译趣

A Magazine About Translation

I think, therefore I translate

第一期

安徽省重点建设院校、国家中西部高校基础能力建设工程（二期）项目建设高校

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安徽工程大学
外国语学院

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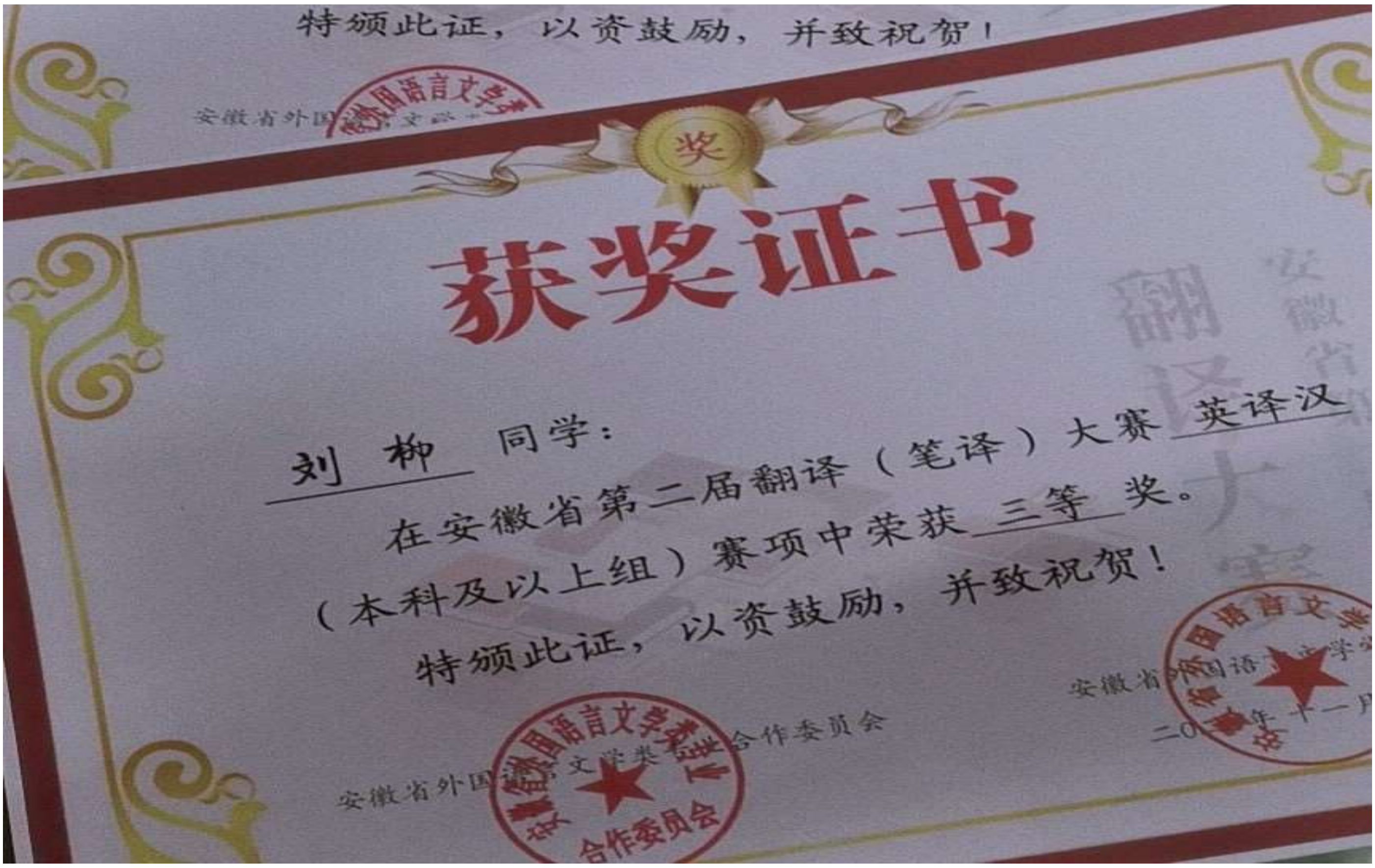


Black Hole from Iconic Image Appears to Be Wobbling

图像数据显示黑洞周围光环极不稳定

Black holes are regions of space in which the force of gravity is so strong that not even light can escape. To create one, said Ulf Danielson, a physicist on the Nobel Committee for Physics, at the event, "you'd need to compress the sun into a region only a few kilometers across—or to squeeze the Earth down to the size of a pea." At the heart of every black hole would lie a "singularity," a point at which gravity squeezes matter to infinite density, shrouded by an "event horizon" beyond which anything falling in could not return to the wider outside universe. Although scientists had speculated about their existence for centuries, it was unclear whether such extreme objects could occur in reality. Even Albert Einstein—whose general theory of relativity forms the modern basis for understanding black holes—doubted their existence.

黑洞是宇宙里的一个区域，在该区域中，引力强大到连光都无法逃脱。诺贝尔物理学奖委员会物理学家乌尔夫 •丹尼尔森(Ulf Danielson)在颁奖仪式上说：“若要创造一个黑洞，则需把太阳压缩成一个只有几公里宽的区域，或将地球压缩成豌豆大小。”每个黑洞的中心都存在一个“奇点”，这个点上的引力将物质挤压到无限密度，并被“事件视界”所捕捉，在该视界范围内，任何落入的物体都无法回到更广阔的外部宇宙。尽管科学家们已经推测了几个世纪，但仍不确定这些极端的物质是否真的存在。甚至阿尔伯特 • 爱因斯坦（Albert Einstein）也怀疑黑洞的存在，即便他的广义相对论理论构成了理解黑洞的现代基础。

But in 1965 Penrose, a physicist who worked with Stephen Hawking and is now a professor emeritus at the University of Oxford, mathematically "showed that black holes might really exist, forming in a stable and robust process" consistent with Einstein's theories, David Havilland, a physicist at the KTH Royal Institute of Technology in Sweden and chair of the committee for the physics prize, told reporters.

瑞典皇家理工学院物理学家、物理学奖委员会主席戴维•哈维兰德（David Haviland）告诉记者：1965 年，曾与霍金共事、现为牛津大学名誉教授的物理学家彭罗斯（Penrose）用数学方法证明了黑洞在稳定的过程中形成，这与爱因斯坦的理论一致。

"Penrose and Hawking proved that, for stars of a certain type, black holes are a pretty much unavoidable outcome of stellar collapse," says Sabine Hossenfelder, a theoretical physicist at the Frankfurt Institute for Advanced Studies in Germany. "Prior to this groundbreaking work, most physicists thought that black holes were merely mathematical curiosities which appear in general relativity but that they would not exist in reality. Instead it turned out that black holes are hard to avoid in stellar collapse and that the universe should be full of them.... The story of the discovery of black holes demonstrates vividly how powerful pure mathematics can be in the quest to understand nature."

"彭罗斯和霍金证明，黑洞是某种类型的恒星坍塌后不可避免的结果，"德国法兰克福高等研究院的理论物理学家萨宾•霍森菲尔德（Sabine Hossenfelder）说，"在这一工作取得突破性成果前，大多数物理学家认为黑洞只是广义相对论中出现的数学奇观，现实中是不存在的。相反，事实证明黑洞在恒星坍缩中是难以避免的，因此宇宙中应该有很多黑洞……发现黑洞的故事生动地展示了纯数学理论在探索自然中的强大力量。"

Penrose's black-hole work did not stop at proving their possibility under general relativity, notes Avi Loeb, an astrophysicist at Harvard University and director of its Black Hole Initiative. Penrose also showed how to extract energy from spinning black holes—the so-called Penrose process, which may play an important role in powering quasars, the ultraluminous objects linked to voracious black holes in the cores of distant ancient galaxies. And Penrose's "cosmic censorship hypothesis," Loeb says, "saves our ability to predict the future throughout the universe from the pathology of the singularities associated with black holes, where Einstein's theory breaks down.... Just as in Las Vegas, 'whatever happens inside the event horizon, stays inside the event horizon.'"

哈佛大学天体物理学家、黑洞计划主任艾维•勒布（Avi Loeb）指出，彭罗斯的黑洞研究工作并没有止步于证明它们在广义相对论下的可能性。彭罗斯还展示了如何从旋转的黑洞中提取能量，即所谓的彭罗斯过程，这可能在为类星体提供能量方面发挥重要作用。类星体是与遥远的远古星系中心的贪食的黑洞相连的极亮天体。勒布说，彭罗斯的"宇宙监督假设" 避免了我们从与黑洞有关的奇点病理学中预测整个宇宙，在这种情况下，爱因斯坦的理论崩溃了……就像在拉斯维加斯一样，事界内发生的任何事情都停留在事界内。

While Penrose, Hawking and other theorists were codifying the physical foundations of black holes, observational astronomers were searching for and studying these exotic objects in ever-greater detail.

当彭罗斯、霍金和其他理论家正在编纂黑洞的物理基础时，观测天文学家则在更加详细地寻找和研究这些奇异的天体。

Scientists are now learning important new things about the first-ever directly imaged black hole, including behaviors consistent with Einsteinian theory, but it's also showing an unexpected feature in the form of a very wobbly ring.

Seems like forever ago, but we finally got to feast our eyes on the apparently unseeable back in April 2019, when this incredible image of a supermassive black hole was first released. Of course, we can't actually "see" the black hole, because, as any 6-year-old will happily tell you, black holes have a habit of sucking up light. What the picture does show, however, is an asymmetric ring, known as the black hole's shadow, of superheated gas swirling around the black hole's event horizon—that boundary beyond which light cannot escape.

This particular black hole, with the mass of 6.5 billion Suns, is located 55 million light-years away in the Messier 87 galaxy, or M87 for short. The black hole, designated M87*, was imaged by the Event Horizon Telescope in April 2019, in what was a historic scientific achievement. The image provided a static view of M87*, but new research published this week to The Astrophysical Journal shows it's now possible to study physical changes to this black hole and its surrounding area over time.

Astronomers with the EHT project observed M87* for a one-week period in April 2017, which didn't afford them enough time to track dynamic aspects of the system, like changes to its shape. But the researchers have now done exactly that, by studying archival EHT data going back to 2009.

"If you want to see a black hole evolve over a decade, there is no substitute for having a decade of data," said Maciek Wielgus, an astronomer at the Center for Astrophysics at Harvard & Smithsonian and the lead author of the new paper, in a press release.

EHT is a large telescope array composed of radio dishes strategically placed around the globe. The system achieved full operational power in 2017, and, with dishes at five different locations, it resulted

科学家们现在正在了解有史以来第一个直接成像的黑洞这一重要新事物，包括与爱因斯坦理论一致的行为，但它也显示出一个意想不到的特征，即一个非常不稳定的环。

似乎是很久以前的事了，但在 2019 年 4 月，这张令人难以置信的超大质量黑洞的照片首次发布，我们最终大饱眼福了。当然，我们不能肉眼看到黑洞，正如 6 岁的孩子都会兴奋地告诉你，黑洞有吸收光线的习性。然而，这张图片确实显示了一个不对称的环，即黑洞的阴影，它是由围绕着黑洞视界的过热气体组成的，视界之外的光线是无法逃脱的。

这个质量为 65 亿个太阳的特殊黑洞位于距离我们 5500 万光年的梅西耶 87 星系，简称梅 87。2019 年 4 月，事件视界望远镜（EHT）对梅 87*黑洞成像，这是一项历史性的科学成就。该图片提供了梅 87 的静态视图，但当周发表在《天文物理期刊》上的新研究表明，现在可以研究这个黑洞及其周围区域随着时间的推移而发生的物理变化。

2017 年 4 月，事件视界望远镜项目的天文学家对梅 87*进行了为期一周的观测，这并没有给他们足够的时间来追踪该系统的动态方面，比如其形状的变化。但是研究人员现在通过研究追溯到 2009 年的事件视界望远镜档案数据做到了这一点。

"如果你想看到一个黑洞十多年的演化过程，这十年的数据是必不可少的。"哈佛大学和史密森学院天体物理中心的天文学家马茨克 •维尔格斯(Maciek Wielgus)在一份新闻稿中说，他也是这篇新论文的主要作者。

事件视界望远镜是一个由无线电天线组成的大型望远镜阵列，战略性地放置在全球各地。马克斯 • 普朗

in a kind of "Earth-sized radio dish," as it was described in a press release put out by the Max Planck Institute for Radio Astronomy. Importantly, however, an early prototype of the EHT array was gathering important astronomical information while the system was being built. Specifically, observations of the monstrous black hole were gathered from 2009 to 2012 from three sites, and in 2013 from four sites.

" While these observations do not contain enough information to produce images, they are sufficient to constrain simple geometric models," wrote the authors in the new study.

A statistical modeling technique, plus some educated guessing, allowed the researchers to chart changes to the system over time, in a process that included observations gathered by EHT until 2019.

As the models showed, the overall shape of this thing has remained constant over the past 10 years, which is good news if you're a fan of Albert Einstein. The fixed diameter of the crescent shadow for a black hole of this size agrees with a prediction drawn from his famous theory of general relativity.

" In this study, we show that the general morphology, or presence of an asymmetric ring, most likely persists on timescales of several years," said Kazumori Akiyama, an MIT scientist and study co-author, in the Harvard & Smithsonian press release. "This is an important confirmation of theoretical expectations as the consistency [of multiple observations] gives us more confidence than ever about the nature of M87* and the origin of the shadow."

This constancy aside, the astronomers did notice a major difference, as the asymmetric ring appears to be wobbling to a significant degree. The ring's shape hasn't changed in the past decade, but it has rotated.

" Actually, we see quite a lot of variation there," said Wielgus.

克射电天文研究所在一份新闻稿中称，该系统在 2017 年实现了全面运行，并且在 5 个不同地点安装了碟形天线，最终形成了一种类似于地球大小的无线电天线。然而，重要的是，早期的事件视界望远镜阵列原型在系统建造过程中收集了重要的天文信息。具体来说，从 2009 年到 2012 年，我们从三个地点收集了对这个巨大黑洞的观测数据，2013 年又从四个地点收集了这些数据。

"虽然这些观测数据不包含足够的信息来生成图像，但它们足以约束简单的几何模型，"作者在新研究中写道。

统计建模技术加上一些有根据的猜测，使研究人员能够绘制出该系统的时间变化图，这个过程包括事件视界望远镜到 2019 年收集的观察数据。

如模型所示，其整体形状在过去的 10 年里保持不变，这对爱因斯坦的粉丝来说是个好消息，因为这种大小的黑洞的月牙形阴影的固定直径与他著名的广义相对论理论的预测一致。

"在这项研究中，我们发现一般的形态或者说不对称环的存在，很可能会持续几年，"麻省理工学院的科学家和研究合著者秋山和森(Kazumori Akiyama)在哈佛史密森天体物理中心的新闻稿中说，"这是对理论预期的一个重要证实，因为(多重观测的)一致性让我们比以往更加相信梅 87 * 的性质和阴影的起源。"

撇开这种恒定性不谈，天文学家们确实注意到了一个重大不同之处，那就是非对称光环似乎有很大程度的晃动。在过去的十年里，环的形状没有改变，但是它已经旋转了。

"其实，我们看到了很多变化，"维尔格斯说。

Thomas Krichbaum, an astronomer at MPIfRA and a co-author of the study, said the "data analysis suggests that the orientation and fine structure of the ring varies with time," which is important as it provides a "first impression on the dynamical structure of the accretion flow, which surrounds the event horizon," as he explained in the Max Planck press release.

这项研究的共同作者、马克斯·普朗克射电天文研究所的天文学家托马斯·克里鲍姆(Thomas Krichbaum)说，数据分析表明，环的方向和精细结构随时间而变化。他在马克斯·普朗克新闻稿中解释这一点很重要，因为它提供了围绕事件视界的吸积流动力学结构的第一印象。

Accretion flow—the rate of material streaming into a black hole—for M87* appears to be variable. As the authors speculate, the glowing gas in the ring is in a highly turbulent state, the result of magnetic fields, and this is what is causing the shifting appearance of the black hole over time. This is super exciting, because the "dynamics of this wobbling will allow us to measure the accretion flow," said Anatua.

梅 87 的吸积流流入黑洞的速率似乎是可变的。正如作者推测的那样，光环中的发光气体处于一种高度动荡状态，这是磁场的结果，也是黑洞变化的原因。阿纳图阿说，这让他们非常兴奋，因为这种晃动的动力学能够测量吸积流。

With this paper, we've now entered into a new era of studying the intimate areas around black holes. Astronomers can track changes to these exotic systems over time, and they should be able to study not just accretion flow but also related phenomena, such as relativistic jets. The physical characteristics of relativistic jets—outflows of highly energetic particles—are "key to understanding the interactions with the surrounding medium in a black hole's host galaxy," said Richard Anantua, study co-author, in the release. Observations of accretion flow will also provide another way for scientists to test general relativity, a theory that has held up pretty well so far.

有了这篇论文，我们现在已经进入了一个研究黑洞周围私密区域的新时代。天文学家可以追踪这些外来系统随时间的变化，他们能够研究的不仅仅是吸积流，还有相关的现象，如相对论喷流。该研究的合著者理查德·安图亚(Richard Anantua)在研究报告中说相对论性喷流的物理特征，也就是高能粒子的外流是理解黑洞所在星系中与周围介质相互作用的关键。对吸积流的观测也将为科学家们提供另一种方法来检验广义相对论理论，这个理论迄今为止依然可靠。

This year's Nobel Prize in Physics was awarded to three scientists for their work on black holes. British cosmologist Roger Penrose will receive half of the prize, with the remaining half split between German astrophysicist Reinhard Genzel and American astrophysicist Andrea Ghez.

“This year's prize is about the darkest secrets of the universe,” said Göran K. Hansson, secretary-general of the Royal Swedish Academy of Sciences, at a press event. The academy recognized Penrose for his “discovery that black hole formation is a robust prediction of the general theory of relativity,” Hansson added, while Ghez and Genzel were awarded “for the discovery of a supermassive compact object at the center of our galaxy.”

“Science is so important, and presenting the reality of our physical world is critical to us as human beings,” Ghez said in an interview with reporters after learning of her award. “We have no idea what's inside black holes.... They really represent the breakdown of our understanding of the laws of physics. That's part of the intrigue—we still don't know.”

今年的诺贝尔物理学奖授予了三位科学家，以表彰他们在黑洞方面的研究成果。英国宇宙学家罗杰•彭罗斯将获得一半奖金，剩下的一半由德国天体物理学家赖因哈德•根策尔（Reinhard Genzel）和美国天体物理学家安德里亚•盖兹（Andrea Ghez）平分。

瑞典皇家科学院秘书长戈兰• k •汉森(Göran k. Hansson)在新闻发布会上说，“今年的诺贝尔奖是关于宇宙中最黑暗的秘密。”该学院表彰彭罗斯发现了黑洞的形成是广义相对论强有力的预测。汉森补充说，盖兹和根策尔则是因为发现了银河系中心的超大质量致密物体而获奖。

“科学太重要了，展示物理世界的现实对人类至关重要，”盖兹在获奖后接受记者采访时说，“我们不知道黑洞里面是什么……它们确实代表了我们对物理定律的理解的崩溃。这仍是我们需要研究的错综复杂的部分。”

供稿 刘柳

（安徽省第二届翻译（笔译）大赛

英译汉三等奖获得者）

Black Hole from Iconic Image Appears to Be Wobbling

图像显示：黑洞在晃动

Black holes are regions of space in which the force of gravity is so strong that not even light can escape. To create one, said Ulf Danielson, a physicist on the Nobel Committee for Physics, at the event, "you'd need to compress the sun into a region only a few kilometers across—or to squeeze the Earth down to the size of a pea." At the heart of every black hole would lie a "singularity," a point at which gravity squeezes matter to infinite density, shrouded by an "event horizon" beyond which anything falling in could not return to the wider outside universe. Although scientists had speculated about their existence for centuries, it was unclear whether such extreme objects could occur in reality. Even Albert Einstein—whose general theory of relativity forms the modern basis for understanding black holes—doubted their existence.

黑洞是一片引力超强的区域，连光都无法逃脱。诺贝尔物理学奖委员会委员乌尔夫 •丹尼尔松（Ulf Danielson）指出："要创造一个黑洞，需要把太阳压缩成只有几公里宽的区域，或者把地球压缩成豌豆大小。" 每个黑洞的核心都有一个"奇点"，在这个点上，重力将物质挤压到无限稠密，外面再裹上

一层“事件视界”（Event Horizon）。超过这个边界，任何掉进去的东西都不能再回到外部世界。其实，关于黑洞是否存在，科学家们已经推测了几个世纪，但尚不确定这样的极端物体是否真的存在，就连阿尔伯特 • 爱因斯坦也怀疑黑洞有无，尽管他的广义相对论奠定了理解黑洞的现代基础。

But in 1965 Penrose, a physicist who worked with Stephen Hawking and is now a professor emeritus at the University of Oxford, mathematically “showed that black holes might really exist, forming in a stable and robust process” consistent with Einstein’s theories, David Haviland, a physicist at the KTH Royal Institute of Technology in Sweden and chair of the committee for the physics prize, told reporters.

但 1965 年，曾与斯蒂芬 • 霍金共事，后任牛津大学荣誉教授的物理学家彭罗斯（Penrose）却通过数学推导指出，“黑洞也许真的存在，且形成过程稳定有力”，这与爱因斯坦的理论相符。瑞典皇家理工学院物理学家、诺贝尔物理学奖委员会主席大卫 • 哈维兰（David Haviland）告诉记者。

“Penrose and Hawking proved that, for stars of a certain type, black holes are a pretty much unavoidable outcome of stellar collapse,” says Sabine Hossenfelder, a theoretical physicist at the Frankfurt Institute for Advanced Studies in Germany. “Prior to this groundbreaking work, most physicists thought that black holes were merely mathematical curiosities which appear in general relativity but that they would not exist in reality. Instead it turned out that black holes are hard to avoid in stellar collapse and that the universe should be full of them.... The story of the discovery of black holes demonstrates vividly how powerful pure mathematics can be in the quest to understand nature.”

“彭罗斯和霍金证明了，对于特定类型的恒星来说，黑洞几乎是恒星坍缩不可避免的结果。在这项开创性的工作开始之前，多数物理学家都认为黑洞只是数学家的奇思妙想，它出现在广义相对论中，但在现实中并不存在。事实证明，黑洞在恒星坍缩中难以避免，宇宙中到处都有黑洞……黑洞的发现生动体现了纯数学在探索理解自然过程中数学有多重要。”德国法兰克福高级研究所的理论物理学家萨宾 • 霍森菲尔德（Sabine Hossenfelder）说道。

Penrose’s black-hole work did not stop at proving their possibility under general relativity, notes Avi Loeb, an astrophysicist at Harvard University and director of its Black Hole Initiative. Penrose also showed how to extract energy from spinning black holes—the so-called Penrose process, which may play an important role in powering quasars, the ultraluminous objects linked to voracious black holes in the cores of distant ancient galaxies. And Penrose’s “cosmic censorship hypothesis,” Loeb says, “saves our ability to predict the future throughout the universe from the pathology of the singularities associated with black holes, where Einstein’s theory breaks down.... Just as in Las Vegas, ‘whatever happens inside the event horizon, stays inside the event horizon.’”

哈佛大学天体物理学家兼黑洞计划创始人阿维 • 勒布（Avi Loeb）指出，彭罗斯并未停留在只在广义相对论基础上证明黑洞的存在，而是继而提出如何从旋转的黑洞中计算能量——即所谓的彭罗斯过程，这可能对测算类星体（quasars）的能量有重要启发。类星体是一种超亮物质，与遥远古代星系

中的黑洞密切相关。勒布指出，“彭罗斯的‘宇宙监督理论’（cosmic censorship hypothesis）使我们跳出从黑洞奇点出发来预测整个宇宙未来的死穴，黑洞奇点已使爱因斯坦的理论失效……就像那句关于拉斯维加斯的谚语 所说的一样，‘无论在事件视界内发生什么，都要留在事件视界内’”。

While Penrose, Hawking and other theorists were codifying the physical foundations of black holes, observational astronomers were searching for and studying these exotic objects in ever-greater detail.

当彭罗斯、霍金和其他理论家正在制定有关黑洞理论的相关规则时，观测天文学家正在细心地寻找和探究这个外来客。

Scientists are now learning important new things about the first-ever directly imaged black hole, including behaviors consistent with Einsteinian theory, but it’s also showing an unexpected feature in the form of a very wobbly ring.

科学家正在细致研究这个首次直接拍摄到的黑洞，它有符合爱因斯坦理论的行为，但也显示出一些出乎意料的特征，如它呈现出一种剧烈晃动的环形形状。

Seems like forever ago, but we finally got to feast our eyes on the apparently unseeable back in April 2019, when this incredible image of a supermassive black hole was first released. Of course, we can’t actually “see” the black hole, because, as any 6-year-old will happily tell you, black holes have a habit of sucking up light. What the picture does show, however, is an asymmetric ring, known as the black hole’s shadow, of superheated gas swirling around the black hole’s event horizon—that boundary beyond which light cannot escape.

光阴似箭，终于在 2019 年 4 月，当这张超大黑洞的照片首次发布时，我们终于看到了它，非常不可思议，简直难以置信！当然，我们并不能用肉眼看到黑洞，因为正像任何一个 6 岁的孩子都会兴奋地告诉你的那样，黑洞会把光吸进去。这张图像展示的其实是一个不对称的环，也就是黑洞的阴影，由环绕在黑洞“事件视界”周围的过热气体组成——过了这个边界，光就无法逃脱。

This particular black hole, with the mass of 6.5 billion Suns, is located 55 million light-years away in the Messier 87 galaxy, or M87 for short. The black hole, designated M87*, was imaged by the Event Horizon Telescope in April 2019, in what was a historic scientific achievement. The image provided a static view of M87*, but new research published this week to The Astrophysical Journal shows it’s now possible to study physical changes to this black hole and its surrounding area over time.

这个黑洞的质量相当于 65 亿个太阳，位于梅西耶 87 号星系（简称 M87），距地球 5500 万光年之遥。科学家将它命名为 M87*。这张照片是在 2019 年 4 月由事件视界望远镜（EHT）拍摄到的，这是一项划时代的科学成就。图像上显示的是 M87*静止的样子，但本周发表在《天体物理杂志》上的最新研究表明，现在已经能够研究它及其周边区域的物理变化。

Astronomers with the EHT project observed M87* for a one-week period in April 2017, which didn’t afford them enough time to track dynamic aspects of the system, like changes to its shape. But the researchers have now done exactly that, by studying archival EHT data going back to 2009.

2017 年 4 月，事件视界望远镜项目的天文学家利用一周时间观测 M87*，但未能充分了解它的动态变化，比如它的形状是否有改变。如今，研究人员通过回溯 2009 年以来的 EHT 档案数据，已能充分掌握这一切。

“If you want to see a black hole evolve over a decade, there is no substitute for having a decade of data,” said Maciek Wielgus, an astronomer at the Center for Astrophysics at Harvard & Smithsonian and the lead author of the new paper, in a press release.

“如果你想看到黑洞十年来的变化，就要有十年的数据。”哈佛-史密森天体物理中心天文学家，也是一篇新论文的首席作者梅西埃•维尔古斯（Maciek Wielgus）在一次新闻采访中说道。

EHT is a large telescope array composed of radio dishes strategically placed around the globe. The system achieved full operational power in 2017, and, with dishes at five different locations, it resulted in a kind of “Earth-sized radio dish,” as it was described in a press release put out by the Max Planck Institute for Radio Astronomy. Importantly, however, an early prototype of the EHT array was gathering important astronomical information while the system was being built. Specifically, observations of the monstrous black hole were gathered from 2009 to 2012 from three sites, and in 2013 from four sites.

EHT 是一个由射电望远镜组成的大型阵列，战略性地分布在全球各地。该系统在 2017 年全部投入运行，五个设在世界各地的射电望远镜形成一个“地球般大小的望远镜群”，马克斯•普朗克射电天文研究所的新闻报道中说。不过，在这一系统建成之前，EHT 的早期原型在收集数据方面发挥了重要作用。具体来说，从 2009 年到 2012 年，观测黑洞这一庞然大物的信息主要来自三个数据点，2013 年增加到四个。

“While these observations do not contain enough information to produce images, they are sufficient to constrain simple geometric models,” wrote the authors in the new study.

一项新研究表明：“虽然这些观测结果产生的信息还不能生成图像，但它们足以形成简单的几何模型。”

A statistical modeling technique, plus some educated guessing, allowed the researchers to chart changes to the system over time, in a process that included observations gathered by EHT until 2019.

一种统计建模技术，加上一些有根据的猜测，使得研究人员能够绘制出这一系统的历时变化模型曲线，这其中包括研究人员在 2019 年之前利用 EHT 观测到的数据。

As the models showed, the overall shape of this thing has remained constant over the past 10 years, which is good news if you’re a fan of Albert Einstein. The fixed diameter of the crescent shadow for a black hole of this size agrees with a prediction drawn from his famous theory of general relativity.

正如模型所显示的，在过去 10 年里这个家伙的整体形状并没有发生大的变化。如果你是爱因斯坦的粉丝，这绝对是个好消息。因为，对于这种大小的黑洞，其新月形阴影的固定直径与他著名的广

义相对论的预测完全一致。

“In this study, we show that the general morphology, or presence of an asymmetric ring, most likely persists on timescales of several years,” said Kazumori Akiyama, an MIT scientist and study co-author, in the Harvard & Smithsonian press release. “This is an important confirmation of theoretical expectations as the consistency [of multiple observations] gives us more confidence than ever about the nature of M87* and the origin of the shadow.”

“这项研究表明，黑洞的总体形态，或说那个不对称的环形，很可能已持续好几年了。”麻省理工学院的科学家、项目合作者秋山和森（Kazumori Akiyama）在哈佛-史密森研究中心的报道中写道。“这是对理论预期的一个重要证实，因为多次观测的一致性让我们对 M87*的性质和阴影来源的预测比以往任何时候都更有信心。”

This constancy aside, the astronomers did notice a major difference, as the asymmetric ring appears to be wobbling to a significant degree. The ring’s shape hasn’t changed in the past decade, but it has rotated.

撇开这种稳定性不谈，天文学家还注意到一个重要变化：不对称的环似乎在剧烈晃动，环的形状在过去十年里没有改变，但它却发生了转向。

“Actually, we see quite a lot of variation there,” said Wielgus.

“实际上，晃动相当强烈”，维尔古斯说。

Thomas Krichbaum, an astronomer at MPIfRA and a co-author of the study, said the “data analysis suggests that the orientation and fine structure of the ring varies with time,” which is important as it provides a “first impression on the dynamical structure of the accretion flow, which surrounds the event horizon,” as he explained in the Max Planck press release.

马克斯·普朗克射电天文研究所的天文学家托马斯·克里什鲍姆(Thomas Krichbaum)是这项研究的合作者之一，他说，“数据分析表明，环的方向和精细结构会随时间发生变化”，这一点很重要，因为它体现出“环绕在事件视界周围的吸积流（accretion flow）正在发生结构性改变”，他在马克斯·普朗克的相关报道中说。

Accretion flow—the rate of material streaming into a black hole—for M87* appears to be variable. As the authors speculate, the glowing gas in the ring is in a highly turbulent state, the result of magnetic fields, and this is what is causing the shifting appearance of the black hole over time. This is super exciting, because the “dynamics of this wobbling will allow us to measure the accretion flow,” said Anatua.

M87*的吸积流（物质流入黑洞的速率）似乎是可变的。正如作者推测的那样，在磁场的作用下，环中的发光气体处于高度湍流状态，这就是黑洞的外观随时间变化的原因。这一新发现令科学家相当振奋，因为“这种晃动将使我们能够测量吸积流”，阿南图瓦说。

With this paper, we’ve now entered into a new era of studying the intimate areas around black holes. Astronomers can track changes to these exotic systems over time, and they should be able to study not just accretion flow but also related phenomena, such as relativistic jets. The physical characteristics of relativistic jets—outflows of highly energetic particles—are “key to understanding the interactions with the surrounding medium in a black hole’s host galaxy,” said Richard Anantua, study co-author, in the release. Observations of accretion flow will also provide another way for scientists to test general relativity, a theory that has held up pretty well so far.

这项研究开创了探索黑洞周边区域的新时代。天文学家可以追踪这一系统的变迁，他们不仅能够研究吸积流，还能研究其他相关现象，如相对性喷流（relativistic jets）。该研究的合作者之一理查德 •阿南图瓦(Richard Anantua)认为相对性喷流(高能粒子的外流)的物理特征是理解黑洞与其周围介质相互作用的关键。观测吸积流也为科学家验证至今仍被奉为圭臬的广义相对论提供了另一途径。

This year’s Nobel Prize in Physics was awarded to three scientists for their work on black holes. British cosmologist Roger Penrose will receive half of the prize, with the remaining half split between German astrophysicist Reinhard Genzel and American astrophysicist Andrea Ghez.

今年的诺贝尔物理学奖被授予三位研究黑洞的物理学家。其中，英国宇宙学家罗杰 • 彭罗斯获得一半奖金，剩下的一半由德国天体物理学家莱因哈特 • 根泽尔和美国天体物理学家安德里亚 • 盖兹平分。

“This year’s prize is about the darkest secrets of the universe,” said Göran K. Hansson, secretary-general of the Royal Swedish Academy of Sciences, at a press event. The academy recognized Penrose for his “discovery that black hole formation is a robust prediction of the general theory of relativity,” Hansson added, while Ghez and Genzel were awarded “for the discovery of a supermassive compact object at the center of our galaxy.”

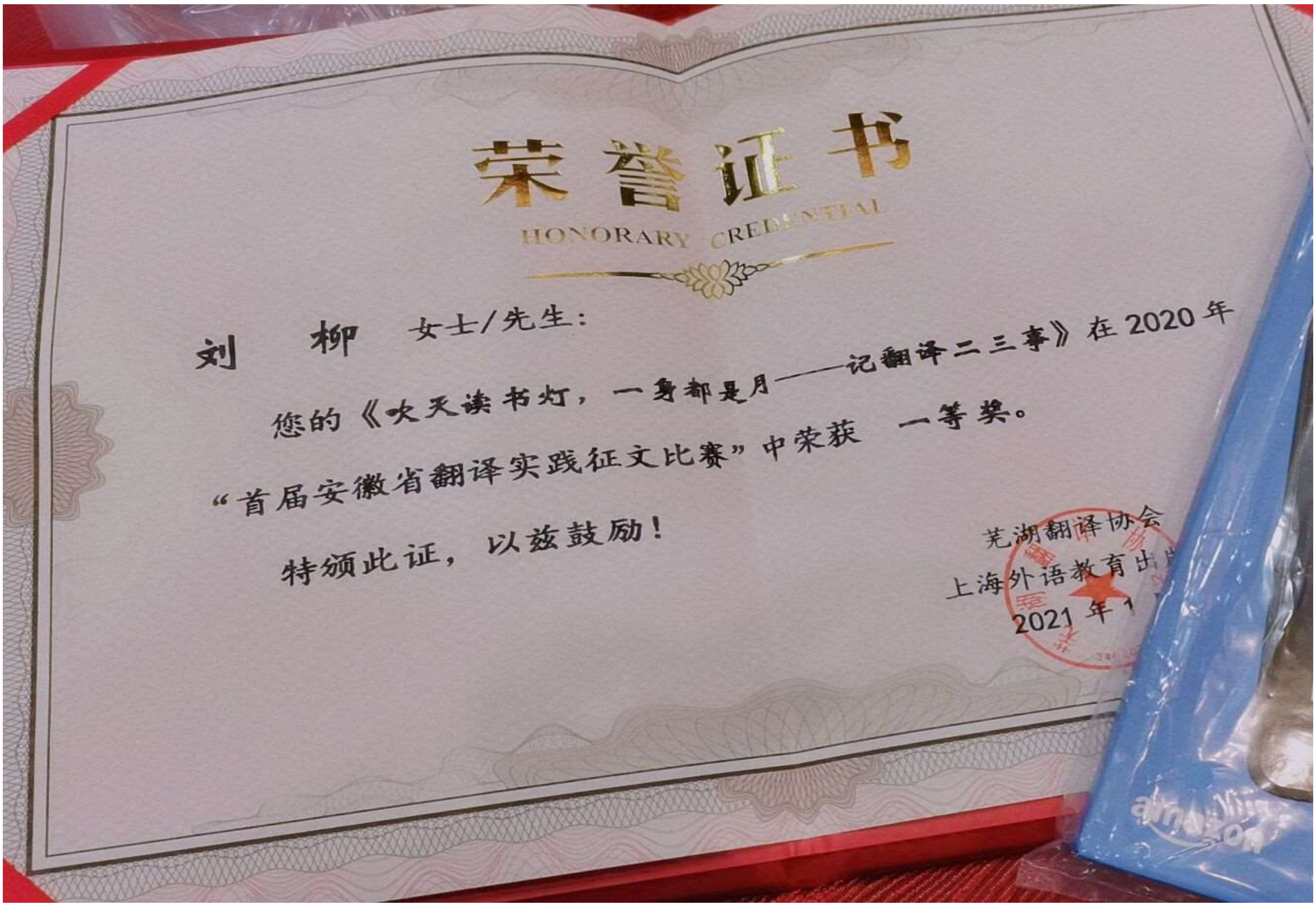
“今年的奖项是关于宇宙最黑暗的秘密”，瑞典皇家科学院秘书长约兰 •汉森（Göran K. Hansson）在新闻发布会上说。研究院认为彭罗斯的贡献在于他发现“黑洞的形成是广义相对论的有力证明”。盖兹和根泽尔则因“发现银河系中心的超大质量致密物体”而获奖。

“Science is so important, and presenting the reality of our physical world is critical to us as human beings,” Ghez said in an interview with reporters after learning of her award. “We have no idea what’s inside black holes.... They really represent the breakdown of our understanding of the laws of physics. That’s part of the intrigue—we still don’t know.”

“科学非常重要，用科学来揭示世界的真实面貌对人类来说至关重要。”盖兹在得知自己获奖后对记者如是说。“我们不知道黑洞里到底有什么……他们象征着我们对物理定律理解的局限。这只是冰山一角，未知的还有很多。”

供稿 刁倩男

(安徽省第二届翻译（笔译）大赛英译汉二等奖获得者)



吹灭读书灯，一身都是月

——记翻译二三事

成为一名优秀的译员，是我一生的理想。理想起源于大学见闻，四年读的书和经历沉淀在血肉中，使我知道了我想要什么东西，知道了想成为什么样的人，且愿为之不断奋斗，永不止步。

一、吾之所向，一往无前

大学二年级时，我第一次接触到笔译课程，大三学习了一年口译课程：在准确、通顺、优美的基础上，把一种语言信息转变成另一种语言信息。在我看来，翻译不仅仅是一项工具，更像是一门推敲的艺术。如果说大学课程提高了我对翻译的兴趣，那么许渊冲先生的讲座和译著更是让我坚定了做一名译员的决心。中国古诗词对仗工整，意境深远，在英语中很难解释。但许老先生被誉为"诗译英法唯一人"，他的翻译精彩绝伦。课余之时，我时常诵读他的唐诗宋词译文，心里钦佩至极，希望自己今后也能成为像许先生这样优秀的译者，将中华传统文化传达给世界，让各地人民了

解中华文化独特的魅力。令我印象最深刻的是毛泽东《为女兵题照》中的一句：不爱红装爱武装。许先生译为：To face the powder, and not to powder the face. 非常巧妙地运用同源词语传达了原诗中“红装”与“武装”对应的趣味。具体来说，也就是 face the powder 是“面对硝烟”，powder the face 即为“涂脂抹粉”。我惊讶于三个一样的单词调换顺序却组成了两种对比的意思，将女民兵们保家卫国的顽强斗志表现得淋漓尽致，也体现了毛主席当时反抗外来侵略的决心。这是何等的知识和智慧呀！

可以说，许老先生就是我学习翻译路上的榜样，去年观看了他的交流会，那时他已经是一位 98 岁老人，但谈起翻译依旧充满热情和敬意，非常耐心得回答同学们提出的问题。如今，即将成为翻译专业研究生的我也积攒了一些翻译经验。我知道身在翻译行业，其实有很多苦闷、无趣的时候，很多译者中途也会转型去到别的行业。但我相信，真正对“翻译”这件事情充满热爱，才能体会到解决一个翻译问题后的独特的成就感。因此，吾之所向，一往无前。越败越战，越挫越勇。

二、苔花如米小，也学牡丹开

还记得我的第一次非正式笔译经验是在大二帮理工科专业的朋友翻译论文，这个过程中遇到了很多专业名词需要去查阅相关资料、斟酌用词和时态句法。这次的翻译工作也让我明白了自身的不足：知识储备太少，词汇积累慢。我还是个渺小的苔花，还需更努力才能像牡丹那样绽放。

第二次口译经验是陪同一个澳大利亚的家庭介绍以及游览本地的游乐园和海洋馆。为了圆满完成这份工作，我提前准备了几天，查询游乐园和海洋馆里的词汇、路线以及相关的趣味知识。结束后我只给自己打了个 50 分，虽然磕磕巴巴可以与他们交流，将看到的中文字翻译明白，但是我没有考虑到各地英文的口音问题。比如他们会把音标中的[ei]音发成[ai]音，他们说 today(今天)，听起来就很像 to die(去死)。所以在整趟旅途中，听到对方不断地说今天有我陪伴很开心，总有一种他们不喜欢我的服务，想叫我去死的错觉哈哈哈。这份工作也让我明白了，做口译的时候，不仅要注意知识的储备，也要留意各地口音的特点。后来我恶补了这项短板，在大学模拟招聘会中模仿了中国、日本、韩国、印度等国家的英语口音，逗得评委哈哈大笑和满堂喝彩。

大三的时候，我争取了一份国外巡回舞台秀的随同翻译工作机会，主要包括翻译合同票据以及做甲方乙方和游客日常交流的工作。我与同事去南京出差时，第一次参加晚宴，有些紧张，还闹出了笑话。当时我被安排在加拿大主管和中方领导中间。开始我并没有意识到有什么不妥，看到别人动筷子，我也开始吃。看到那么多好吃的，我都快忘记是要来给人翻译的了。嘴里正塞着一口菜，味道不错，还没咽下去。这时中方领导开口了：“10 年冬奥会那时候，我还去过你们那里的惠斯勒村呢，风景真的很美啊，小镇充满文艺与情调……”领导停了下来，这时加拿大人看着我。

最怕空气突然变安静。我终于反应了过来，赶紧把嘴里的菜吞下去，差点呛着了……那个场面太美，我根本不敢回想。后面我才知道，中方领导的那句“10 年……”就是这次晚宴沟通的开始。直到午餐会结束，我愣是没再吃到一口。那么多好吃的，我一个也吃不到！但是这次教训我永生难

忘，之后再做午餐会或晚宴翻译，都会提前垫点东西，在饭桌上不吃，或者吃那些好咀嚼好下咽的。有些时候口译工作对于笔译工作来说更有压力，因为没有多少时间思考。这次翻译工作让我精疲力尽，但是结束时同事和主管都夸我能力提升得很快，听到这话我顿时觉得再多辛苦都值得，甘之如饴。

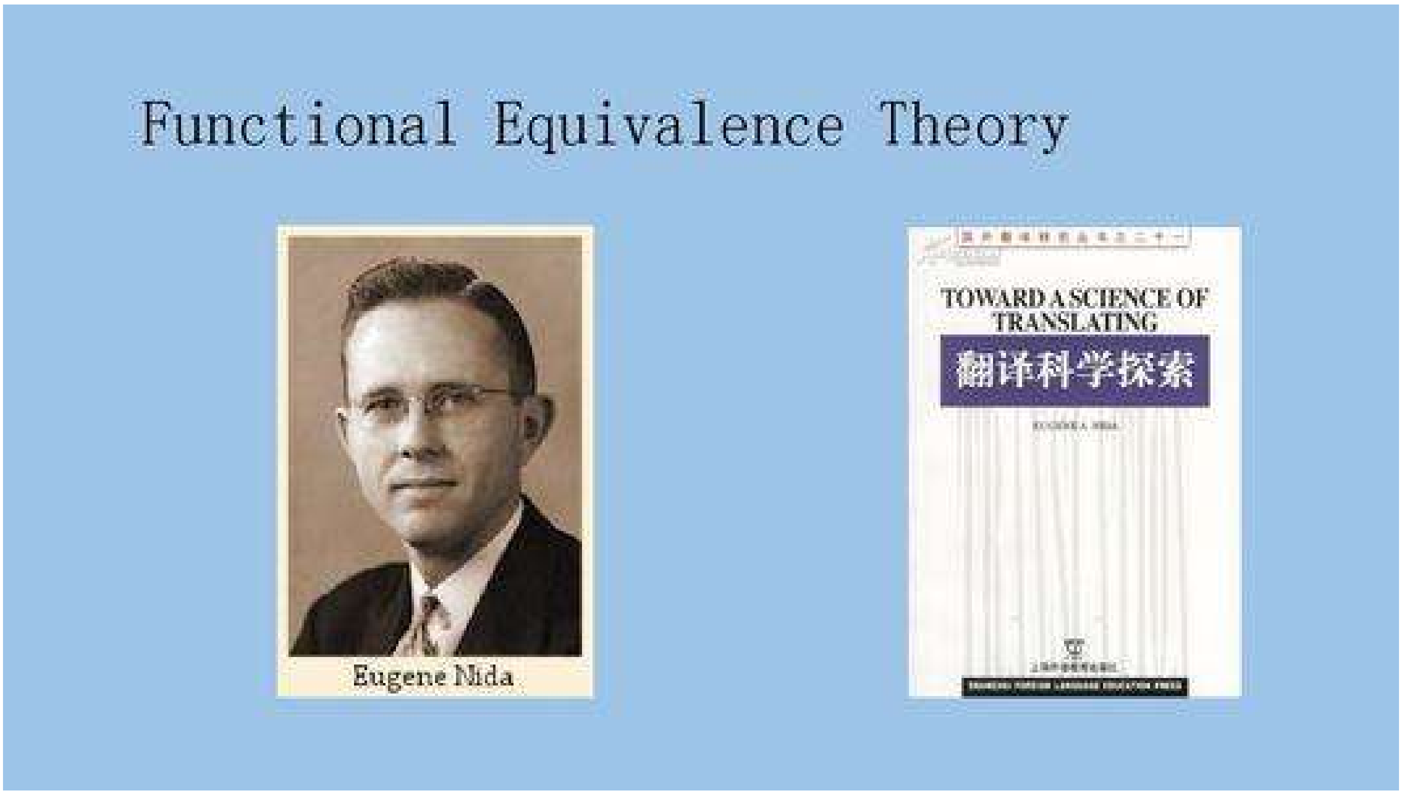
我大学毕业后，在初中母校做了一名英语老师，教学生们课文内容的时候，也会用翻译技巧和方式让他们更流畅深刻地理解文章。我想，学习翻译过程中增长的知识是一生受用无穷的，不管今后从事什么样的工作，我都会不断学习，积累知识，实现自我价值，使生命如夏花般灿烂。

苔花如米小，也学牡丹开。吾之所向，一往无前。越败越战，越挫越勇。

后记：吹灭读书灯，一身都是月。当我们读过诗书万卷，遍历人海浮沉，回首看去，那些经历都已经刻在我们的骨肉里，成为了生命的气质。

供稿 刘柳

（首届安徽省翻译实践征文比赛一等奖获得者）



功能对等理论

Eugune A. Nida(1964)在其出版的专著《翻译的科学》中，基于翻译的本质，首次从语言学的角度提出动态对等概念。它的对等内容包括四个方面：词汇对等、句法对等、篇章对等、文体对等。翻译是用最恰当、自然和对等的语言再现源语的信息，包括从语义到文体的再现。也就是说，在奈达看来，功能对等应该优先于形式对等，但并不是只顾内容，而不顾形式，在做到内容信息对等的同时，尽可能在形式上也要求对等，但二者中，优先考虑内容对等。

1.词汇对等：一个词的意义在于它在语言中的用法，在目的语找到对应的意义。

2.句法对等：译者不仅要清楚目的语言有没有这种结构，而且要明白这种结构的使用频率。

3.篇章对等：在进行语篇分析时不能只分析语言本身，而要看语言是怎样在特定的语境中体现意义和功能。

（1）上下文语境：在语言上下文分析的基础上，判断语义，然后进行语义的翻译转化。

（2）情景语境：具体的参与交际的人和事,交际渠道以及参与者之间的相互关系和心理情感。

（3）文化语境：语言运用的社会文化背景，历史文化传统以及社会背景。

4.文体对等：不同文体的翻译作品有着各自独特的语言特征。只有在同时掌握源语和目的语两种语言特征，且能熟练运用两种语言的情况下，译者才能创造出真实体现源语风格的翻译作品。

供稿 freya 不是肥鸭（网名）

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