



超级实验室

第1集 征程

Super Lab / Episode 1 – Journey

实验室 (shí yàn shì) laboratory. 征程 (zhēng chéng) journey; expedition; voyage.

央视纪录 | CCTV Documentary

▶ 看视频

On a clear night,

在晴朗的夜晚,

晴朗 (qíng lǎng) sunny and cloudless. 夜晚 (yè wǎn) night.

When you look up, you will see bright stars,

抬头你会看见璀璨的群星,

抬头 (tái tóu) to raise one's head; to gain ground; account name, or space for writing the name on checks, bills etc. 璀璨 (cuǐ càn) bright; resplendent.

And the unfathomable night sky,

还有深不可测的夜晚,

深不可测 (shēn bù kě cè) deep and unmeasurable (idiom); unfathomable depths; incomprehensible; enigmatic and impossible to predict. 夜空 (yè kōng) night sky.

Have you ever thought about being behind this boundless darkness,

你是否想过在这无边的黑暗背后,

无边 (wú biān) without boundary; not bordered. 黑暗 (hēi àn) dark; darkly; darkness. 背后 (bèi hòu) behind; at the back; in the rear; behind sb's back.

Hiding an unknown world?

隐藏着一个不为人知的世界?

隐藏 (yín cáng) to hide; to conceal; to mask; to shelter; to harbor (i.e. keep sth hidden); to hide oneself; to lie low; to nestle; hidden; implicit; private; covert; recessed (lighting). 不为人知 (bù wéi rén zhī) not known to anyone; secret; unknown.

Astronomers tell us,

天文学家们告诉我们,

天文学家 (tiān wén xué jiā) astronomer.

All the planets we can see, star,

我们所有能够看到的行星、恒星、

行星 (xíng xīng) planet.

The sum of the galaxies,

星系加起来的总和,

恒星 (héng xīng) (fixed) star.

But 5% of the total mass of the universe,

不过占宇宙总质量的5%,

星系 (xīng xì) see 恒星系 (héng xīng xì). 总和 (zǒng hé) sum.

What is the remaining 95%?

剩下的95%又是什么呢?

宇宙 (yǔ zhòu) universe; cosmos.

Astronomers tell us it is dark matter and dark energy.

天文学家告诉我们是暗物质和暗能量。

剩下 (shèng xià) to remain; left over.

Dark matter neither emits light nor reflects light,

暗物质既不发光又不能反射光,

暗能量 (àn néng liàng) dark energy (astronomy).

发光 (fā guāng) to shine. 反射光 (fǎn shè guāng) to reflect light; reflection; reflected light.

How can we perceive their existence?

The answer is that they have quality,

It also has gravity.

Scientists speculate,

It is precisely because of the strong gravitational action of dark matter,

The particles in the universe can aggregate to form stars,

Form a galaxy.

It can be said that in this starry universe,

Dark matter is the real determining force behind it.

More and more evidence points to the existence of dark matter,

But we haven't found them until today,

It can be said that searching for dark matter has become the biggest scientific mystery of the 21st century.

Scientists all over the world are doing everything possible to find dark matter,

Chinese scientists have also joined.

to this end,

They saw the deepest underground laboratory in the world.

Speaking of this, you may find it strange,

Explore the mysteries of the universe,

Why go deep into the ground 2 kilometers deep?

我们如何**能够感知它们**的存在呢?

答案在于**它们**有质量,

也具有引力。

科学家们推测,

正是由于暗物质**强大的引力作用**,

宇宙中的粒子才能够聚合形成星体,

形成**星系**。

可以说在**这个星光灿烂的宇宙**中,

暗物质才是**背后**真正决定力量。

越来越多的证据都在**指向**暗物质的确存在,

但是**直到**今天我们也还没有**找到它们**,

可以说寻找暗物质已经成为21世纪最大的科学之谜。

全世界的科学家们想尽一切办法在寻找暗物质,

中国的**科学家们**也**加入**了其中。

为此,

他们见到了世界上最深的**地下实验室**。

说到这你也许觉得奇怪,

探寻宇宙的**奥秘**,

为什么要**深入**到**2千米**深的**地下**呢?

感知 (gǎn zhī) perception; awareness. **它们** (tā men) they (for inanimate objects).

引力 (yǐn lì) gravitation (force); attraction.

科学家 (kē xué jiā) scientist. **推测** (tuī cè) speculation; to conjecture; to surmise; to speculate.

正是 (zhèng shì) (emphasizes that sth is precisely or exactly as stated); precisely; exactly; even; if; just like; in the same way as. **强大** (qiáng dà) large; formidable; powerful; strong.

粒子 (lǐ zǐ) (elementary) particle; grain. **聚合** (jù hé) to come together (to form sth); to assemble together; (chemistry) to polymerize. **星体** (xīng tǐ) celestial body (planet, satellite etc).

星光 (xīng guāng) starlight. **灿烂** (càn làn) to glitter; brilliant; splendid.

指向 (zhǐ xiàng) to point towards; aimed at; facing; the direction indicated.

全世界 (quán shì jiè) worldwide; entire world.

为此 (wèi cǐ) for this reason; with regards to this; in this respect; in order to do this; to this end.

见到 (jiàn dào) to see. **地下** (dì xià) underground; subterranean; covert. **实验室** (shí yàn shì) laboratory.

说到 (shuō dào) to talk about; to mention; (preposition) as for.

探寻 (tàn xún) to search; to seek; to explore. **奥秘** (ào mì) secret; mystery.

深入 (shēn rù) to penetrate deeply; thorough. **千米** (qiān mǐ) kilometer.

Deep in the mountains far away
from the city,

远离城市的大山深处，

远离 (yuǎn lí) to be far from; to keep away from. 大山 (dà shān) Dashan, stage name of Canadian Mark Henry Rowswell (1965-), actor and well-known TV personality in PRC. 深处 (shēn chù) abyss; depths; deepest or most distant part.

A huge project is hidden.

隐匿着一项巨大的工程。

隐匿 (yǐn nì) to cover up; to hide; to conceal. 工程 (gōng chéng) engineering; an engineering project; project; undertaking.

This high pressure is 2200.

这个高压是2200。

高压 (gāo yā) high pressure; high-handed.

Into the depths of the earth,

进入地底的深处，

地底 (dì dǐ) subterranean; underground.

Looking for unreachable
dreams in the deepest darkness.

在最深处的黑暗中寻找遥不可及的梦想。

遥不可及 (yáo bù kě jí) unattainable; far-fetched; out of reach; exceedingly remote or distant.

80 years ago,

80多年前，

年前 (nián qián) before the end of the year; before the new year.

Astronomers discovered a
strange phenomenon,

天文学家发现了一个奇怪的现象，

The movement of stars in the
galaxy seems to be too fast,

星系中恒星的运动速度似乎太快了，

If it is not caught by something
huge,

如果不是什么庞大物质拽住了它，

庞大 (páng dà) huge; enormous; tremendous. 拽 (zhuài) alternate writing of 蹶 (zhuǎi).

They are likely to fall apart,

它们很可能会分崩离析，

分崩离析 (fēn bēng lí xī) to collapse and fall apart (idiom); to break up; falling to pieces.

Scattered around.

四散而去。

四散 (sì sàn) to disperse; to scatter in all directions.

Later, more and more indirect
observational evidence of
astrophysics convinced
scientists that

后来越来越多的天体物理间接观测证据让科学家们确信，

天体物理 (tiān tǐ wù lǐ) astrophysics. 间接 (jiàn jiē) indirect. 观测 (guān cè) to observe; to survey; observation (scientific etc). 确信 (què xìn) to be convinced; to be sure; to firmly believe; to be positive that; definite news.

Our galaxy is surrounded by a
huge cloud of undiscovered
dark matter,

我们的星系被一团巨大的未被发现的黑暗物质包围着，

包围 (bāo wéi) to surround; to encircle; to hem in.

This mysterious matter is called
dark matter.

这种神秘的物质被称为暗物质。

称为 (chēng wéi) called; to call sth (by a name); to name.

Dark matter is first of all a
substance,

暗物质它首先是一种物质，

It provides gravitation,

它提供引力作用，

But it doesn't shine,

但是它不发光，

We can't see.

我们看不见。

看不见 (kàn bu jiàn) unseen; to be invisible.

The invisible dark matter in the
vast universe,

茫茫宇宙中看不见的暗物质，

茫茫 (máng máng) boundless; vast and obscure.

Is the real leader.

才是真正的领导者。

主导 (zhǔ dǎo) leading; dominant; prevailing; to lead; to direct; to dominate.

In addition,

We know almost nothing about it.

So far

Scientists have not found direct evidence of the existence of dark matter.

But they firmly believe that dark matter does exist,

Once it is found, the existing physics theory will be rewritten accordingly.

Looking for invisible matter,

Scientists have their own solutions.

Yue Qian, an associate professor in the Department of Physics of Tsinghua University, showed us the secret weapon for intercepting dark matter.

Although dark matter interacts weakly with known matter,

But it's not without effect,

High purity germanium detector,

Made of germanium crystal material with the highest purity in the world,

Once dark matter hits the germanium atom in it,

The energy of the nucleus will change slightly,

And was discovered.

The dark matter particles interact with the high-purity germanium detector,

There is a very small amount of energy left in the high school germanium detector,

除此之外,

我们对它几乎一无所知。

迄今为止,

科学家尚未找到暗物质存在的直接证据。

但是他们坚定的相信暗物质的确存在,

一旦找到它现有的物理学理论将因此被改写。

寻找看不见的物质,

科学家们自有他们的办法。

清华大学物理系副教授岳谦向我们展示了截获黑暗物质的秘密武器。

虽然暗物质与已知物质作用微弱,

但却不是没有作用,

高纯锗探测器,

用世界上纯度最高的锗晶体材料制造而成,

一旦暗物质击中其中的锗原子,

原子核的能量就会发生微小的变化,

并被发现。

暗物质粒子跟高纯度锗探测器相互作用,

在高中锗探测器里面留了很小很小一点点的能量,

除此之外 (chú cǐ zhī wài) apart from this; in addition to this.

一无所知 (yī wú suǒ zhī) not knowing anything at all (idiom); completely ignorant; without an inkling.

迄今为止 (qì jīn wéi zhǐ) so far; up to now; still (not).

尚未 (shàng wèi) not yet; still not.

坚定 (jiān dìng) firm; steady; staunch; resolute.

有的 (yǒu de) (there are) some (who are...); some (exist). 物理学 (wù lǐ xué) physics. 改写 (gǎi xiě) to revise; to edit.

自有 (zì yǒu) to possess; to own; to have.

清华大学 (qīng huá dà xué) Tsinghua or Qinghua University, Beijing; National Tsing Hua University, Hsinchu, Taiwan. 副教授 (fù jiào shòu) associate professor (university post). 岳 (yuè) high mountain; highest peak of a mountain ridge. 谦 (qiān) modest. 展示 (zhǎn shì) to reveal; to display; to show; to exhibit sth. 截获 (jié huò) to intercept; to cut off and capture. 武器 (wǔ qì) weapon; arms.

已知 (yǐ zhī) known (to science). 微弱 (wēi ruò) weak; faint; feeble.

有作用 (yǒu zuò yòng) effective; to have impact.

锗 (zhè) germanium (chemistry). 探测器 (tàn cè qì) detector; probe; craft.

纯度 (chún dù) purity. 最高 (zuì gāo) tallest; highest; supreme (court etc). 晶体 (jīng tǐ) crystal.

击中 (jī zhòng) to hit (a target etc); to strike. 原子 (yuán zǐ) atom; atomic.

原子核 (yuán zǐ hé) atomic nucleus. 能量 (néng liàng) energy; capabilities. 小的 (xiǎo de) I (when talking to a superior).

相互作用 (xiāng hù zuò yòng) to interact; interaction; interplay.

高中 (gāo zhōng) senior high school; abbr. for 高级中学 (gāo jí zhōng xué). 一点点 (yī diǎn diǎn) a little bit.

Our detector can perceive it.

我们**这个探测器**都可以把它**感知**。

The problem is not that simple,

问题**并不那么简单**,

To make the detector encounter dark matter particles,

要让**探测器遭遇**暗物质**粒子**,

遭遇 (zāo yù) to meet with; to encounter; (bitter) experience.

And recognize it,

并且把它**识别出来**,

识别 (shí bié) to distinguish; to discern.

There is also a huge challenge.

还面临着一个巨大的挑战。

The high-energy particles in the universe hit the earth like a downpour,

宇宙中的高能粒子如同倾盆大雨
轰击着地球,

高能粒子 (gāo néng lì zǐ) high energy particle. **如同** (rú tóng) like; as. **倾盆大雨** (qīng pén dà yǔ) a downpour; rain bucketing down; fig. to be overwhelmed (with work or things to study). **轰击** (hōng jī) bombard.

To identify and discover the dark matter particles hidden in them,

要**甄别**并且发现**隐身其中的**暗物
质**粒子**,

甄别 (zhēn bié) to screen; to discriminate; to reexamine a case; screening (of applicants etc). **隐身** (yǐn shēn) to hide oneself; invisible (person or online status).

Like at the scene of a football match with full of voices,

如同在一场人声鼎沸的足球比赛
现场,

同在 (tóng zài) to be with. **人声鼎沸** (rén shēng dǐng fèi) lit. a boiling cauldron of voices (idiom); hubbub; brouhaha. **现场** (xiàn chǎng) the scene (of a crime, accident etc); (on) the spot; (at) the site.

I heard the sound of a steel needle falling,

听见一根**钢针****跌落**的声音,

针 (zhēn) needle; pin; injection; stitch. **跌落** (diē luò) to fall; to drop.

The scientist's solution is to move the laboratory deep enough underground,

科学家的办法是把**实验室**搬到**足**
够深的**地下**,

足够 (zú gòu) enough; sufficient.

Relying on deep rocks to shield out cosmic rays and background radiation,

依靠深厚的**岩石****屏蔽**掉**宇宙射线**
和**背景辐射**,

依靠 (yī kào) to rely on sth (for support etc); to depend on. **深厚** (shēn hòu) deep; profound. **岩石** (yán shí) rock. **屏蔽** (píng bì) to screen; to block (sth or sb); to shield; (protective) shield. **宇宙射线** (yǔ zhòu shè xiàn) cosmic ray. **辐射** (fú shè) radiation.

Only dark matter particles do not interact with other matter,

唯有暗物质**粒子**不与其他物质发
生作用,

唯有 (wéi yǒu) only.

It will penetrate the rock easily.

它将轻松**穿透****岩石**。

穿透 (chuān tòu) to penetrate.

If the scientist is lucky enough,

如果**科学家****足够****幸运**的话,

Maybe it can be captured.

或许**能够**将其**捕获**。

捕获 (bǔ huò) to catch; to capture; to seize.

At present, dark matter research in the world mostly uses underground mines and tunnels to establish laboratories.

目前**全世界**暗物质研究多利用**地**
下**矿井**和**隧道**建立**实验室**,

矿井 (kuàng jǐng) a mine; a mine shaft. **隧道** (suì dào) tunnel.

The research team initially went to South Korea to carry out dark matter experiments.

课题组最初**远赴****韩国****开展**暗物质
实验,

课题 (kè tí) task; problem; issue. **远赴** (yuǎn fù) to travel to (a distant place). **开展** (kāi zhǎn) to launch; to develop; to unfold; (of an exhibition etc) to open.

It's a pity that the deep laboratory there is only more than 700 meters deep,

可惜**那里**的**深地****实验室**只有**700多**
米深,

Yue Qian and his colleagues hope to find a depth of more than 1 km in China,

Also suitable for mines and tunnels for scientific research,

Never gain,

As a result, the research was once stuck.

August 8, 2008,

Hundreds of millions of Chinese people rejoiced for the opening of the Beijing Olympics,

Yue Qian got an unexpected gift.

There was a piece of news in the live TV broadcast that day,

The diversion tunnel of Jingping Hydropower Station successfully realized double-action pipe connection,

The maximum buried depth of the tunnel is 2375 meters,

Yue Qian quickly reported the news to school leaders.

Soon Tsinghua University contacted the Yalong River Basin Hydropower Development Company,

Explore the possibility of establishing an underground laboratory,

The turbulent Yalong River encounters Jingping Mountain at 4193 meters above sea level.

The river was forced to turn,

岳谦和同事们希望在中国**找到深度超过1千米**,

同时适合**开展科学研究的矿井和隧道**,

始终没有收获,

研究因此**一度陷入困顿**。

2008年8月8日,

亿万中国人为北京**奥运会开幕而欢欣鼓舞**,

岳谦得到一个意外的礼物。

当天的电视**直播中插播**了一条新闻,

井平水电站引水隧道胜利实现**双动管通**,

隧道最大埋深2375米,

岳谦迅速向学校领导**反馈**这一消息。

很快**清华大学**与**亚龙江流域水电**开发公司联系,

探讨建立**地下实验室的可能性**,

汹涌奔流的**亚龙江**遭遇**海拔4193米**的**井平山**,

江流被迫**转弯**,

谦和 (qiān hé) meek; modest; amiable. **深度** (shēn dù) depth; (of a speech etc) profundity; advanced stage of development.

科学研究 (kē xué yán jiū) scientific research.

一度 (yī dù) for a time; at one time; one time; once. **陷入** (xiàn rù) to sink into; to get caught up in; to land in (a predicament). **困顿** (kùn dùn) fatigued; exhausted; poverty-stricken; in straitened circumstances.

亿万 (yì wàn) millions and millions. **中国人** (zhōng guó rén) Chinese person. **奥运会** (ào yùn huì) abbr. for 奥林匹克运动会; Olympic Games; the Olympics. **开幕** (kāi mù) to open (a conference); to inaugurate. **欢欣鼓舞** (huān xīn gǔ wǔ) elated and excited (idiom); overjoyed.

当天 (dàng tiān) the same day. **直播** (zhí bō) live broadcast (not recorded); direct Internet broadcasting; (agriculture) direct seeding. **插播** (chā bō) to interrupt (a radio or TV program) with a commercial insert, breaking news etc; to put a call on hold.

井 (jǐng) a well; neat; orderly. **水电站** (shuǐ diàn zhàn) hydroelectric power plant. **引水** (yǐn shuǐ) to pilot a ship; to channel water; to draw water (for irrigation).

埋 (mái) to blame.

反馈 (fǎn kuì) to send back information; feedback.

龙江 (lóng jiāng) Longjiang county in Qiqihar 齐齐哈尔 (qí qí hā ěr), Heilongjiang. **流域** (liú yù) river basin; valley; drainage area. **水电** (shuǐ diàn) hydroelectric power; plumbing and electricity.

探讨 (tàn tǎo) to investigate; to probe. **可能性** (kě néng xìng) possibility; probability.

汹涌 (xiōng yǒng) to surge up violently (of ocean, river, lake etc); turbulent. **奔流** (bēn liú) to flow at great speed; to pour; racing current. **海拔** (hǎi bá) height above sea level; elevation. **平山** (píng shān) Pingshan county in Shijiazhuang 石家庄 (shí jiā zhuāng), Hebei; Pingshan district of Benxi city 本溪市, Liaoning.

江流 (jiāng liú) river; river flow; current. **被迫** (bèi pò) to be compelled; to be forced. **转弯** (zhuǎn wān) to turn; to go around a corner.

Forming a large river bend of 150 kilometers,

形成150千米的大河湾,

大河 (dà hé) large river (esp the Yellow River). 湾 (wān) bay; gulf; to cast anchor; to moor (a boat).

The elevation difference between the upstream and downstream reaches more than 600 meters,

河段上下游高位差达到600多米,

下游 (xià yóu) lower reaches (of a river); lower level; lower echelon; downstream. 高位 (gāo wèi) high position; eminent status; top job; raised position; upper (limbs); a high (i.e. local maximum); high point on scale, high grade, temperature, latitude etc.

This is the perfect place to build the dam.

这里正是建造水坝的绝佳地点。

建造 (jiàn zào) to construct; to build. 水坝 (shuǐ bà) dam; dike. 绝佳 (jué jiā) exceptionally good.

Jinping Hydropower Station was constructed in 9 years.

锦屏水电站历时9年建造而成,

锦屏 (jīn píng) Jinping county in Qiandongnan Miao and Dong autonomous prefecture 黔东南州 (qián dōng nán zhōu), Guizhou. 历时 (lì shí) to last; to take (time); period; diachronic.

He set the highest arch dam,

他创下最高拱坝、

创下 (chuàng xià) to establish; to set (a new record). 拱坝 (gǒng bà) an arch dam.

The largest slope,

最大边坡、

坡 (pō) slope; sloping; slanted.

Multiple world records for the deepest tunnel.

最深隧道的多项世界纪录。

世界纪录 (shì jiè jì lù) world record.

The double-curved arch dam leverages the towering mountains on both sides of the bank,

双曲形拱坝借力两岸巍峨的高山,

双曲 (shuāng qū) hyperbola; hyperbolic (function). 两岸 (liǎng àn) bilateral; both shores; both sides; both coasts; Taiwan and mainland. 巍峨 (wēi é) lofty; towering; majestic. 高山 (gāo shān) high mountain; alpine.

Block the huge pressure of the water body.

挡住了水体的巨大压力。

挡住 (dǎng zhù) to obstruct. 水体 (shuǐ tǐ) body of water.

In order to make full use of the river drop,

为了充分利用河流落差,

河流 (hé liú) river. 落差 (luò chā) drop in elevation; (fig.) gap (in wages, expectations etc); disparity.

A second dam will be built downstream of Dahewan.

在大河湾的下游还要建造第二个大坝,

大坝 (dà bà) dam.

But water conservancy experts have more sophisticated designs here,

但是水利专家们在这里有更加精妙的设计,

水利 (shuǐ lì) water conservancy; irrigation works. 更加 (gèng jiā) more (than sth else); even more. 精妙 (jīng miào) exquisite; fine and delicate (usu. of works of art).

Excavate a diversion tunnel directly under the dam,

在大坝的下方直接开凿引水隧洞,

下方 (xià fāng) underneath; below; the underside; world of mortals; to descend to the world of mortals (of Gods). 开凿 (kāi záo) to cut (a canal, tunnel, well etc). 隧洞 (suì dòng) tunnel.

Through Jinping Mountain,

穿过锦屏山,

穿过 (chuān guò) to pass through.

Directly use the 300-meter natural drop,

直接利用300米的自然落差,

落差 (luò chā) drop in elevation; (fig.) gap (in wages, expectations etc); disparity.

Build a second hydropower station in the lower reaches of Dahewan.

在大河湾下游建立第二个水电站。

水电站 (shuǐ diàn zhàn) hydropower station.

For the convenience of construction,

为施工方便,

施工 (shī gōng) construction; to carry out construction or large-scale repairs.

Two traffic tunnels were built beside the four diversion tunnels,

The middle of the tunnel is 2,400 meters from the top of the mountain.

This is an excellent place to build a deep laboratory.

In March 2009,

Yueqian and his colleagues finally set foot on the land of their dreams.

I see such a high mountain,

There is such a thick rock covering the top of the head,

I feel my mood is ups and downs.

The rock above the head gradually thickened,

Getting thicker,

As if walking towards the depths of the earth.

Relying on the construction of super projects,

China's super laboratory was born.

In May 2009,

Tsinghua University and Yalong River Basin Hydropower Development Company signed an agreement,

Jointly build Jinping Dark Matter Laboratory.

Since the date of completion,

It covers a depth of 2400 meters of rock,

Become the deepest underground laboratory in the world.

在**四条引水隧道**的旁边**修建**了两条交通**隧洞**,

隧道中部距离**山顶**2400米,

这里正是建立**深地实验室**的**绝佳地点**。

2009年3月,

跃迁和同事们终于**踏上**梦想之地。

我看到**那么**高的山,

头顶上有**那么**厚的**岩石覆盖**,

我感觉我的心情也是**起起伏伏**。

头顶上的**岩石**逐渐的**变厚**,

越来越厚,

好像向地球的深部**走去**似的。

依托于**超级工程**的建设,

中国的**超级实验室**得以**横空出世**。

2009年5月,

清华大学与**亚龙江流域水电开发公司****签署协议**,

共同建设**锦屏暗物质实验室**。

自**建成**之日起,

它就以2400米的**岩石覆盖深度**,

成为世界上最深的**地下实验室**。

四条 (sì tiáo) four of a kind; quads (poker). **修建** (xiū jiàn) to build; to construct.

中部 (zhōng bù) middle part; central section. **山顶** (shān dǐng) hilltop.

跃迁 (yuè qiān) transition; jump (e.g. quantum leap in spectroscopy). **踏上** (tà shàng) to set foot on; to step on or into.

头顶 (tóu dǐng) top of the head. **覆盖** (fù gài) to cover.

起伏 (qǐ fú) to move up and down; to undulate; ups and downs. **伏** (fú) to lean over; to fall (go down); to hide (in ambush); to conceal oneself; to lie low; hottest days of summer; to submit; to concede defeat; to overcome; to subdue; volt.

变厚 (biàn hòu) to thicken.

走去 (zǒu qù) to walk over (to).

依托 (yī tuō) to rely on; to depend on; support.

得以 (dé yǐ) able to; so that sb can; enabling; in order to; finally in a position to; with sth in view. **横空** (héng kōng) filling the atmosphere; covering the sky. **出世** (chū shì) to be born; to come into being; to withdraw from worldly affairs.

签署 (qiān shǔ) to sign (an agreement). **协议** (xié yì) agreement; pact; protocol.

建成 (jiàn chéng) to establish; to build.

The laboratory is located in the middle of the tunnel in the deepest part of the earth.

It's like a well-arranged trap,

To ensure that only dark matter falls into it,

And was discovered,

Scientists also need to set up layers of barriers,

Keep all kinds of cosmic rays and environmental radiation out.

This is the core of the laboratory core,

Three high-purity germanium detection devices continuously record data.

From these massive amounts of data,

The CDEX experimental group of Tsinghua University obtained the most sensitive experimental results of the detector in the low-energy region.

It was determined that the dark matter existed areas declared by well-known foreign laboratories for many years.

Right beside the experimental group of Tsinghua University,

The Pandex experimental group at Shanghai Jiaotong University used xenon atoms as targets to replenish dark matter particles.

The 500 kg liquid xenon detector they developed,

Recently announced the results of the operation,

实验室位于地底最深处的隧道中部,

这里就像是一个精心布置的陷阱,

为了确保只有暗物质落入其中,

并且被发现,

科学家还需要设置层层壁垒,

将各种宇宙射线和环境辐射挡在外面。

这里是实验室核心中的核心,

三台高纯锗探测装置一刻不停地收录着数据。

从这些海量数据中,

清华大学CDEX实验组获得了低能区探测器最灵敏实验结果,

确定排除了国外知名实验室多年宣称的暗物质存在区域。

就在清华大学实验组的旁边,

上海交通大学潘戴克斯实验组用氙原子作为补货暗物质粒子的靶子,

他们研制的500公斤液氙探测器,

最近公布运行结果,

精心(jīng xīn) with utmost care; fine; meticulous; detailed. 布置(bù zhì) to put in order; to arrange; to decorate; to fix up; to deploy. 陷阱(xiàn jǐng) pitfall; snare; trap.

确保(què bǎo) to ensure; to guarantee. 落入(luò rù) to fall into.

设置(shè zhì) to set up; to install. 层层(céng céng) layer upon layer. 壁垒(bì lěi) rampart; barrier.

在外(zài wài) outer; excluded.

三台(sān tái) Santai county in Mianyang 绵阳(mián yáng), north Sichuan. 探测(tàn cè) to probe; to take readings; to explore; exploration. 装置(zhuāng zhì) to install; installation; equipment; system; unit; device. 不停(bù tíng) incessant. 收录(shōu lù) to include (in a collection); to put together (stories, poems etc); to record; to employ; to recruit.

海量(hǎi liàng) huge volume.

低能(dī néng) incapable; incompetent; stupid; mentally deficient. 灵敏(líng mǐn) smart; clever; sensitive; keen; quick; sharp.

国外(guó wài) abroad; external (affairs); overseas; foreign. 知名(zhī míng) well-known; famous. 宣称(xuān chēng) to assert; to claim. 区域(qū yù) area; region; district.

上海交通大学(shàng hǎi jiāo tōng dà xué) Shanghai Jiaotong University. 潘(pān) surname Pan; Pan, faun in Greek mythology, son of Hermes. 氙(xiān) xenon (chemistry). 补货(bǔ huò) to restock (an item); to replenish inventory. 靶子(bǎ zi) target.

研制(yán zhì) to manufacture; to develop.

运行(yùn xíng) to move along one's course (of celestial bodies etc); (fig.) to function; to be in operation; (of a train service etc) to operate; to run; (of a computer) to run.

The latest restrictions on possible dark matter candidates are given,

Dark matter is still not found,

But its hiding area has become smaller and smaller.

Europe,

Both American and Chinese scientists are conducting dark matter detection experiments,

Who can be the first winner to capture dark matter?

With the natural advantages of Jinping Laboratory,

The sudden emergence of Chinese scientists has high hopes.

Western media issued a statement saying,

The conditions of China's underground laboratories are like heaven,

China's bold steps will disrupt the hugely costly field of particle physics research.

The question now is who can keep up with China's pace?

I think it's reach the stage where it can take a leading role in the international scientific research effort.

And CJPL is one example of that.

I'm sure that in the next 50 years,

we will see China becoming one of the leading players in scientific research.

对可能的暗物质**候选**对象给出了**最新**的限制,

暗物质依然没有**找到**,

但是它**藏身**的**区域**已经**越来越小**。

欧洲、

美国和中国**科学家**都在**开展**暗物质**探测**实验,

谁能最早成为**捕获**暗物质的**赢家**?

凭借锦屏实验室的**天然**优势,

异军突起的中国**科学家**被**寄予厚望**。

西方媒体发**文**称,

中国**地下**实验室的条件**犹如天堂**,

中国的**大胆**步伐将**颠覆**耗资巨大的**粒子物理**研究领域。

现在的问题是**谁能紧跟**中国的**步伐**?

I think it's reach the stage where it can take a leading role in the international scientific research effort.

And CJPL is one example of that.

I'm sure that in the next 50 years,

we will see China becoming one of the leading players in scientific research.

候选 (hòu xuǎn) candidate (attributive).

藏身 (cáng shēn) to hide; to go into hiding; to take refuge.

赢家 (yíng jiā) winner.

凭借 (píng jiè) to rely on; to depend on; by means of; thanks to; sth that one relies on. **天然** (tiān rán) natural.

异军突起 (yì jūn tū qǐ) to emerge as a new force to be reckoned with (idiom). **寄予厚望** (jì yǔ hòu wàng) to place high hopes.

西方 (xī fāng) the West; the Occident; Western countries.

犹如 (yóu rú) similar to; appearing to be. **天堂** (tiān táng) paradise; heaven.

大胆 (dà dǎn) brazen; audacious; outrageous; bold; daring; fearless. **步伐** (bù fá) pace; (measured) step; march. **颠覆** (diān fù) to topple (i.e. knock over); to capsize; fig. to overturn (a regime, by plotting or subversion); to undermine; to subvert. **耗资** (hào zī) to spend; expenditure; to cost. **粒子物理** (lì zǐ wù lǐ) particle physics. **研究领域** (yán jiū lǐng yù) research area; field of research.

紧跟 (jǐn gēn) to follow precisely; to comply with.

In order to expand the results,

Jinping Laboratory carried out the second phase of construction,

The underground experiment space was expanded to 120,000 cubic meters,

A 10-story pit was dug down in the cave,

Tons of super detectors will be installed here in the future.

Before the opening of the new experimental hall,

The builders used cryogenic detectors to comprehensively monitor the laboratory environment.

In this largest and deepest underground laboratory,

Chinese scientists will attack the biggest scientific mystery.

If there is no dark matter,

This universe cannot develop to the time we see today.

I can't say that this dark matter will contribute to mankind immediately,

It just lets us humans know this universe,

It is no longer the universe we saw before.

We look for dark matter in the deepest underground laboratory,

We are also searching for traces of dark matter in the vast space.

In 2016,

为了**扩大战果**,

锦屏实验室开展二期工程建设,

地下实验空间扩大到12万立方米,

在**岩洞中又向下挖出10多层楼高的地坑**,

未来将在**这里安置吨量级超级探测器**。

在新的实验**大厅启用之前**,

建设者采用**低温探测器对实验室环境进行全面监测**。

在**这个最大最深的地下实验室里**,

中国**科学家**将向最大的科学之谜**发起冲击**。

如果没有暗物质,

这个宇宙是不能发展到当今我们看到的现在**这个时间**的。

我说**不好这个暗物质**马上立即的会对人类有什么贡献,

它**只是**让我们人类知道**这个宇宙**,

而**不再**是我们以前看到的**那个宇宙**。

我们在最深的**地下实验室**寻找暗物质,

我们也在**茫茫太空中**探寻暗物质的**痕迹**。

2016年,

大战 (dà zhàn) war; to wage war.

立方米 (lǐ fāng mǐ) cubic meter (unit of volume).

岩 (yán) cliff; rock. **向下** (xiàng xià) down; downward. **挖** (wā) to dig; to excavate; to scoop out. **层楼** (céng lóu) multistoried building; tower; pagoda. **坑** (kēng) hole; pit; tunnel; to defraud.

安置 (ān zhì) to find a place for; to help settle down; to arrange for; to get into bed; placement.

大厅 (dà tīng) hall; lounge. **启用** (qǐ yòng) to start using; (computing) to enable (a feature).

低温 (dī wēn) low temperature. **监测** (jiān cè) to monitor.

发起 (fā qǐ) to originate; to initiate; to launch (an attack, an initiative etc); to start; to propose sth (for the first time). **冲击** (chōng jī) to attack; to batter; (of waves) to pound against; shock; impact.

当今 (dāng jīn) current; present; now; nowadays.

太空 (tài kōng) outer space. **痕迹** (hén jì) vestige; mark; trace.

China launched the most advanced dark matter experimental satellite Wukong,

In this global race to find dark matter,

The Chinese are becoming the most powerful competitors.

Look into space and you will find,

China has not only launched multiple scientific experiment satellites,

Also built a palace of science,

Tiangong No.2.

Tiangong-2 is China's first real space laboratory,

Here we use the conditions of microgravity and vacuum in space,

This allows many experiments that cannot be carried out on the ground.

Tiangong-2 has built a grand stage for scientists in China and the world.

The Shanghai Institute of Optics and Mechanics of the Chinese Academy of Sciences is the top research institute of laser technology in China.

In this laboratory,

Liu Liang and his colleagues deal with mysterious atoms every day.

Is this a mirror?

Ok.

中国**发射**了**最先进**的暗物质实验**卫星悟空号**,

在这场**全球**寻找暗物质的**竞赛**中,

中国人正在成为**最有力**的**竞争者**。

放眼太空就会发现,

中国不仅**发射**了多颗**科学实验卫星**,

还**搭建**了一座科学的**宫殿**,

天宫二号。

天宫二号是中国第一个真正意义上的**空间实验室**,

在这里利用**太空中微重力和真空**的条件,

使得许多**在地面上**无法展开的**实验得以进行**。

天宫二号为中国**乃至**世界的**科学家们****搭建**了一座**宏大**的**舞台**。

中科院上海光机所是中国**激光技术**研究的**顶尖机构**,

在这个**实验室**中,

刘亮和同事们**每天**都在和**神秘莫测**的**原子**打交道。

这是**镜**是吧?

嗯。

发射 (fā shè) to shoot (a projectile); to fire (a rocket); to launch; to emit (a particle); to discharge; emanation; emission. **先进** (xiān jìn) advanced (technology); to advance. **卫星** (wèi xīng) satellite; moon. **悟空** (wù kōng) Sun Wukong, the Monkey King, character with supernatural powers from the novel Journey to the West 西游记 (xī yóu jì).

竞赛 (jìng sài) race; competition.

有力 (yǒu lì) powerful; forceful; vigorous. **竞争者** (jìng zhēng zhě) competitor.

放眼 (fàng yǎn) to survey; to view broadly.

科学实验 (kē xué shí yàn) scientific experiment.

搭建 (dā jiàn) to build (esp. with simple materials); to knock together (a temporary shed); to rig up. **宫殿** (gōng diàn) palace.

天宫 (tiān gōng) Temple in Heaven (e.g. of the Jade Emperor). **二号** (èr hào) 2nd day of the month.

重力 (zhòng lì) gravity. **真空** (zhēn kōng) vacuum.

使得 (shǐ de) usable; workable; feasible; doable; to make; to cause. **在地** (zài dì) local.

乃至 (nǎi zhì) and even; to go so far as to. **宏大** (hóng dà) great; grand. **舞台** (wǔ tái) stage; arena; fig. in the limelight.

中科院 (zhōng kē yuàn) abbr. for 中国社会科学院 (zhōng guó shè huì kē xué yuàn), Chinese Academy of Sciences (CAS). **激光** (jī guāng) laser. **顶尖** (dǐng jiān) peak; apex; world best; number one; finest (competitors); top (figures in a certain field). **机构** (jī gòu) mechanism; structure; organization; agency; institution.

神秘莫测 (shén mì mò cè) mystery; unfathomable; enigmatic.

嗯 (en) interjection indicating approval, appreciation or agreement.

Is that what it is?

No.

Can you imagine using a laser to look at an atom,

Seeing the atom grabbed it,

I caught it and saw the fluorescence come out.

It sounds like a game of cat and mouse.

In fact, it is a world-leading topic.

Liu Liang and his colleagues studied the clock with the highest timekeeping accuracy in the world today.

Laser cold atomic clock,

It can run for millions of years,

The error is only one second.

This one looks weird,

There are black machines on the surface,

Why can it break through the limits of human time measurement?

Have you seen all kinds of clocks,

From the early pendulum clock to the later mechanical clock,

Quartz clock,

They have different shapes,

The principle behind it is the same,

The time is measured according to the oscillation frequency of different objects.

那就是本来就有的吗？

没有。

你能想象把一个原子用激光来把它看着，

看到原子把它抓住了，

抓住了看到荧光出来了。

听来像是一场猫捉老鼠的游戏。

其实是一项领先世界的课题。

刘亮和同事们研究的是当今世界计时精度最高的钟表，

激光冷原子钟，

它可以做到运行几百万年，

只误差一秒钟。

这台外形古怪，

表面有黑的机器，

为何能够突破人类时间计量的极限呢？

你见过各种各样的钟表，

从早期的摆钟到后来的机械钟、

石英钟，

它们外形各不相同，

背后的原理却都是一个，

根据不同物体的震荡频率来测量时间。

抓住 (zhuā zhù) to grab; to capture.

荧光 (yíng guāng) fluorescence; fluorescent.

听来 (tīng lái) to sound (old, foreign, exciting, right etc); to ring (true); to sound as if (i.e. to give the listener an impression); to hear from somewhere. 捉 (zhuō) to clutch; to grab; to capture.

领先 (lǐng xiān) to lead; to be in front.

计时 (jì shí) to measure time; to time; to reckon by time. 精度 (jīng dù) precision. 钟表 (zhōng biǎo) clock.

原子钟 (yuán zǐ zhōng) atomic clock.

做到 (zuò dào) to accomplish; to achieve. 百万 (bǎi wàn) million; millions.

误差 (wù chā) difference; error; inaccuracy. 秒钟 (miǎo zhōng) (time) second.

外形 (wài xíng) figure; shape; external form; contour. 古怪 (gǔ guài) eccentric; grotesque; oddly; queer.

为何 (wèi hé) why. 突破 (tū pò) to break through; to make a breakthrough; to surmount or break the back of (a task etc); (of ball sports) to break through a defense. 计量 (jì liàng) measurement; to calculate. 极限 (jí xiàn) limit; extreme boundary.

各种各样 (gè zhǒng gè yàng) various kinds; all sorts.

早期 (zǎo qī) early period; early phase; early stage. 摆钟 (bǎi zhōng) pendulum clock. 机械钟 (jī xiè zhōng) mechanical clock.

石英钟 (shí yīng zhōng) quartz clock.

各不相同 (gè bù xiāng tóng) to have nothing in common with each other (idiom).

原理 (yuán lǐ) principle; theory.

物体 (wù tǐ) object; body; substance. 震荡 (zhèn dòng) to shake up; to jolt; to vibrate; to oscillate; to fluctuate. 频率 (pín lǜ) frequency. 测量 (cè liáng) survey; to measure; to gauge; to determine.

In the 1930s and 1940s,

Scientists found that

Atoms have a more precise oscillation frequency,

This is how the atomic clock, a super timekeeping tool, was invented.

And change the error of human timing from one day to one second,

The error of one second in ten days has increased to only one second in millions of years.

Since then, mankind has entered the era of atomic timekeeping.

do you know?

The most basic time measurement unit, second, is defined by the atomic clock.

This is a picture of the structure of a cesium atom,

For some reason,

Electrons will jump back and forth between different tracks,

This phenomenon is called atomic oscillation.

Cesium atoms can oscillate 9192631770 times per second,

In other words, we can divide one second into more than 90 parts,

Take advantage of this feature,

We can increase the timing accuracy to several billionths of a second.

Of course this is a very ideal state,

Actually at room temperature,

20世纪三四十年代,

科学家发现,

原子有着更为精确的震荡频率,

超级计时工具原子钟就这样被发明出来,

并把人类计时误差从一天误差一秒钟,

十天误差一秒钟提升到数百万年只误差一秒,

人类从此进入原子计时时代。

你知道吗?

最基本的时间计量单位秒就是由原子钟定义的。

这是一幅铯原子的结构图,

由于某种原因,

电子会在不同的轨道之间来回跳跃,

这种现象就称为原子震荡。

铯原子一秒钟可以震荡9192631770次,

也就是说我们可以把一秒钟分为90多一份,

利用这种特性,

我们就可以把计时精度提高到几十亿分之一秒。

当然了这是一种非常理想的状态,

实际上在常温下,

四十 (sì shí) forty; 40.

有着 (yǒu zhe) to have; to possess. 更为 (gèng wéi) even more. 精确 (jīng què) accurate; precise.

并把 (bìng bǎ) to include.

数百万 (shù bǎi wàn) several million.

定义 (dìng yì) definition; to define.

铯 (sè) cesium (chemistry).

某种 (mǒu zhǒng) some kind (of).

轨道 (guǐ dào) orbit; railway or tram line; fig. conventional way of thinking. 之间 (zhī jiān) between; among; inter-. 来回 (lái huí) to make a round trip; return journey; back and forth; to and fro; repeatedly. 跳跃 (tiào yuè) to jump; to leap; to bound; to skip.

也就是说 (yě jiù shì shuō) in other words; that is to say; so; thus. 分为 (fēn wéi) to divide sth into (parts); to subdivide.

特性 (tè xìng) property; characteristic.

十亿 (shí yì) one billion; giga-. 之一 (zhī yī) one of (sth); one out of a multitude; one (third, quarter, percent etc).

实际上 (shí jì shàng) in fact; in reality; as a matter of fact; in practice. 常温 (cháng wēn) room temperature; ordinary temperatures.

The atom is moving at high speed,

It is difficult for scientists to accurately measure its oscillation frequency.

So in order to improve the measurement accuracy,

Scientists are going to slow down the movement of atoms,

For this they invented a magic method,

Laser cold atomic clock.

Lasers are ten million times hotter than sunlight,

Using it to cool atoms is indeed a big brainstorm.

This vision really became a reality in the 1980s.

Use laser to irradiate atomic groups from different directions,

Lock the atom firmly in the center,

The erratic atom is like being locked in a closed cage.

When it stops moving,

The temperature will drop from room temperature to absolute zero in an instant,

In this way, scientists can measure its oscillation frequency in a leisurely manner.

As early as the late 70s,

原子是在**高速**的运动着,

科学家们很难**精确地测量**它的**振荡频率**。

那么为了提高**测量精度**,

科学家们就要让**原子运动慢下来**,

为此他们发明了一种**神奇的方法**,

激光冷原子钟。

激光比太阳光还炽热千万倍,

用它来**冷却原子**的确是**脑洞大开**,

20世纪80年代**这个构想真的成了现实**。

用**激光**从**不同方向照射原子团**,

把**原子牢牢的锁定**在中心位置,

飘忽不定的原子就像被关进了一个**密闭的笼子**。

当它**停止**运动后,

温度会**瞬间从室温降到绝对零度**,

这样科学家们就能**从容不迫地测量**它的**振荡频率**。

早在**70年代末期**,

高速 (gāo sù) high speed.

振荡 (zhèn dòng) vibration; oscillation.

神奇 (shén qí) magical; mystical; miraculous.

太阳光 (tài yáng guāng) sunlight. **炽热** (chì rè) red-hot; glowing; blazing; (fig.) passionate.

冷却 (lěng què) to cool off; cooling. **脑洞大开** (nǎo dòng dà kāi) imaginative; to have one's mind buzzing with ideas.

构想 (gòu xiǎng) to conceive; concept. **成了** (chéng le) to be done; to be ready; that's enough!; that will do!.

照射 (zhào shè) to shine on; to light up; to irradiate.

牢牢 (láo láo) firmly; safely. **锁定** (suǒ dìng) to lock (a door); to close with a latch; to lock into place; a lock; a latch; to lock a computer file (to prevent it being overwritten); to lock (denying access to a computer system or device or files, e.g. by password-protection); to focus attention on; to target.

飘忽不定 (piāo hū bù dìng) to drift without a resting place (idiom); roving; errant; vagrant; erratic. **密闭** (mì bì) sealed; airtight. **笼子** (lóng zi) cage; basket; container.

停止 (tíng zhǐ) to stop; to halt; to cease.

瞬间 (shùn jiān) in an instant; in a flash. **室温** (shì wēn) room temperature. **绝对零度** (jué duì líng dù) absolute zero.

从容不迫 (cóng róng bù pò) calm; unruffled.

早在 (zǎo zài) as early as. **末期** (mò qī) end (of a period); last part; final phase.

Liu Liang's teacher, Academician Wang Yuzhu, proposed the advanced idea of using lasers to cool atoms.

But due to insufficient research funding at the time,

Leading physics ideas are hard to get strong support from experiments.

After entering the 21st century,

The rapidly rising Chinese economy has become a strong backing for science and technology.

Research in laser cold atoms was restarted,

And move towards the goal of higher precision.

at this time,

A historical opportunity of a lifetime has emerged.

The Tiangong project was launched in the early 21st century,

The Chinese will build their own space science laboratory in space,

Tiangong No.2.

He provides the best experimental platform for many scientific experiments.

At that time, European and American countries were conducting research on space cold atomic clocks.

Send the cold atomic clock into space,

It is something that scientists all over the world dream of.

刘亮的老师王玉竹院士就提出用激光冷却原子的超前构想,

但是由于当时研究经费不足,

领先的物理思想难以得到实验的有力支持。

进入21世纪之后,

迅速崛起的中国经济成为科技事业强大的后盾。

激光冷原子中研究得以重启,

并向更高精度的目标迈进。

就在这时,

一个千载难逢的历史机遇出现了。

21世纪初天宫项目启动,

中国人将在太空中建立自己的空间科学实验室,

天宫二号。

他为众多科学实验提供了最佳的实验平台。

当时欧美各国都在开展空间冷原子钟研究,

把冷原子钟送上太空,

是各国科学家梦寐以求的事情。

玉竹 (yù zhú) angular Solomon's seal; Polygonatum odoratum. 院士 (yuàn shì) scholar; academician; fellow (of an academy). 提出 (tí chū) to raise (an issue); to propose; to put forward; to suggest; to post (on a website); to withdraw (cash). 超前 (chāo qián) to be ahead of one's time; to surpass or outdo one's predecessors; to be ahead of the pack; to take the lead; advanced.

经费 (jīng fèi) funds; expenditure.

难以 (nán yǐ) hard to (predict, imagine etc).

崛起 (jué qǐ) to rise abruptly (to a towering position); to tower over; to spring up; to emerge suddenly; the emergence (e.g. of a power). 事业 (shì yè) undertaking; project; activity; (charitable, political or revolutionary) cause; publicly funded institution, enterprise or foundation; career; occupation. 后盾 (hòu dùn) support; backing.

重启 (chóng qǐ) to reopen; to restart.

高精度 (gāo jīng dù) high precision. 迈进 (mài jìn) to step in; to stride forward; to forge ahead.

这时 (zhè shí) at this time; at this moment.

千载难逢 (qiān zǎi nán féng) extremely rare (idiom); once in a blue moon. 机遇 (jī yù) opportunity; favorable circumstance; stroke of luck.

启动 (qǐ dòng) to start (a machine); (fig.) to set in motion; to launch (an operation); to activate (a plan).

众多 (zhòng duō) numerous. 最佳 (zuì jiā) optimum; optimal; peak; best (athlete, movie etc).

欧美 (ōu měi) Europe and America; the West. 各国 (gè guó) each country; every country; various countries.

送上太空 (sòng shàng tài kōng) to launch into space.

梦寐以求 (mèng mèi yǐ qiú) to yearn for sth even in one's dreams (idiom); to long for sth day and night.

The appearance of Tiangong-2,

Let Chinese scientists be the ones closest to their dreams.

In 2005,

Liu Liang responded to the call,

back to China,

He took on the heavy responsibility entrusted by Academician Wang Yuzhu,

Send the cold atomic clock made by the Chinese into space.

It is now 70 kg.

So why do we send cold atomic clocks into space?

In fact, a cold atomic clock achieves precise timing by accurately measuring the frequency of atomic oscillations.

By adjusting the laser irradiation frequency,

Eject the cold atom in confinement,

During the atomic flight,

Use microwaves to capture its oscillation frequency.

The problem is that under the influence of ground gravity,

The atomic group is always falling freely,

The measurement accuracy has reached a certain level and has approached the limit,

There is another way to break the limit,

That is to send it to the sky.

Heaven,

After we can put

天宫二号的出现,

让中国**科学家**成为距离梦想最近的人。

2005年,

刘亮响应**召唤**,

返回中国,

他**担负**起**王玉竹**院士**托付**的**重任**,

把**中国人**制造的**冷原子钟**送上**太空**。

现在**就是**70公斤。

那么我们为什么要把**冷原子钟**送上**太空**呢?

其实**冷原子钟**是通过**精确**测量**原子振荡频率**来实现**精确**计时,

通过调整**激光照射频率**,

把**禁闭**状态下的**冷原子**抛射出去,

在**原子飞行**过程中,

通过**微波**来**捕捉**它的**震荡频率**。

问题是**在地面重力**作用影响下,

原子团始终**处于**自由**坠落**状态,

测量精度达到一定程度已**逼近****极限**,

要**突破极限**还有一个办法,

那就是把它**送上天**。

天上,

我们可以把**之后**,

响应 (xiǎng yìng) to respond to; answer. **召唤** (zhào huàn) to summon; to beckon; to call.

担负 (dān fù) to shoulder; to bear; to undertake. **托付** (tuō fù) to entrust. **重任** (zhòng rèn) heavy responsibility.

抛射 (pāo shè) to throw; to shoot. **出去** (chū qù) to go out.

飞行 (fēi xíng) (of planes etc) to fly; flying; flight; aviation.

微波 (wēi bō) ripple; microwave. **捕捉** (bǔ zhuō) to catch; to seize; to capture.

处于 (chǔ yú) to be in (some state, position, or condition). **坠落** (zhuì luò) to fall; to drop.

逼近 (bī jìn) to press on towards; to close in on; to approach; to draw near.

上天 (shàng tiān) Heaven; Providence; God; the day before; the sky above; to fly to the sky; to take off and fly into space; to die; to pass away.

Ran forward,

It can move forward at a constant speed,

Go forward at a constant speed.

For example, we can run very slowly,

We can get a very narrow signal,

It can't be on the ground,

Can't do it on the ground,

There is gravity on the ground.

Under space microgravity conditions,

The ejected atoms get rid of the constraints of the earth's gravity,

It can fly a bit slower,

Longer,

Scientists have sufficient time and conditions to improve measurement accuracy.

If the cold atomic clock can enter space,

Its measurement accuracy can also be improved by two orders of magnitude,

It's only a second to reach 30 million years.

Payload Control Center, Space Technology Application Center, Chinese Academy of Sciences,

Is the director of all space load missions of the Tiangong-2 Space Laboratory,

Their task is to select the most valuable space experiment projects in all of China.

Initial certification,

往前跑了,

它可以**匀速地**往前走,

匀速往前走。

比如说我们可以跑**得很慢**,

我们可以**得到**一个非常窄的信号,

在地面上就不能,

地面上做不到,

地面上有重力。

太空微重力条件下,

抛射出的原子摆脱了地球重力的约束,

它可以飞得更慢一点儿,

更久一点儿,

科学家就有了充足的时间和条件来提升测量精度。

如果冷**原子钟能够进入太空**,

其**测量精度**还可以提高两个**数量级**,

达到3000**万年**只差**一秒钟**。

中国科学院空间技术应用中心有效载荷运控中心,

是**天宫二号空间实验室**所有空间**载荷**任务的**总管**,

他们的任务是在全中国挑选最有价值的空间实验项目。

初期认证,

往前 (wǎng qián) to move forwards.

匀速 (yún sù) uniform velocity.

得很 (de hěn) (after an adjective) very.

地面 (dì miàn) floor; ground; surface. **做不到** (zuò bù dào) impossible.

抛 (pāo) to throw; to toss; to fling; to cast; to abandon. **射出** (shè chū) emission; ejaculation. **摆脱** (bǎi tuō) to break away from; to cast off (old ideas etc); to get rid of; to break away (from); to break out (of); to free oneself from; to extricate oneself. **约束** (yuē shù) to restrict; to limit to; to constrain; restriction; constraint.

有了 (yǒu le) I've got a solution!; to have a bun in the oven (abbr. for 有了胎 (yǒu le tāi)). **充足** (chōng zú) adequate; sufficient; abundant.

数量级 (shù liàng jí) order of magnitude.

万年 (wàn nián) Wannian county in Shangrao 上饶, Jiangxi.

中国科学院 (zhōng guó kē xué yuàn) Chinese Academy of Science. **载荷** (zài hè) load; lading (weight).

挑选 (tiāo xuǎn) to choose; to select. **有价值** (yǒu jià zhí) valuable.

初期 (chū qī) initial stage; beginning period.

There should be hundreds of projects participating in the solicitation process of our early projects,

The scope is very wide.

If it involves sub-projects,

Just more,

May reach hundreds of items,

Then it will be selected gradually through hundreds of projects,

We gradually condense out representative,

Such advanced projects,

Finally, as a project implemented by our Tiangong-2 space laboratory.

In order to become the first load test project of Tiangong-2,

In 2007,

Liu Liang leads a team whose average age is less than 30 years old.

Invested in the development of a space-cooled atomic clock.

The higher we measure the accuracy of time,

The higher the accuracy of our distance measurement,

You have to be accurate to that,

Or mm,

Or more precise,

You must have a higher precision atomic clock.

Send a cold atomic clock into space,

It will undoubtedly greatly improve the navigation accuracy of the Beidou navigation satellite positioning system.

应该有上百项的项目在参与我们**早期**的项目的**征集**过程,

范围很广。

如果**涉及**到子项目的**话**,

就更多了,

可能达到几百项,

那么会通过上百项的项目逐步地**遴选**,

我们逐步**凝练**出来**各个领域**里面**具有代表性的**、

具有先进性的这样的项目,

最后作为我们**天宫二号空间实验室**实施的项目。

为了成为**天宫二号**首批**载荷试验**项目,

2007年,

刘亮带领着一支平均年龄**不到30**岁的**团队**,

投入了空间冷**原子钟**的**研制**。

我们把时间的**精度**测量越高,

我们**测量**距离的**精度**也越高,

你要**精确**到跟**那样**,

或者**毫米**,

或者更**精确**,

你**必须**要有**更高精度**的**原子钟**。

将冷**原子钟**送入**太空**,

无疑将**大大提升****北斗导航卫星定位系统**的**导航精度**,

征集 (zhēng jí) to collect; to recruit.

涉及 (shè jí) to involve; to touch upon (a topic).

遴选 (lín xuǎn) to pick; to choose; to select.

凝练 (níng liàn) concise; compact; condensed. **各个** (gè gè) every; various; separately, one by one. **代表性** (dài biǎo xìng) representativeness; representative; typical.

实施 (shí shī) to implement; to carry out.

试验 (shì yàn) experiment; test; to experiment; experimental.

带领 (dài lǐng) to guide; to lead. **不到** (bù dào) not to arrive; not reaching; insufficient; less than.

那样 (nà yàng) that kind; that sort.

毫米 (háo mǐ) millimeter.

须要 (xū yào) must; have to.

无疑 (wú yí) no doubt; undoubtedly. **大大** (dà dà) greatly; enormously; (dialect) dad; uncle. **北斗** (běi dòu) Great Bear; Big Dipper; Peitou town in Changhua county 彰化县 (zhāng huà xiàn), Taiwan. **导航** (dǎo háng) navigation. **卫星定位系统** (wèi xīng dìng wèi xì tǒng) global positioning system (GPS).

The meaning need not be said.

其意义**不必多言**。

不必 (bù bì) need not; does not have to; not necessarily. **多言 (duō yán)** wordy; talkative.

But to realize the dream of flying a cold atomic clock,

但是要实现冷**原子钟**的**飞天梦**想,

飞天 (fēi tiān) flying Apsara (Buddhist art).

A series of strict conditions need to be met.

还需要满足**一连串**的严格条件。

一连串 (yī lián chuàn) a succession of; a series of.

Space in the Tiangong-2 laboratory is extremely limited.

天宫二号实验室空间极为有限。

极为 (jí wéi) extremely; exceedingly. **有限 (yǒu xiàn)** limited; finite.

According to the overall deployment requirements,

按照**总体部署**要求,

总体 (zǒng tǐ) completely; totally; total; entire; overall; population (statistics). **部署 (bù shǔ)** to dispose; to deploy; deployment.

The weight in the cold atom needs to be reduced from 500 kg to 80 kg,

冷**原子中**的重量要从500公斤减到80公斤,

耗 (hào) to waste; to spend; to consume; to squander; news; (coll.) to delay; to dilly-dally.

Energy consumption should also be minimized.

能耗也要降到最低程度。

不仅如此 (bù jǐn rú cǐ) not only that, but

Not only that,

不仅如此,

There are also strict time requirements.

还有严格的时间要求。

限定 (xiàn dìng) to restrict to; to limit. **样机 (yàng jī)** prototype. **验证 (yàn zhèng)** to inspect and verify; experimental verification; to validate (a theory); to authenticate.

In order to complete the verification of the principle prototype within a limited time,

为了在**限定**的时间内完成**原理样机**的**验证**,

只能 (zhǐ néng) can only; obliged to do sth; to have no other choice. **与时间赛跑 (yǔ shí jiān sài pǎo)** to race against time.

These time-measuring scientists can only race against time.

这些**测量时间**的**科学家**只能与**时间赛跑**。

多年来 (duō nián lái) for the past many years. **基本上 (jī běn shàng)** basically; on the whole. **节假日 (jié jià rì)** public holiday.

In so many years, there are basically no holidays,

在**这么多**年来**基本上**是没有**节假日**,

春节 (chūn jié) Spring Festival (Chinese New Year).

No weekend,

没有**周末**,

There is no Spring Festival either.

也没有**春节**。

So we only put it on two days each Spring Festival,

所以我们每个**春节**只放两天,

The first one is New Year's Eve,

第一个是**年三十**、

年三十 (nián sān shí) last day of the lunar year; Chinese New Year's Eve.

New Year's Day,

年初一,

年初 (nián chū) beginning of the year.

Work on the second day of the new year.

年初二就要上班。

初二 (chū èr) 2nd year in junior middle school; 2nd day of a lunar month; 2nd day of lunar New Year.

After three years,

经过**三年**时间,

科研 (kē yán) (scientific) research.

The scientific research team has produced a principle prototype,

科研团队制造出了一台**原理样机**,

It originally needed 6 lasers to capture and cool atoms,

Due to innovative use,

Folding light path method,

The same effect can be achieved with only two lasers.

After slimming, the area of cold atomic clock parts has been reduced from the size of a table to half a meter square.

The original equipment weighing 500 kg was finally reduced to 70 kg.

The originally upright ground-based cold atomic clock has become a horizontal space cold atomic clock.

After the atom is ejected,

Flying at a constant speed in microgravity.

High-precision measurement data can be obtained through various sophisticated equipment.

The question that follows is whether it can withstand the test of extreme environments after going up to heaven.

In a space orbit nearly 400 kilometers above the ground,

Can the cold atomic clock run automatically?

Almost at the same time,

European scientists are working on a project codenamed Pharaoh.

According to the plan,

They will go to heaven before Tiangong-2

原本需要6台**激光器**来**捕获**和**冷却**原子,

由于**创新性**运用,

折叠光路方法,

只用两台**激光器**就达到了**同样**的效果。

瘦身之后的**冷原子钟**零部件面积从一个桌子**大小**缩小到半米**见方**,

原本500公斤重的设备最后被**缩小**到了70公斤。

原本**直立**的**地面冷原子钟**变成了**平卧**的**空间冷原子钟**。

原子被**抛射**出去之后,

在**微重力**状态下**匀速**飞行。

通过**各种精密**的设备就可以获得**高精度**的**测量**数据。

随之而来的问题是**上天**之后它**能否**经受**极端**环境的**考验**,

在离**地面**近400公里的空间**轨道**上,

冷原子钟能否**自动运行**呢?

几乎**与此同时**,

欧洲科学家正在进行一个**代号**为**法老**的项目。

按照计划,

他们将在**天宫二号**上天之前,

原本 (yuán běn) originally; original. **激光器** (jī guāng qì) laser.

创新 (chuàng xīn) innovation; to bring forth new ideas; to blaze new trails.

折叠 (zhé dié) to fold; collapsible; folding (bicycle, antenna, bed etc).

同样 (tóng yàng) same; equal; equivalent.

瘦身 (shòu shēn) to lose weight (intentionally); to slim down; (Tw) to downsize (a business). **零部件** (líng bù jiàn) spare part; component. **大小** (dà xiǎo) dimension; magnitude; size; measurement; large and small; at any rate; adults and children; consideration of seniority. **缩小** (suō xiǎo) to reduce; to decrease; to shrink. **见方** (jiàn fāng) a (10 meter) square; a square of given side.

直立 (zhí lì) erect; upright; vertical. **变成** (biàn chéng) to change into; to turn into; to become.

原子被**抛射**出去之后,

精密 (jīng mì) accuracy; exact; precise; refined.

随之 (suí zhī) thereupon; subsequently; accordingly. **能否** (néng fǒu) whether or not; can it or can't it; is it possible?. **经受** (jīng shòu) to undergo (hardship); to endure; to withstand. **极端** (jí duān) extreme. **考验** (kǎo yàn) to test; to put to the test; trial; ordeal.

在离**地面**近400公里的空间**轨道**上,

与此同时 (yǔ cǐ tóng shí) at the same time; meanwhile.

代号 (dài hào) code name. **法老** (fǎ lǎo) pharaoh (loanword).

按照计划 (àn zhào jì huà) according to (the) plan

Run a cold atomic clock on the International Space Station.

There is not much time left for the traffic team.

After repeated research,

The scientific research team has designed a set of control system for the automatic operation of the cold atomic clock remotely controlled by ground instructions.

They have the last research topic left,

Let the extremely precise space-cooled atomic clock withstand the huge shock test of the rocket launch.

It's 2016,

The cold atomic clock passed the vibration test test,

Ten years of sharpening a sword,

In the tenth year of the cold atomic clock project,

This cold atomic clock device entrusted the dream of three generations of scientists,

Finally completed the assembly,

Sent to the launch base.

On the night of Mid-Autumn Festival on September 15, 2016,

The Long March-2 FT-2 carrier rocket put the Tiangong-2 space laboratory into orbit.

Strive for accurate timing,

Push to new heights.

在国际**空间站运行**一台**冷原子钟**。

留给流量团队的时间已经不多了。

经过反复**攻关**,

科研团队设计出了一套**通过地面指令遥控冷原子钟自动运行**的控制系统,

他们还剩下最后一个**攻关课题**,

让**无比精密**的空间**冷原子钟**能够**经受火箭发射时巨大的震动考验**。

时间到了2016年,

冷原子钟通过**振动试验测试**,

十年磨一剑,

在**冷原子钟**项目**开启**的第十年,

这台**寄托了**三代**科学家**梦想的**冷原子钟**设备,

终于完成**组装**,

送往**发射基地**。

2016年9月15日**中秋**之夜,

长征二号FT二号运载火箭将**天宫二号**空间**实验室**送入**运行轨道**。

力求精确计时,

推向新的**高度**。

空间站 (kōng jiān zhàn) space station.

留给 (liú gěi) to set aside for. **流量** (liú liàng) flow rate; rate; throughput; site traffic (Internet).

攻关 (gōng guān) to storm a strategic pass; fig. to tackle a key problem.

一套 (yī tào) suit; a set; a collection; of the same kind; the same old stuff; set pattern of behavior. **指令** (zhǐ lìng) order; command; instruction. **遥控** (yáo kòng) remote control.

无比 (wú bǐ) incomparable; matchless. **火箭** (huǒ jiàn) rocket. **震动** (zhèn dòng) to shake; to vibrate; to strongly affect; shock; vibration.

测试 (cè shì) to test (machinery etc); to test (students); test; quiz; exam; beta (software).

磨 (mó) to rub; to grind; to polish; to sharpen; to wear down; to die out; to waste time; to pester; to insist. **剑** (jiàn) double-edged sword; classifier for blows of a sword.

寄托 (jì tuō) to entrust (to sb); to place (one's hope, energy etc) in; a thing in which you invest (your hope, energy etc). **三代** (sān dài) three generations of a family; the three earliest dynasties (Xia, Shang and Zhou).

组装 (zǔ zhuāng) to assemble and install.

基地 (jī dì) base (of operations); industrial or military base; al-Qaeda.

中秋 (zhōng qiū) the Mid-autumn festival, the traditional moon-viewing festival on the 15th of the 8th lunar month.

长征 (cháng zhēng) expedition; long journey. **运载火箭** (yùn zài huǒ jiàn) carrier rocket.

力求 (lì qiú) to make every effort to; striving to do one's best.

高度 (gāo dù) height; altitude; elevation; high degree; highly.

We set up a project that most people cannot believe,

Such a complicated thing can run so well in the sky.

Do it now,

We found that I could do it,

As long as we want to do

I can do it.

2017 Chinese New Year,

Liu Liang gave the team a week off,

This is their longest vacation in 10 years.

now,

Liu Liang and his colleagues devoted themselves to the development of high-precision cold atomic clocks.

There are bigger dreams in their hearts,

That is to send a cold atomic clock to the moon,

Even more distant Mars,

It will launch deep space exploration for China and even mankind,

Interstellar voyage,

give directions.

Humanity's footsteps in exploring space have gone further and further,

But it is still difficult for us to reach the deepest place on earth.

The earth on which humans live is actually a water ball,

71% of its surface is covered by the ocean.

我们**立项**是**大多数人**都**不能**相信,

这么复杂的东西**能够**在**天上****这么**好的**运行**。

现在**做**下来,

我们发现我**能够**做到,

只要我们想做,

一定能**做到**。

2017年**春节**,

刘亮给**团队**放了一个星期的假,

这是**他们**10**年来**最长的一个**假期**。

如今,

刘亮和同事们又投入了心在**高精度**冷原子钟的**研制**工作。

在**他们**的**心中**还有更大的梦想,

那**就是**把冷原子钟送上**月球**,

甚至**更加**遥远的**火星**,

它将为中国**乃至**人类展开**深空**探索、

星际航行,

指引方向。

人类**探索**太空的**脚步**已经越走越远,

可是我们还是很难**抵达**地球上最**深邃**的地方。

人类**生存**的地球其实是一个**水**球,

它表面有71%的面积都被海洋**覆盖**。

立项 (lì xiàng) to launch a project. **大多数** (dà duō shù) (great) majority.

年来 (nián lái) this past year; over the last years. **假期** (jià qī) vacation.

心中 (xīn zhōng) central point; in one's thoughts; in one's heart.

月球 (yuè qiú) the moon.

遥远 (yáo yuǎn) distant; remote. **火星** (huǒ xīng) Mars (planet).

深空 (shēn kōng) deep space (outer space). **探索** (tàn sù) to explore; to probe.

星际 (xīng jì) interstellar; interplanetary. **航行** (háng xíng) to sail; to fly; to navigate.

指引 (zhǐ yǐn) to guide; to show; to point (the way); directions; guidance; guidelines.

脚步 (jiǎo bù) footstep; step.

抵达 (dǐ dá) to arrive; to reach (a destination). **深邃** (shēn suì) deep (valley or night); abstruse; hidden in depth.

生存 (shēng cún) to exist; to survive. **水球** (shuǐ qiú) water polo.

Speaking of the ocean,
The various colorful
underwater worlds we saw,

It is actually a superficial
phenomenon.

Because sunlight can only reach
a depth of 200 meters
underwater,

The average depth of the
world's oceans is 3800 meters.

The real underwater world is
actually hidden in the
boundless darkness,

There are new species that we
don't know,

new energy,

There are numerous secrets
waiting for us to discover.

With the development of deep-
sea exploration technology,

Chinese scientists are also
telling the most mysterious,

Advance in the strangest place.

You ask me what the bottom of
the deep sea looks like?

I can only say,

The place I have been to is very
desolate,

I saw some traces of the
earthquake,

Staggered like a rock,

The collapse of the old house
looks like this.

But after a while,

Elsewhere,

It may be different.

说到海洋,

我们见到的**各种各样**色彩**斑斓**的
海底世界,

它其实是一个表面现象。

因为阳光**只能抵达水下200米的深**
度,

而**全世界**海洋的平均**深度**是3800
米。

真实的**海底**世界其实是**隐藏在无**
边的黑暗之中,

那里有我们所不知道的新**物种**、

新能源,

那里有**为数众多**的秘密等待着
我们去**发掘**。

随着**深海探测**技术的发展,

中国的**科学家**们也在向地球上最
神秘、

最陌生的地方**挺进**。

你问我**深海的****海底**是**什么样**
的?

我也**只能说**,

我到过的那个地方是很**荒凉**的,

看到**有一些**地震过的**痕迹**,

像石头**东倒西歪**的,

旧**房子**的**倒塌**的**这种**样子。

但是你再过一段,

在**别**的地方,

它可能就**不一样**了。

斑斓 (bān lán) gorgeous; brightly colored; multi-
colored. **海底** (hǎi dǐ) seabed; seafloor; bottom of the
ocean.

水下 (shuǐ xià) under the water; submarine.

之中 (zhī zhōng) inside; among; in the midst of (doing
sth); during.

物种 (wù zhǒng) species.

有为 (yǒu wéi) promising; to show promise. **发掘** (fā
jué) to excavate; to explore; (fig.) to unearth; to tap into.

深海 (shēn hǎi) deep sea.

挺进 (tǐng jìn) progress; to advance.

什么样 (shén me yàng) what kind?; what sort?; what
appearance?.

荒凉 (huāng liáng) desolate.

有一些 (yǒu yī xiē) somewhat; rather; some.

东倒西歪 (dōng dǎo xī wāi) to lean unsteadily from side
to side (idiom); to sway; (of buildings etc) to lean at a
crazy angle.

房子 (fáng zi) house; building (single- or two-story);
apartment; room. **倒塌** (dǎo tā) to collapse (of
building); to topple over.

别的 (bié de) else; other.

不一样 (bù yī yàng) different; distinctive; unlike.

I hope to walk all these deep sea bottoms,

Go surveying and mapping,

Then take a complete view of the seabed,

Can let us humans know.

In the Abyss Science and Technology Laboratory,

Researchers are nervously debugging the equipment.

10 days later,

These strange shapes,

Colorful deep-sea equipment,

About to head to the Western Pacific,

Carry out marine science experiments.

Three 11,000-meter landers to be built.

The red one,

Inside the bucket are glass and balls,

This is used to provide buoyancy.

This is called the No. 2 Lander,

Is used for sediment sampling,

Is inserted into the bottom of the sea,

Put another jar down,

Pick up the mud-like sediment sampler from the bottom of the sea.

To study the bottom quality of the bottom,

What kind of mud is this bottom substance,

What microorganisms are in it?

我希望把所有的这些**深海海底能够**都去走**一遍**,

都去**测绘**一下,

然后把一个**海底的完整的景象**,

能够让我们人类知道。

深渊科学技术实验室里,

科研人员正在紧张地调试设备。

10天**之后**,

这些形状**奇特**、

色彩鲜艳的**深海**设备,

即将奔赴西太平洋,

开展海洋科学实验。

三台要去做**的11000米的着陆器**。

红的那**里边**,

桶里边都是玻璃和球,

这个是用于提供**浮力**的。

这个叫**二号着陆器**,

是用来做**沉积物取样**的,

就是插到**海底里边**,

再往下插一**罐子**,

起**海底里边**的**泥样**的**沉积物取样器**。

要研究**海底里边**的**底质**,

这个底质是一个什么**泥样**的,

里面含有**什么微生物**?

一遍 (yī biàn) one time (all the way through); once through.

测绘 (cè huì) to survey and draw; to map.

景象 (jǐng xiàng) scene; sight (to behold).

深渊 (shēn yuān) abyss. 科学技术 (kē xué jì shù) science and technology.

科研人员 (kē yán rén yuán) (scientific) researcher. 调试 (tiáo shì) to debug; to adjust components during testing; debugging.

奇特 (qí tè) peculiar; unusual; queer.

即将 (jí jiāng) on the eve of; to be about to; to be on the verge of. 奔赴 (bēn fù) to rush to; to hurry to. 西太平洋 (xī tài píng yáng) the western Pacific Ocean.

着陆 (zhuó lù) landing; touchdown; to land; to touch down.

里边 (lǐ bian) inside.

用于 (yòng yú) use in; use on; use for. 浮力 (fú lì) buoyancy.

用来 (yòng lái) to be used for. 沉积物 (chén jī wù) sediment. 取样 (qǔ yàng) to take a sample.

罐子 (guàn zi) jar; pitcher; pot.

泥 (ní) mud; clay; paste; pulp.

含有 (hán yǒu) to contain; including. 微生物 (wēi shēng wù) microorganism.

What other various ingredients?

Then you have to pick up the sample.

Unmanned submersibles are pioneers in human exploration of the abyss,

Just relying on a thin optical fiber,

It can be in the abyss outside,

Complete large-scale search and survey tasks.

The submersible dives.

Roger that.

Can these deep-sea weapons show their talents?

Finally, it will be tested in the real abyss environment,

The so-called abyss is the deepest part of the ocean,

It is scattered in twenty-six trenches all over the world,

The deepest place in the world is the Mariana Trench in the Western Pacific.

Its maximum depth reaches 11,000 meters,

People call it Challenger Abyss.

2012,

Cui Weicheng led a young team to achieve a historic breakthrough in China's deep diving.

As the deputy chief designer of Jiaolong,

还有什么**各种各样**的成分?

那么你要把**样本**要**起上来**。

无人潜水器是人类**探索深渊**的**探路先锋**,

仅仅靠着一根**细细的光纤**,

它就能**够在外面深渊**中,
完成**大规模搜索勘测**任务。

潜水器下**潜**。

收到。

这些**深海利器**能否**大显身手**?

最终还要在**真实的深渊**环境中**得到检验**,

所谓**深渊**为于**海洋最深处**,

它**弥散**的分布在**全世界二十六个海沟**之中,

世界**上海洋最深**的地方位于**西太平洋马里亚纳海沟**,

其**最大深处**达到11000米,

人们称之为挑战者深渊。

2012年,

崔维成带领一支年轻团队实现了**中国深潜的历史性突破**,

作为**蛟龙号副总设计师**,

样本 (yàng běn) sample; specimen. **上来** (shàng lái) to come up; to approach; (verb complement indicating success).

无人 (wú rén) unmanned; uninhabited. **潜水** (qián shuǐ) to dive; to go under water; lurker (Internet slang for sb who reads forum posts but never replies). **探路** (tàn lù) to find a path. **先锋** (xiān fēng) vanguard; pioneer; avant-garde.

仅仅 (jǐn jǐn) barely; only; merely; only (this and nothing more). **光纤** (guāng xiān) optical fiber; fiber optics.

大规模 (dà guī mó) large scale; extensive; wide scale; broad scale. **勘测** (kān cè) to investigate; to survey.

潜 (qián) hidden; secret; latent; to hide; to conceal; to submerge; to dive.

收到 (shōu dào) to receive.

利器 (lì qì) sharp weapon; effective implement; outstandingly able individual. **大显身手** (dà xiǎn shēn shǒu) (idiom) fully displaying one's capabilities.

最终 (zù zhōng) final; ultimate. **检验** (jiǎn yàn) to inspect; to examine; to test.

弥散 (mí sàn) to dissipate everywhere (of light, sound, gas etc). **二十** (èr shí) twenty; 20. **海沟** (hǎi gōu) marine trench.

马里亚纳海沟 (mǎ lì yà nà hǎi gōu) Mariana Trench (or Marianas Trench).

称之为 (chēng zhī wéi) to call it...; known as.... **挑战者** (tiǎo zhàn zhě) challenger.

历史性 (lì shǐ xìng) historic.

蛟龙 (jiāo lóng) legendary dragon with the ability to control rain and floods. **副** (fù) secondary; auxiliary; deputy; assistant; vice-; abbr. for **副词** adverb; classifier for pairs, sets of things & facial expressions. **设计师** (shè jì shī) designer; architect.

He personally took the operational submersible Jiaolong to dive to the depths of 7000 meters in Haiyang,

In the same year,

The American director Cameron drove a single submersible into the Mariana Trench in the Western Pacific at a depth of 10,898 meters.

Be the first person in the world to dive to the deepest part of the earth alone.

Our Jiaolong is aimed at taking the world's number one past,

When we have successfully completed the 7000-meter Jiaolong, it will test 7000 meters at sea,

Cameron took the lead,

He reached 11,000 meters before us.

The experience of missing the world deep diving record,

Let Cui Weicheng have a bold plan,

He left the original research unit,

The self-built team plans to spend ten years developing and manufacturing the world's first manned submersible for 10,000-meter operations.

Now mankind is about to enter an era of large-scale exploitation of marine resources,

If I don't understand the abyss ocean,

At this time, it may have a relatively large negative impact on our human development and utilization of marine resources.

For Cui Weicheng,

他亲自乘坐作业型**潜水器蛟龙号**下**潜海阳**7000米深缘,

就在**同一年**,

美国导演卡**梅隆**驾驶**单人潜水器****潜入深度**10898米的**西太平洋马里亚纳海沟**,

成为世界上第一个**单人**下**潜**到地球**最深处**的人。

我们**蛟龙号**是冲着拿**世界第一**过去的,

等到我们做成功7000米**蛟龙号**要海试冲7000米的时候,

被卡**梅隆**抢了**先机**,

他在我们**之前**就到达了11000米。

与世界深**潜**记录**失之交臂**的经历,

让**崔维成**有了**一个大胆**的计划,

他离开了原来的研究单位,

自建**团队**计划用十年时间**研发**制造**全球**首台**万米级**作业型**载人潜水器**。

现在人类马上要**进入**一个海洋资源**大规模****开采**的时代,

如果我对**深渊**海洋不了解,

这个时候就**有可能**给我们人类开发利用海洋资源**带来**比较大的**负面**的影响。

对于**崔维成**来说,

海阳 (hǎi yáng) Haiyang county level city in Yantai 烟台, Shandong.

同一 (tóng yī) identical; the same.

隆 (lóng) grand; intense; prosperous; to swell; to bulge. **单人** (dān rén) one person; single (room, bed etc). **潜入** (qián rù) to submerge; to infiltrate; to steal into.

世界第一 (shì jiè dì yī) ranked number one in the world; the world's first. **过去** (guò qu) (verb suffix).

等到 (děng dào) to wait until; by the time when (sth is ready etc).

先机 (xiān jī) key moment; decisive opportunity.

失之交臂 (shī zhī jiāo bì) to miss narrowly; to let a great opportunity slip.

研发 (yán fā) research and development; to develop. **载人** (zài rén) to carry a passenger; (of spaceships etc) manned; also pr. (zǎi rén).

开采 (kāi cǎi) to extract (ore or other resource from a mine); to exploit; to mine.

有可能 (yǒu kě néng) possible; probable; possibly; probably; may; might. **面的** (miàn di) abbr. of 面包车的士 (miàn bāo chē dì shì); minivan taxi.

Challenging the abyss is not just to create a record,

His dream is to establish the world's first abyssal science and technology mobile laboratory,

He uses a 5,000-ton professional scientific research ship as the mother ship,

Take three 10,000-meter landers,

An unmanned submersible,

And a 10,000-meter-class manned submersible,

With this set of abyss detection equipment that challenges the limit,

Vertical and horizontal trenches and abysses,

Unravel the mysteries of the deep ocean for people.

To truly realize the dream of challenging the 10,000-meter abyss,

Cui Weicheng still needs to find partners,

Five years ago, he and his junior brother Wu Xin jointly formed the Rainbow Fish team,

Wu Xin, who knew nothing about the ocean,

He soon became a deep-sea dream catcher.

We are now studying the so-called abyss, which is the entire trench below 6000 meters.

Or our knowledge is not as good as human knowledge about Mars.

Actually Mars, you said it's too far away from the earth,

挑战**深渊**不仅仅是为了创造纪录,

他的梦想是建立**全球**第一个**深渊科学技术流动实验室**,

他以一条5000**吨级**专业**科考**船为**母船**,

搭乘三台**万米**着陆器,

一台**无人**潜水器,

和一台**万米级**载人潜水器,

凭借这套挑战**极限**的**深渊探测装备**,

纵横海沟**深渊**,

为**人们**解开**大洋**深海的**奥秘**。

要真正实现挑战**万米深渊**的梦想,

崔维成还需要寻找**合作伙伴**,

五年前他与**师弟****吴辛**共同**组建****彩虹鱼**团队,

原本对海洋**一无所知**的**吴辛**,

很快也成为一名**深海**追梦人。

我们现在对整个**就是**6000米以下的所谓叫**深渊**的**海沟**的研究,

或者我们的知识**还不如**人类对**火星**的知识更多。

其实**火星**你说离地球其实太**遥远**了,

流动 (liú dòng) to flow; to circulate; to go from place to place; to be mobile; (of assets) liquid.

吨级 (dūn jí) tonnage; class in tons (of a passenger ship). **科考** (kē kǎo) preliminary round of imperial examinations; abbr. for 科学考察 (kē xué kǎo chá), scientific exploration. **母船** (mǔ chuán) mother ship.

搭乘 (dā chéng) to ride as a passenger; to travel by (car, plane etc).

装备 (zhuāng bèi) equipment; to equip; to outfit.

纵横 (zòng héng) lit. warp and weft in weaving; vertically and horizontal; length and breadth; criss-crossed; able to move unhindered; abbr. for 合纵连横 (hé zòng lián héng), School of Diplomacy during the Warring States Period (475-221 BC).

解开 (jiě kāi) to untie; to undo; to solve (a mystery). **大洋** (dà yáng) oceans; silver yuan.

合作伙伴 (hé zuò huǒ bàn) cooperative partner.

师弟 (shī dì) young disciple (of the same master); younger or junior male schoolmate. **组建** (zǔ jiàn) to organize; to set up; to establish.

还不如 (hái bù rú) to be better off ...; might as well ...

Our children and grandchildren,

Including ourselves,

In fact, the source of resources that humans need to rely on in the future is actually the ocean.

Especially the deep sea.

In order to welcome the upcoming ocean age,

Wu Xin and Cui Weicheng are determined to explore a new model,

Through the collaboration of scientists and entrepreneurs,

Rely on the power of society,

Complete a world-class scientific research project for exploring the 10,000-meter abyss.

Because don't talk about financing at the beginning,

To convince our investors,

We can't even convince ourselves,

Said that the money invested in it will definitely come back,

But I always feel that this is a great cause.

We tell our things to friends around us,

My friends were moved by us,

Although they might doubt whether we can do this,

But at least he was moved by this spirit.

When our ship starts to cut steel plates to be built in the shipyard,

Many people are surprised,

Saying that you said shipbuilding,

我们的**子孙后代**,

包括我们自己,

其实未来人类需要**依靠**的**资源来源**其实是海洋,

特别是**深海**。

为了迎接**即将到来**的海洋时代,

吴辛和**崔维成**决心要**探索**一种**新模式**,

通过**科学家**和**企业家的联手**,

依靠社会的力量,

完成**万米级深渊探索**的**世界级科研课题**。

因为一开始的时候别说去**融资**,

去说服我们的**投资人**,

我们连自己都说服**不了**,

说**这个钱投进去**一定**能够**回来,

但是总觉得这是一件伟大的**事业**。

我们把我们的事情讲给我们**周边**的朋友听,

朋友们被我们感动了,

他们虽然也是可能怀疑我们**这个事能不能**做成,

但**起码**他被**这种**精神所感动。

等到我们的船开始**切割钢板**在**船厂**造的时候,

很多人就很**惊讶**,

说原来你们说**造船**,

子孙 (zǐ sūn) offspring; posterity. **后代** (hòu dài) descendant; progeny; posterity; later ages; later generations.

来源 (lái yuán) source (of information etc); origin.

到来 (dào lái) to arrive; arrival; advent.

模式 (mó shì) mode; method; pattern.

企业家 (qǐ yè jiā) entrepreneur. **联手** (lián shǒu) lit. to join hands; to act together.

世界级 (shì jiè jí) world-class.

融资 (róng zī) financing.

投资人 (tóu zī rén) investor.

不了 (bù liǎo) unable to; without end.

进去 (jìn qù) to go in.

周边 (zhōu biān) periphery; rim; surroundings; all around; perimeter; peripheral (computing); spin-offs.

起码 (qǐ mǎ) at the minimum; at the very least.

切割 (qiē gē) to cut. **钢板** (gāng bǎn) steel plate. **船厂** (chuán chǎng) shipyard; shipbuilder's yard.

惊讶 (jīng yà) amazed; astonished; to surprise; amazing; astonishment; awe.

造船 (zào chuán) shipbuilding.

It really started.

The introduction of social funds has accelerated the construction of scientific research ships,

This allowed their dream to set sail.

On the basis of the success of "Jiaolong",

Cui Weicheng led the team to develop and manufacture the "Rainbow Fish" 10,000-meter lander and unmanned submersible in just three years.

Lay a solid foundation for the research and development of manned submersibles.

The manned submersible that advances into the abyss is like a manned spacecraft flying in space.

It will send three passengers into the 10,000-meter abyss,

At the same time, multiple round trips must be achieved

Withstand 1100 times the pressure of the ground,

Complete difficult and complex tasks in the 10,000-meter abyss,

All these materials for manned submersibles,

Craftsmanship,

Technology puts forward demands close to the limit.

The R&D team uses global wisdom to jointly develop with foreign advanced enterprises,

The most advanced ultra-high-strength steel material is used to manufacture the spherical manned cabin,

At present, the manufacturing of sample balls has achieved phased results.

真的开始造了。

社会资金的**引入加速**了**科考船**的**建造**,

这**使得**他们的**梦想得以扬帆起航**。

在**“蛟龙号”**成功基础上,

崔维成带领团队用短短**三年**研发制造**“彩虹鱼”**号**万米级**着陆器和**无人潜水器**,

为**载人深潜器**的研发打下**坚实基础**。

挺进深渊的**载人深潜器**如同是**翱翔太空**的**载人航天器**,

它要把**三名乘客**送入**万米深渊**,

同时还要实现**多次**往返,

承受**相当于地面**1100倍的压力,

在**万米深渊**中完成**高难度**复杂任务,

所有这些对**载人深潜器**的材料、

工艺、

技术**提出**了接近**极限**的要求。

研发团队利用**全球智慧**与**国外先进企业**联合进行开发,

采用**最先进**的**超高强度**钢材料制造**球形载人舱**,

目前**样球**制造已**取得阶段性**成果。

引入 (yǐn rù) to draw into; to pull into; to introduce. **加速** (jiā sù) to speed up; to expedite.

扬帆 (yáng fān) to set sail. **起航** (qǐ háng) (of a ship) to set sail; (of an aeroplane) to take off; also written 启航 (qǐ háng).

打下 (dǎ xià) to lay (a foundation); to conquer (a city etc); to shoot down (a bird etc). **坚实** (jiān shí) firm and substantial; solid.

翱翔 (áo xiáng) to soar; to wheel about in the sky. **航天器** (háng tiān qì) spacecraft.

乘客 (chéng kè) passenger.

多次 (duō cì) many times; repeatedly.

相当于 (xiāng dāng yú) equivalent to.

难度 (nán dù) trouble; problem.

工艺 (gōng yì) arts and crafts; industrial arts.

强度 (qiáng dù) strength; intensity. **球形** (qiú xíng) spherical; ball-shaped. **舱** (cāng) cabin; the hold of a ship or airplane.

取得 (qǔ dé) to acquire; to get; to obtain. **阶段性** (jiē duàn xìng) in stages; step by step.

They are cooperating with domestic companies to develop simultaneously,

Manned cabin test paper work,

Not only to ensure that the development of the manned cabin is foolproof,

It has greatly promoted the improvement of domestic deep-sea manufacturing technology.

Not to mention that it seems that climbing the world's cutting-edge technology peaks is very powerful,

Things that don't matter,

Has nothing to do with us,

Don't have such a fear.

It should be said,

You just have to follow the laws of science,

scientific methods,

Concentrate on doing it seriously,

Anyone can go to the forefront of the world.

After a comprehensive test,

The newly-developed 10,000-meter lander and unmanned submersible have finally been packaged.

About to accept the test of sea trials.

The scientific research ship "Zhang Jian" crossed the Luzon Strait through the South China Sea,

Arrived in the deepest part of the world ocean on December 25, 2016,

Mariana Trench.

他们与国内企业合作同步开展,

载人舱试纸工作,

既保证载人舱研制万无一失,

有极大的带动了国内深海制造技术的提升。

不要说好像攀登世界前沿科技高峰都是很厉害的了、

不得的人的事情,

跟我们自己没有关系的,

不要有这样的一种恐惧的心理。

应该说,

你只要按照科学的规律,

科学的方法,

专心致志认认真真去做,

谁都可以走到国际的前沿。

经过了全面的测试,

新研发的万米着陆器和无人潜水器终于被打包装船,

即将接受海试的考验。

“张謇”号科考船经南海穿吕宋海峡,

2016年12月25日抵达世界大洋最深处,

马里亚纳海沟。

同步 (tóng bù) synchronous; to synchronize; to keep step with.

万无一失 (wàn wú yī shī) surefire; absolutely safe (idiom).

极大 (jí dà) maximum; enormous. **带动 (dài dòng)** to spur; to provide impetus; to drive.

要说 (yào shuō) as for; when it comes to. **攀登 (pān dēng)** to climb; to pull oneself up; to clamber; to scale; fig. to forge ahead in the face of hardships and danger. **前沿 (qián yán)** front-line; forward position; outpost; extending ahead; frontier (of science, technology etc). **高峰 (gāo fēng)** peak; summit; height.

不得 (bù dé) must not; may not; not to be allowed; cannot.

没有关系 (méi yǒu guān xi) see 没关系 (méi guān xi).

恐惧 (kǒng jù) to be frightened; fear; dread.

专心致志 (zhuān xīn zhì zhì) with single-hearted devotion (idiom).

包装 (bāo zhuāng) to pack; to package; to wrap; packaging.

蹇 (jiǎn) to speak out boldly. **南海 (nán hǎi)** South China Sea. **吕宋海峡 (lǚ sòng hǎi xiá)** Luzon Strait between Taiwan and Luzon Island (Philippines).

The huge waves put the maritime affairs at great risk,

滔天的巨浪让海事面临极大风险，

滔(tāo) overflow; torrent-dash. 海事(hǎi shì) maritime affairs; accident at sea.

The violent turbulence will destroy the test equipment,

剧烈的颠簸将使测试设备遭到毁灭性破坏，

剧烈(jù liè) violent; acute; severe; fierce. 颠簸(diān bō) to shake; to jolt; to bump. 遭到(zāo dào) to suffer; to meet with (sth unfortunate). 毁灭性(huǐ miè xìng) destructive; devastating.

Seize the only window period,

抓紧仅有的窗口期，

窗口(chuāng kǒu) window; opening providing restricted access (e.g. customer service window); computer operating system window; fig. medium; intermediary; showpiece; testing ground.

They conducted a full-sea depth test of the 10,000-meter lander.

他们进行了万米着陆器的全海深测试。

it is good,

好，

okay,

好嘞，

嘞(lei) sentence-final particle similar to 了(le), but carrying a tone of approval.

Note the time.

记下时间。

Probe No. 1 successfully hit the bottom of the abyss,

一号探测器成功触底万里深渊，

一号(yī hào) first day of the month; toilet; (slang) top (in a homosexual relationship). 万里(wàn lǐ) Wanli township in New Taipei City 新北市(xīn běi shì), Taiwan.

The high-definition camera records the scene of the mud and sand.

高清镜头记录下泥沙泛起的画面。

高清(gāo qīng) high definition (television etc); high fidelity (audio). 镜头(jìng tóu) camera lens; camera shot (in a movie etc); scene. 泥沙(ní shā) silt. 泛起(fàn qǐ) to appear; to emerge; to surface. 画面(huà miàn) scene; tableau; picture; image; screen (displayed by a computer); (motion picture) frame; field of view.

Not too late,

不会太晚了，

Not too late,

不会太晚了，

It's not too late.

不会太晚了。

The 28th will not work.

28号就不行了。

不行了(bù xíng le) (coll.) on the point of death; dying.

Correct.

对。

thank you very much.

非常感谢。

非常感谢(fēi cháng gǎn xiè) extremely grateful; very thankful.

Probe No. 2 returned full of deep-sea sediments,

二号探测器满载着深海沉积物归来，

满载(mǎn zài) full to capacity; fully loaded. 归(guī) to return; to go back to; to give back to; (of a responsibility) to be taken care of by; to belong to; to gather together; (used between two identical verbs) despite; to marry (of a woman) (old); division on the abacus with a one-digit divisor.

There are thousands of valuable microbial species in deep sea sediments,

深海沉积物中含有成千上万种宝贵的微生物菌种，

成千上万(chéng qiān shàng wàn) lit. by the thousands and tens of thousands (idiom); untold numbers; innumerable; thousands upon thousands. 菌种(jūn zhǒng) (microorganism) species; strain; (fungus and mushroom) spore; spawn.

It is an indispensable resource for marine biomedical engineering.

它是海洋**生物医药工程**求之不得的资源。

生物 (shēng wù) organism; living creature; life form; biological. **医药 (yī yào)** medical care and medicines; medicine (drug); medical; pharmaceutical. **求之不得 (qiú zhī bù dé)** lit. seek but fail to get (idiom); fig. exactly what one's been looking for.

Facing these mud from a depth of ten thousand meters,

面对着这些来自万米**水深**的**泥巴**,

泥巴 (ní bā) mud.

Happy smiles appeared on the faces of the scientists.

科学家的脸上**露出**了开心的**笑容**。

露出 (lù chū) to expose; to show; also pr. (lòu chū). **笑容 (xiào róng)** smile; smiling expression.

past,

过去,

People think that everything depends on the sun to grow,

人们认为**万物**生长靠**太阳**,

万物 (wàn wù) all living things.

In the depths of the ocean without the sun,

不见天日的**海洋深处**,

不见天日 (bù jiàn tiān rì) all black, no daylight (idiom); a world without justice.

It is impossible for life to survive.

根本不可能有**生命存活**。

不可能 (bù kě néng) impossible; cannot; not able. **存活 (cún huó)** to survive (a serious accident); survival.

These lives from the deep sea tell us,

这些来自**深海**的**生命**告诉我们,

In fact, there are two completely different ecosystems on the earth.

其实地球上有两个完全**不同**的**生态系统**。

生态系统 (shēng tài xì tǒng) ecosystem.

In places where sunlight cannot reach,

在阳光无法**抵达**的地方,

In the depths of the ocean,

在**大洋**的**深处**,

Relying on the energy released by the core of the earth,

依靠着**地核**释放的**能量**,

着地 (zháo dì) to land; to touch the ground; also pr. (zhuó dì). **释放 (shì fàng)** to release; to set free; to liberate (a prisoner); to discharge.

A prosperous world of life,

一个**繁盛**的**生命世界**,

繁盛 (fán shèng) prosperous; thriving; (of vegetation) luxuriant.

Waiting for us to discover.

在等待着我们去**发现**。

The three-month sea experiment,

历时三个月的**海上**实验,

海上 (hǎi shàng) maritime.

Gained experience in detecting the 10,000-meter abyss.

取得了**万米深渊**探测**经验**。

The lander sea trial was successful,

着陆器海试**成功**,

It's just a small step for a 10,000-meter manned deep dive,

仅仅是万米**级载人深潜**一小步,

The next step is the 10,000-meter sea trial of unmanned submersibles and the development of the most difficult manned submersible.

下一步是**无人深潜器**的**万米海试**和**最为艰难**的**载人潜水器**研制,

下一步 (xià yī bù) the next step. **最为 (zuì wéi)** the most. **艰难 (jiān nán)** difficult; hard; challenging.

Eventually, 10,000 meters will
be manned by 2020.

最终在2020年前实现万米载人。