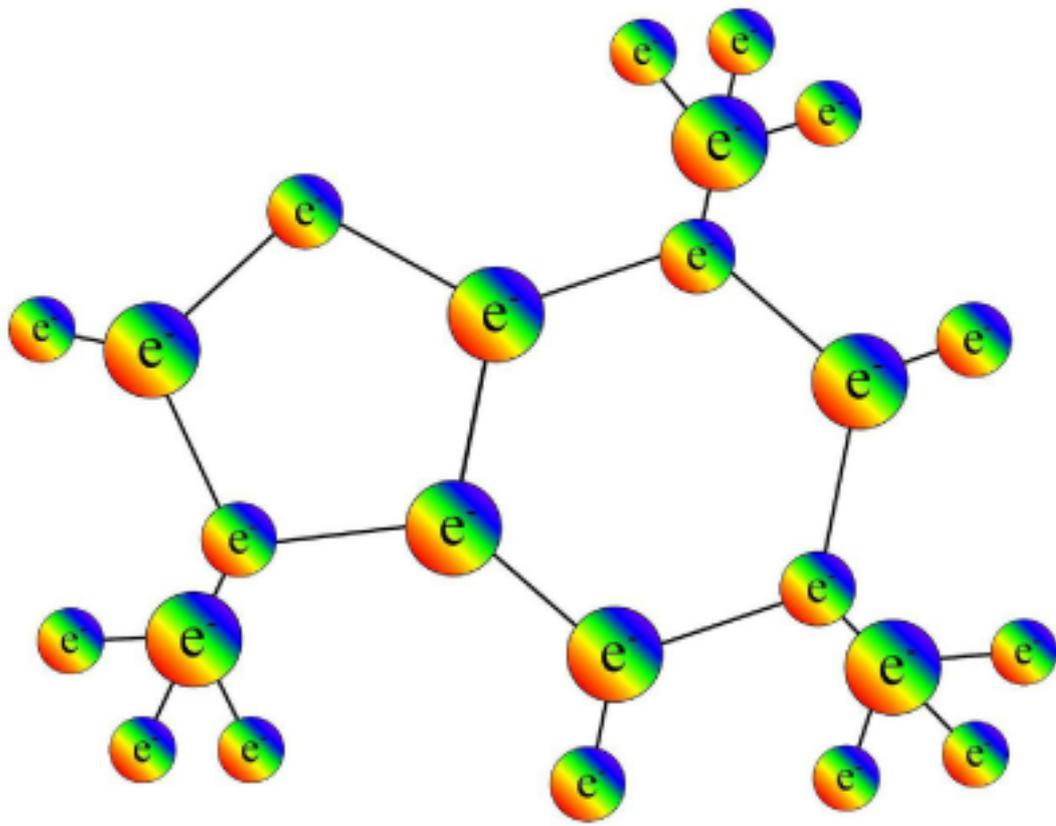
We can use quantum systems to store quantum information!

**我们能用
量子系统来存储
量子信息！**



**What took all the
phones in the world...**

那些信息需要世界
上所有的手机...



**can be done with a
single molecule!**

仅仅一个分子
就能够搞定。

Chris Ferrie is a physicist, mathematician and father of three budding young scientists. He obtained his doctorate in Mathematical Physics from the University of Waterloo in Waterloo, Canada and currently holds a postdoctoral fellowship at the University of New Mexico in Albuquerque, New Mexico.

Chris believes it is never too early to introduce children to the wild and wonderful world of physics!

克里斯·费利是一位物理学家、数学家和三位小小科学家的爸爸。他在加拿大滑铁卢市滑铁卢大学获得自己的数学物理学博士学位，现在美国新墨西哥州阿尔布开克市新墨西哥大学担任博士后研究员。

克里斯相信为孩子们介绍自然的、奇妙的物理世界越早越好！