



Inspired by a solar eclipse: *Prince Igor*, coming to the New York Metropolitan Opera in February.

CULTURE

Top tickets for 2014

It promises to be a heady year for science in culture: fans can steep in the sumptuous world of colour, unpeel the upside of failure, explore neural pathways, revisit the First World War, mend a rip in space-time, go pterosaur-spotting and traverse a mammoth-ridden nation. **Daniel Cressey** investigates.

Prince Igor

Metropolitan Opera House, New York
Premiere 6 February

The cosmic quest to comprehend the Universe has provided rich metaphorical pickings for drama, as Bertolt Brecht's play *Life of Galileo* and Philip Glass's opera *Kepler* attest. Nineteenth-century Russian composer, chemist and physician Alexander Borodin also looked to the skies — specifically, a solar eclipse — for inspiration. The result is the opera *Prince Igor*, based on the epic story of the twelfth-century monarch. Playing at New York's Metropolitan Opera House for the first time in almost a century, the production is directed by Dmitri Tcherniakov and conducted by Gianandrea Noseda. Ildar Abdrazakov stars in the title role.

Fail

Dublin Science Gallery
7 February – 27 April

Should we do more to celebrate failure? Contributors to this exhibition at the Dublin Science Gallery would like us to. Curated by Jane Ni Dhulchaointigh, the Irish inventor of the silicone rubber Sugru — used for everything from fixing to sculpting — the show features 21 objects selected by household names in fields including science and engineering. The items personify the failure survived or exploited by these individuals on their way to success. Be prepared to re-examine flops and losing streaks and, as Irish playwright Samuel Beckett had it, to learn how to “fail better”.

Britain: One Million Years of the Human Story

Natural History Museum, London
13 February – 28 September

About 900,000 years ago, mammoths lumbered through what is now Kensington in central London — along with the first early humans to reach Britain. A portal to that distant world opens in mid-February at the Natural History Museum. The exhibition showcases landmark findings from the Ancient Human Occupation of Britain project, a collaboration between palaeontologists, archaeologists and geologists to craft a calendar of early human activity across the isles. Bringing together objects such as the world's oldest wooden spear and the skull of Britain's earliest known Neanderthal, the show will reveal a bigger picture — waves of humans arriving over the tumultuous millennia of the Pleistocene period, only to be beaten back repeatedly by glaciations.

Pterosaurs: Flight in the Age of Dinosaurs

American Museum of Natural History, New York
5 April 2014 – 5 January 2015

The most terrifying beasts (and the earliest vertebrates) ever to take to the air will throng a vast gallery in a temporary exhibition at

Pterosaurs such as *Tupandactylus* ruled the skies in the Cretaceous period.



AMINH

the American Museum of Natural History. Pterosaurs, the flying reptiles that dominated the airspace from 220 million to 65 million years ago, will be explored through fossils, models and interactive displays, and contrasted with bats, birds and other animals that have evolved the remarkable ability to fly. This family-oriented show will celebrate these animals, which had wingspans that could — in the case of *Quetzalcoatlus northropi* — exceed 10 metres.

Transcendence

Director Wally Pfister
Opens 18 April

The idea of the 'technological singularity' has been knocking around for decades, envisioned by mathematician John von Neumann and futurists including Ray Kurzweil as the moment when advances in artificial intelligence tip humanity into a radical new mode of being. In this much-anticipated science-fiction blockbuster

directed by Wally Pfister, that techno-epiphany reportedly arrives when a computer scientist uploads the brain of her assassinated husband, an artificial-intelligence researcher, into a computer. Does this brave new consciousness herald utopia or dystopia? Rebecca Hall, Johnny Depp and Morgan Freeman star.

Colour

National Gallery, London
18 June – 7 September

From ochre to neon optics, colour has obsessed visual artists from prehistory on, although its maintenance has troubled conservators since at least the nineteenth century. In the National Gallery's 700-year overview of hue in paintings, glass, textiles and ceramics — which includes substantial input from the gallery's groundbreaking science department — the experimentation of colourists from the early Renaissance to the Impressionist era forms the base layer. The show explores the production of pigments, from the grinding of minerals to the formulation of acrylic polymers, as well as the challenges in rendering colours. The trade routes that brought pigments

from caravan to canvas provide a fascinating historical context.

The Valley of Astonishment

Young Vic, London
20 June – 12 July 2014

Theatrical legend Peter Brook has long been inspired by the wilder shores of neurology and mystical Islam. In *The Valley of Astonishment*, Brook and co-director Marie-Hélène Estienne mix the two. True stories of people with synaesthesia — a neurological condition in which the senses are mixed, so colours might be tasted or heard — are woven



YOUNG VIC

into elements from the Sufi poet Attar's sublime twelfth-century epic *The Conference of the Birds*, from which the play's title derives. The formidable cast includes Kathryn Hunter and Marcello Magni.

From Atlantis to Today: Person, Nature, Catastrophes

Reiss-Engelhorn Museum, Mannheim, Germany
7 September 2014 – 1 March 2015

Why do we mythologize catastrophes? This major exhibition takes as its unusual theme how different cultures have responded to natural disasters from antiquity until the present day. Simulations allow visitors to experience the sensations of the stranded as, for instance, Hurricane Katrina hammered and flooded New Orleans in 2005. And hundreds of objects related to disaster are on display, including a statue of Roman emperor Titus Augustus, who helped Pompeii's survivors after the AD 79 eruption of Vesuvius buried the town, and was then condemned by the populace for supposedly triggering the disaster.

Grand reopening

Wellcome Collection, London
October

After a £17.5-million (US\$29-million) expansion and refurbishment, London's Wellcome Collection — a showcase for the links between medicine, art and daily life — will emerge radically recast and with several new spaces. A thematic gallery will host long-term exhibitions — the first taking on

FOSTER + PARTNERS



A simulation of how the Imperial War Museum London's atrium will look when it opens in July.

First World War Galleries

Imperial War Museum London
Opening July

To coincide with a huge programme of events commemorating the 100th anniversary of the start of the First World War, the Imperial War Museum London is set to open these themed galleries. Through interactive digital displays, audio and objects, visitors will explore the rapid escalation in industrial production that ensured that troops were fed and armed. The galleries will also depict a soldier's daily life, from psychological trauma to grappling with military technologies such as tanks and aeroplanes. The museum's refurbished atrium will display big hardware including a V2 rocket, Spitfire plane and T34 tank.

► the pioneers of sex research — and the current gallery will be spruced up before relaunching in October with a show on forensics. The glorious reading room will be made open to all as a place in which objects gathered by medical collector extraordinaire Henry Wellcome keep company with rare books, art and more.

Interstellar

Director Christopher Nolan
Opens 7 November

In a future near you, societal order has collapsed and the remnants of NASA are cobbled together to investigate a tear in the fabric of the Universe. *Interstellar*, already touted as one of the big films of 2014, will be a long-awaited cinematic outing for the ideas of theoretical physicist Kip Thorne, who advised on the venture. Breaking away from the idea that space exploration is limited to the Solar System, Thorne plays with the possibility of time travel using wormholes — ‘warps’ in space-time that serve as shortcuts to distant parts of the Universe. Christopher Nolan, who bent minds with 2010’s heist-within-a-dream-within-a-dream thriller *Inception*, directs.

Russia’s Space Quest

Science Museum, London
Autumn 2014

In 2014, Russia and Britain celebrate a joint year of culture, and the programme’s flagship event will be this showing of a remarkable collection of Soviet space artefacts. Visitors will be able to savour the sight of the capsules that carried cosmonauts aloft and the rocket engines that powered them, alongside smaller items from personal memorabilia to spacesuits. A collaboration with Moscow’s Memorial Museum of Cosmonautics and

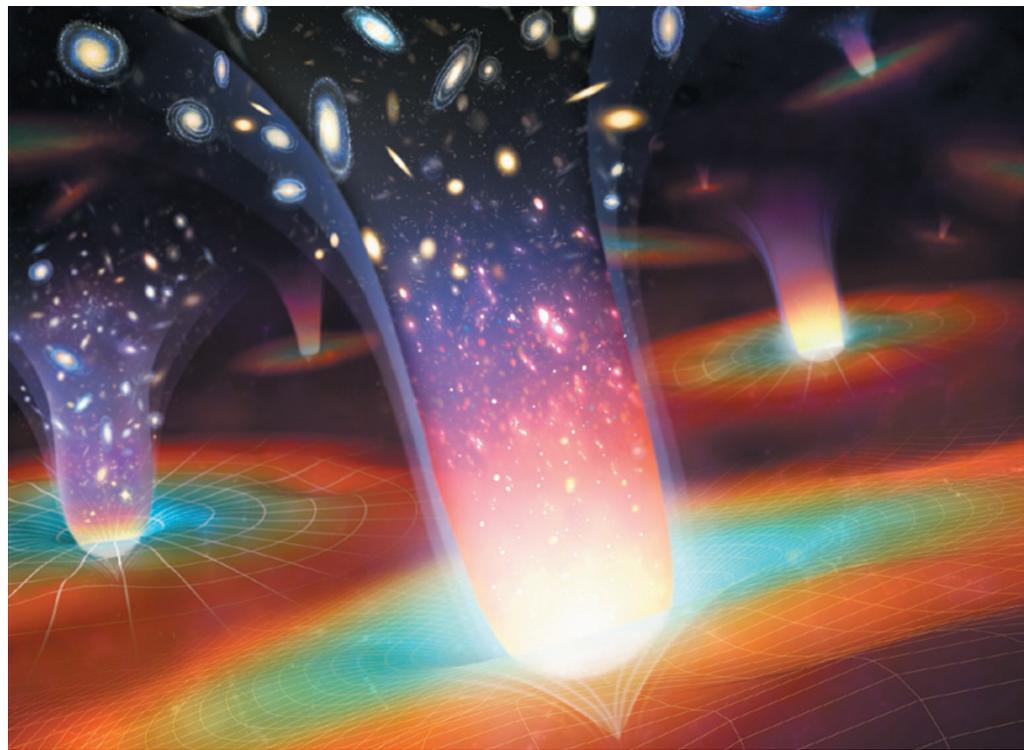
RYKOFF COLLECTION/CORBIS



Soviet propaganda celebrated the first human trip into space, by Yuri Gagarin.

the Russian space agency, Roscosmos, the show represents the most significant collection of such items ever permitted to leave Russia. ■

Daniel Cressey is a reporter for Nature in London. Additional reporting by Alison Abbott and Barbara Kiser.



PHYSICS

Chasing universes

Andrew Liddle contemplates an accomplished explication of the multiverse.

Having trouble understanding the Universe? Try this instead: imagine 10^{500} possible universes, all different, and consider our place within this ensemble. Not randomly chosen, because our location should satisfy some basic conditions, such as habitability for intelligent species able to ask about their place in the cosmos. Can such a multiverse help us to fathom our Universe?

Cosmologist Max Tegmark has written an engaging and accessible book, *Our Mathematical Universe*, that grapples with this multiverse scenario. He aims initially at the scientifically literate public, but seeks to take us to — and, indeed, beyond — the frontiers of accepted knowledge. His explication of these ideas is more ambitious and individualistic than books on this topic by Leonard Susskind and Alex Vilenkin, for instance.

Multiverse theory stands in stark opposition to the belief that there should be some reason, perhaps a Theory of Everything, that determines physical laws such as the types of particle that exist and the ways in which they interact. In the multiverse picture, it is all an accident.

➔ NATURE.COM
For more on the multiverse, see: go.nature.com/mqc2jd

Our Mathematical Universe: My Quest for the Ultimate Nature of Reality

MAX TEGMARK
Knopf: 2014.

What we know as ‘constants’ of nature, such as the strength of gravity or the proton-to-neutron mass ratio, happen to have particular values here, but in distant regions beyond our sight they may take other values and produce universes with very different properties — perhaps an absence of complex atoms and molecules, and hence of life.

Once seen as a fringe interest of dubious scientific validity, the multiverse has developed a serious following. Steven Weinberg used it in 1987 to predict that our observable Universe ought to have a non-zero cosmological constant, probably of a magnitude great enough to accommodate the acceleration of the Universe’s expansion. To everyone’s surprise, this was verified a decade later through observations of distant supernovae by two teams of astronomers. Those who led the work, Saul Perlmutter, Adam Riess and Brian Schmidt, won the 2011 Nobel Prize in Physics. Subsequently, string theory and inflationary cosmology were recognized as