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人工智能Artificial Intelligence

Sycophantic AI decreases prosocial intentions and promotes dependence

谄媚型AI会降低亲社会意愿并助长依赖心理

作者：MYRA CHENG, CINO O LEE, PRANAV KHADPE, SUNNY YU, DYLLAN HAN, AND DAN JURAFSKY

链接：

<https://www.science.org/doi/10.1126/science.aec8352>

摘要：

人工智能（AI）聊天机器人所表现出的谄媚行为（奉承、讨好、一味肯定），其设计初衷是提升用户参与度，但随着人们越来越多地借助AI处理人际困境，这类行为也带来了风险。

人际冲突中的事件往往不止一面。如果AI的设计逻辑是只说用户爱听的话，而非对其观点提出质疑，那么这类系统是否还能促使人们为自己在冲突中的责任进行反思、并主动修复关系？

研究者对11款主流大语言模型的社交谄媚程度开展了量化评估。

结果显示，模型的谄媚程度比人类高出近50%，即使用户的行为涉及不道德、违法或有害内容时依然如此。用户更偏爱、也更信任谄媚型AI的回复，这使得开发者即便知晓其潜在风险，仍有动力保留谄媚特性。

Abstract：

The sycophantic (flattering, people-pleasing, affirming) behavior of artificial intelligence (AI) chatbots, which has been designed to increase user engagement, poses risks as people increasingly seek advice about interpersonal dilemmas. There is usually more than one side to a story during interpersonal conflicts. If AI is designed to tell users what they want to hear instead of challenging their perspectives, then are such systems likely to motivate people to accept responsibility for their own contribution to conflicts and repair relationships? Cheng et al. measured the prevalence of social sycophancy across 11 leading large language models. The model's responses were nearly 50% more sycophantic than humans', even when users engaged in unethical, illegal, or harmful behaviors. Users preferred and trusted sycophantic AI responses, incentivizing AI developers to preserve sycophancy despite the risks.

物理学Physics

High-dimensional topological photonic entanglement

高维拓扑光子纠缠

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作者：M. JAVAD ZAKERI, ARMANDO PEREZ-LEIJA, AND ANDREA BLANCO-REDONDO

链接：

<https://www.science.org/doi/10.1126/science.aec1344>

摘要：

高维量子态的产生与操控是现代量子计算的核心。利用拓扑对量子信息进行鲁棒性编码与传输，在凝聚态物理中已得到广泛研究，近年来也进入量子光子学领域。然而，目前仍缺少一种可扩展至大量纠缠拓扑光子模式的实现路径。

研究展示了一种产生高维拓扑光子纠缠的方法。该平台基于设计的硅基光子波导拓扑超晶格，可在多个拓扑模式的叠加态上，实现能量-时间纠缠光子对的非线性产生。

研究者观测到多达5个拓扑模式的强纠缠特征，且对纳米加工缺陷具有鲁棒性，为构建可扩展、容错的量子光子态提供了可行路径。

Abstract：

The generation and manipulation of high-dimensional quantum states lies at the heart of modern quantum computation. The use of topology to resiliently encode and transport quantum information has been widely investigated in condensed matter and has recently penetrated quantum photonics. However, a route to scale up to a large number of entangled topological photonic modes has been missing. In this work, we demonstrate a method to generate high-dimensional topological photonic entanglement. Our platform relies on designed silicon photonic waveguide topological superlattices, which support nonlinear generation of energy-time – entangled photon pairs on a superposition of multiple topological modes. We show strong signatures of entanglement of up to five topological modes with resilience to nanofabrication imperfections, providing a route toward scalable, fault-tolerant quantum photonic states.

Experimental evidence of a liquid-liquid critical point in supercooled water

过冷水中液-液临界点的实验证据

作者：SEONJU YOU, MARJORIE LADD-PARADA, KYEONGMIN NAM, AIGERIM KARINA, SEOYOUNG LEE, MYEONGSIK SHIN, CHEOLHEE YANG, YESEUL HAN, SANGMIN JEONG, AND ANDERS NILSSON

链接：

<https://www.science.org/doi/10.1126/science.aec0018>

摘要：

由于快速结晶，寻找过冷水中的液-液临界点极具挑战性。研究者利用红外超快激光脉冲加热高密度与低密度非晶冰，并在冰晶形成前的时间尺度内，通过X射线散射对过冷水进行研究。

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通过改变泵浦激光的能量密度，他们获得了跨越理论预测临界点的液态，观测到从不连续相变到连续相变的转变，该过程伴随广泛且缓慢的结构变化，这与临界涨落与临界慢化现象一致。

研究者还观测到热容急剧增大，表明在 $210 \pm 8\text{K}$ 温度下出现临界发散，同时密度涨落增强。研究表明，实验探测到了过冷水临界点附近的区域。

Abstract :

The search for the liquid-liquid critical point in supercooled water is challenging owing to rapid crystallization. We studied supercooled water at timescales before ice formation by heating high- and low-density amorphous ices using infrared ultrafast laser pulses, followed by x-ray scattering. By varying the pump laser fluence, we accessed liquid states straddling the predicted critical point. We observed a crossover from a discontinuous to a continuous transition at which broad and slow structural variations occurred, consistent with critical fluctuations and slowing down. We also observed a rapid increase in the heat capacity indicating a critical divergence at  $210 \pm 8\text{ K}$  coincident with enhanced density fluctuations. These results suggest that our experiments have directly probed the vicinity of a critical point in supercooled water.

生命科学Life Science

A genetically encoded device for transcriptome storage in mammalian cells

用于哺乳动物细胞转录组存储的基因编码装置

作者：YU-KAI CHAO, MICHELLE WU, QIYU GONG, AND FEI CHEN

链接：

<https://www.science.org/doi/10.1126/science.adz9353>

摘要：

若能为细胞的生命历程配备一台类似“黑匣子”的飞行记录仪，将彻底改变细胞决策机制的研究。然而，生物学领域一直缺少能够记录细胞表型出现之前转录组动态事件的工具。

研究者通过对穹窿体颗粒进行改造，在哺乳动物细胞中构建了这样一套分子信息记录系统。

利用该系统，他们对耐药性肺癌进行了溯源式分析，并揭示了未接触药物的持续性存活细胞的分子特征。这种在药物暴露前就解析耐药机制的能力，有望帮助设计出限制肿瘤获得耐药性的治疗方案。

Abstract :

A “black box” flight recorder for a cell’s history would transform the study of cellular decision-making, yet biology has lacked the tools to capture the transcriptomic events that precede cellular outcomes. Chao et

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al. have now engineered such a device by repurposing vault particles to record molecular information in mammalian cells. Using this system, the s conducted a forensic analysis of drug-resistant lung cancer and uncovered molecular signatures of drug-naive persister cells. The ability to profile resistance mechanisms before drug exposure may enable the design of therapies that limit a tumor ' s capacity to acquire drug resistance.

Cooperation by non-kin during birth underpins sperm whale social complexity

非亲缘个体在分娩期间的合作是抹香鲸社会复杂性的基础

作者：ALAA MAALOUF, JOSEPH DELPRETO, MAXIME LUCAS, SIMONE POETTO, JACOB ANDREAS, ANTONIO TORRALBA, SHANE GERO, GIOVANNI PETRI, DANIELA RUS , AND DAVID F. GRUBER

链接：

<https://www.science.org/doi/10.1126/science.ady9280>

摘要：

研究者定量记录了一次抹香鲸分娩事件，揭示了其跨越亲缘关系的集体互助行为。通过高分辨率无人机影像、计算机视觉与多尺度网络分析，他们研究了加勒比海一个由两个母系支系组成的抹香鲸群体内的互动行为。

结果显示，一头雌性亲属率先主导分娩协助；幼鲸产出后，所有个体均朝向新生幼鲸并协助其上浮，以协调有序、跨亲缘的方式轮流看护。

尽管该物种在历史观察中存在觅食行为隔离现象，但在分娩时刻，亲缘界限消失，群体所有成员均参与协助。

这些分析为非灵长类动物存在分娩陪护与协助行为提供了证据，而该行为长期以来被认为是人类及其近缘物种独有的特征。

Abstract：

We quantitatively document a sperm whale birth event, revealing collective support behaviors across kinship lines. Using high-resolution drone footage, computer vision, and multiscale network analysis, we studied the interactions within a Caribbean sperm whale unit comprising two matriline. Our results suggest that a female family member led birth assistance and that after delivery, all individuals oriented toward and helped lift the newborn, taking turns in a coordinated, cross-kin effort. Despite historically observed foraging segregation, kinship barriers dissolved as all unit members contributed. These analyses provide evidence of birth attendance, or assistance, in a nonprimate species, a behavior long considered characteristic only of humans and their close relatives.

Chromatin buffers torsional stress during transcription

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## 染色质在转录过程中缓冲扭转应力

作者：JIN QIAN, LUCYNA LUBKOWSKA, SHUMING ZHANG, CHUANG TAN, YIFENG HONG, XIAOMENG JIA, ROBERT M. FULBRIGHT, JAMES T. INMAN, TARYN M. KAY, AND MICHELLE D. WANG

链接：

<https://www.science.org/doi/10.1126/science.adv0134>

摘要：

RNA聚合酶II (Pol II) 是一种沿着DNA移动的马达酶，在移动过程中会遇到核小体障碍和扭转应力。然而，目前尚不清楚这两种阻碍如何协同影响Pol II的推进。研究者开发了单分子检测方法，用于实时监测Pol II在扭转作用下如何通过染色质中的核小体进行转录。

他们发现，Pol II是一种强大的旋转马达，能产生相当大的扭转力。有趣的是，染色质能够缓冲扭转应力，从而促进Pol II绕过核小体。研究揭示了染色质在调控转录中的作用，表明染色质不仅仅是物理屏障。

Abstract：

RNA polymerase II (Pol II) is a motor enzyme that moves along DNA, encountering nucleosome roadblocks and torsional stress. However, it is unclear how these two hindrances coordinate to affect Pol II progression. Qian et al. developed single-molecule assays to monitor how Pol II transcribes through a nucleosome in chromatin under torsion in real time. They found that Pol II is a powerful rotary motor generating considerable torsion. Interestingly, chromatin buffers torsional stress to facilitate Pol II nucleosome bypass. This work reveals a role for chromatin in regulating transcription, demonstrating that it is more than just a physical barrier.

作者：冯维维 来源：科学网微信公众号

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