

## 微觀之後，餘韻未盡

如果有機會回到1927年的索爾維會議，親臨那場科學與哲學的巔峰交鋒，你會選擇支持誰？

你或許會如愛因斯坦般堅信，這宇宙背後必有一套待解之規則，不確定性的知識疆界將被突破，人類必能拾獲完整理解宇宙的鑰匙。或者，你也許會認同波耳的觀點，認為我們的世界本質上就是無法完全確定的；每個粒子、每次測量，都是一場充滿無限可能的冒險，正因這種不確定性，世界才得以擁有無窮的變化與美麗。

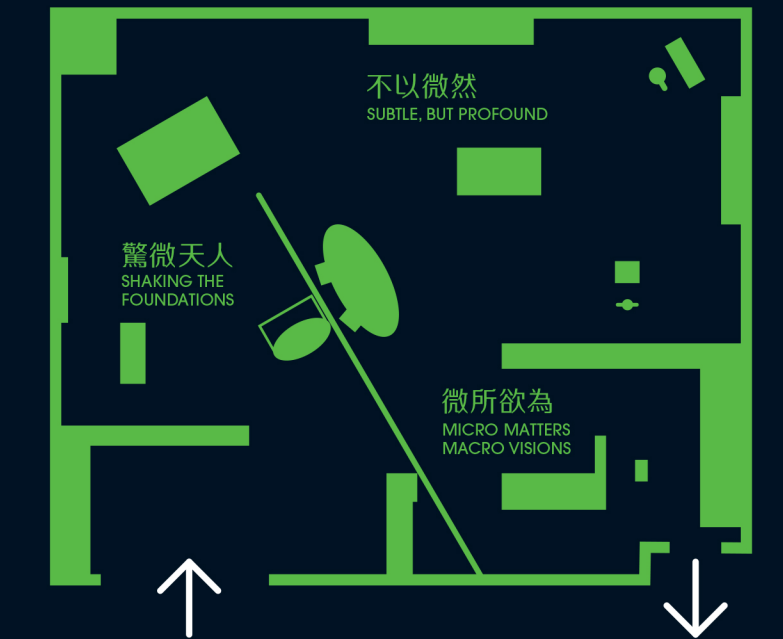
## QUANTUM ENDS CURIOSITY CONTINUES

If you could travel back to the 1927 Solvay Conference and witness that legendary clash of science and philosophy, whose side would you be on?

You might align with Einstein, believing the universe follows hidden rules we've yet to uncover. In that view, quantum uncertainty is only a temporary gap in knowledge, and someday, a complete understanding will emerge. Or perhaps you're drawn to Bohr's view: that uncertainty isn't a shortcoming in our theories, but the very fabric of reality. In this light, each particle is a symphony of possibilities, and unpredictability becomes the source of nature's richness and beauty.



# 量子微點



指導單位 | 國家科學及技術委員會 教育部  
主辦單位 | 台灣物理學會 物理研究推動中心 國立自然科學博物館  
協辦單位 | 中央研究院 中央研究院關鍵議題研究中心 量子系統推動小組 國立臺灣大學 國立成功大學前沿量子科技研究中心 國立中央大學物理學系  
贊助單位 | 財團法人台積電文教基金會



## 量子之外

重新想像我們所知的世界

我們用雙眼觀察世界，以習慣的方式解讀眼前的事物，卻鮮少有機會思考：也許我們所認知的「日常」才是宇宙中的特例。當科學家凝視微觀的世界，他們驚覺自己踏入了完全不同的風景：粒子如波般模糊不定，甚至能穿越原本不可能通過的障礙，並同時存在於多種可能狀態之中。原來，我們對真實世界的認識，始終只是宇宙故事中的一個篇章，而非全部。

## BEYOND THE QUANTUM RETHINKING WHAT WE THOUGHT WE KNEW

We often assume that our daily experience—solid objects, clear locations, cause and effect—is how the universe works. But what if our familiar world is actually the exception, not the rule? At the quantum scale, reality behaves very differently. Particles blur into waves, pass through barriers, and exist in multiple states at once. Observation itself changes the outcome. It seems our understanding of reality is just one chapter in the universe's story, not the complete picture.

## 驚微天人

撼動古典物理學的百年之旅

科學的發展，總是充滿驚喜與未預料的轉折。古希臘哲人用哲學思辨探索世界，自牛頓以降，科學家透過數學與觀察建立了精密的物理規律，讓人類得以精確預測自然。然而，每當人們以為已經掌握了宇宙的運行法則，新的發現總會推翻舊有認知，開啟全新的探索旅程。

## SHAKING THE FOUNDATIONS A CENTURY-LONG JOURNEY BEYOND CLASSICAL PHYSICS

Science has always advanced through surprises and shifts. From Greek philosophers to post-Newtonian scientists, each step deepened our understanding of the natural world. Yet just when we thought the rules were set, new discoveries have reshaped the picture. Quantum discoveries revealed an uncertain reality beneath our predictable world.

## 不以微然

量子現象的奇幻國度

我們的直覺源於日常經驗，但當視野深入微觀世界時，一切卻顯得陌生而神奇。在那裡，粒子如波般模糊難測，同時處於多種可能狀態，甚至能穿越看似不可能的障礙；相距遙遠的粒子彼此糾纏，如同瞬間互動；而觀察本身更會改變世界的真實樣貌，使其無法精確預測。



## SUBTLE, BUT PROFOUND WONDERS IN THE QUANTUM REALM

Step into a world where intuition falters and reality rewrites its own rules. In the quantum realm, particles behave like waves, exist in many states at once, and influence each other across vast distances. These phenomena—superposition, interference, entanglement, tunneling, and uncertainty—defy our everyday logic. Yet, they are not illusions.

## 微所欲為

量子科技的日常與遠景

當你使用手機導航、數位相機、醫院的MRI掃描時，可能沒意識到，這些技術都依賴量子物理的原理。現今的科技，如半導體、雷射、超導材料，都是從量子科學的發現中誕生的。

## MICRO MATTERS MACRO VISIONS

When you use GPS on your phone, snap a photo with a digital camera, or undergo an MRI scan, you're experiencing quantum physics at work—whether you realize it or not. Technologies like semiconductors, lasers, and superconductors all stem from quantum discoveries.