

First known logograms (word signs).

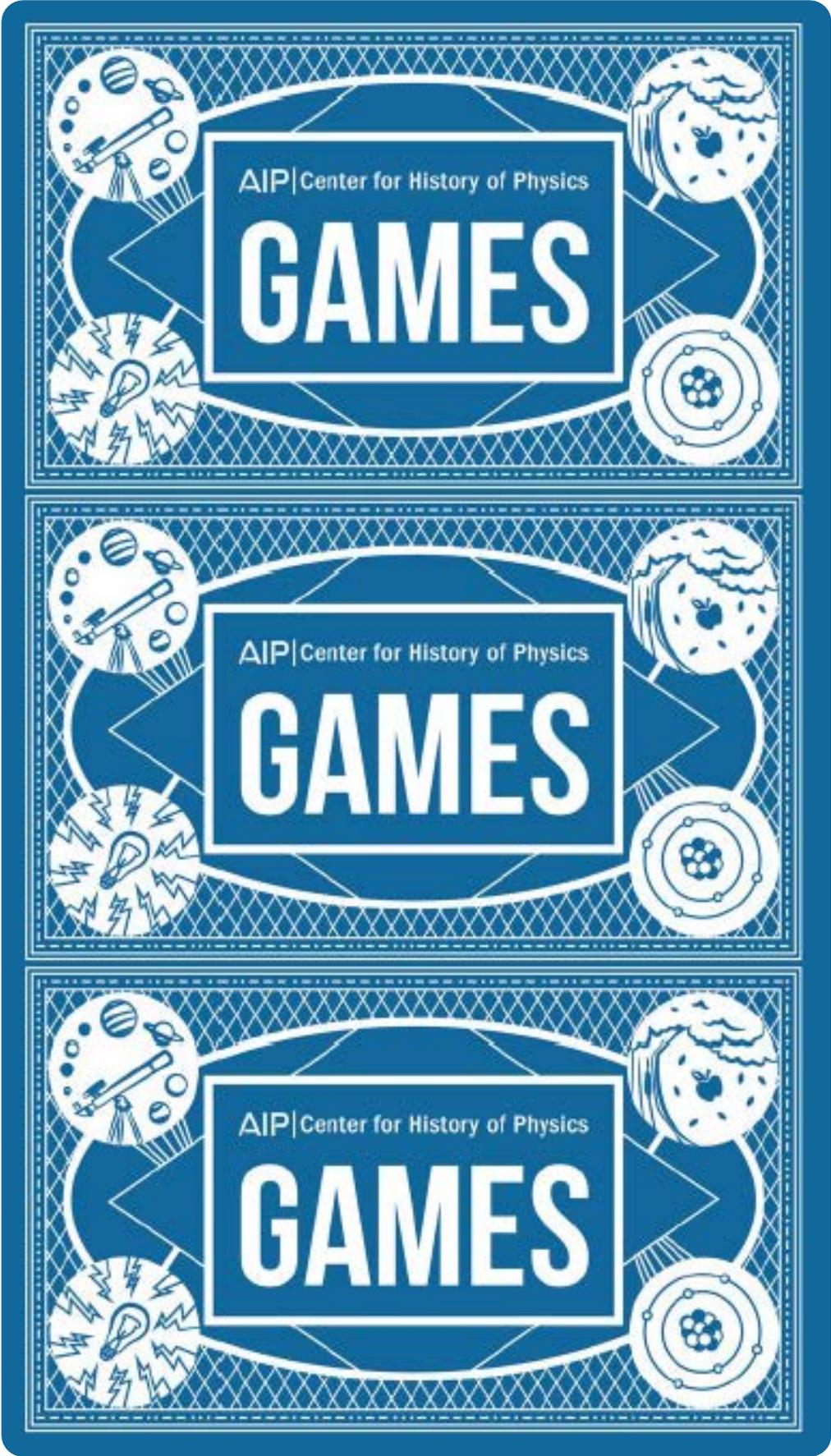
~ 3000 BCE

Babylonian decimal and sexadecimal
number system develops.

~ 2000 BCE

Earliest known records of Babylonian
astronomical observations. Hipparchus
used these observations in his own
work.

~ 1700 BCE



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Syllabic writing systems appear.

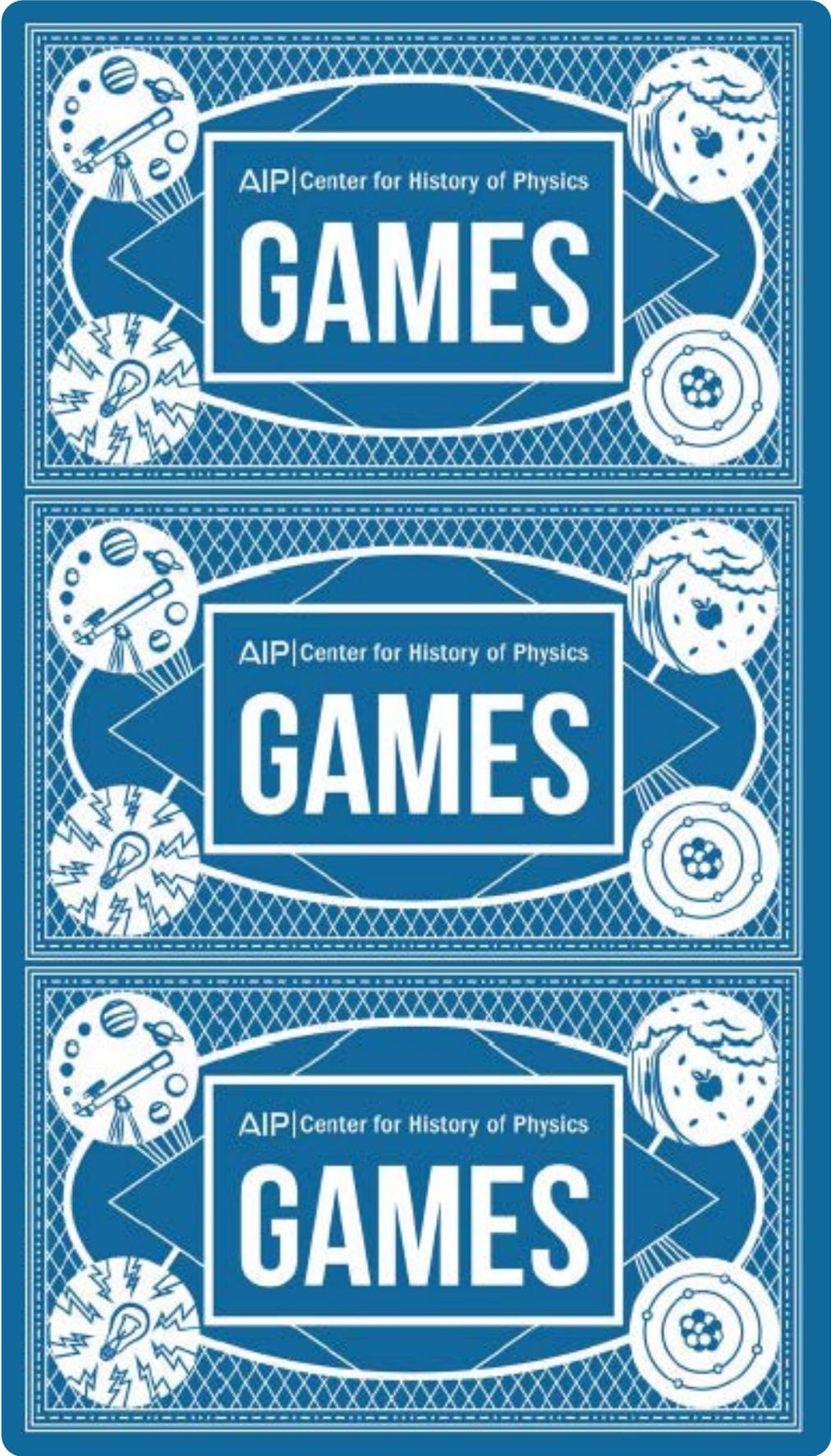
~ 1500 BCE

Fully alphabetic writing appears.

~ 800 BCE

The city of Rome is founded.

753 BCE



Homer writes *The Odyssey*.

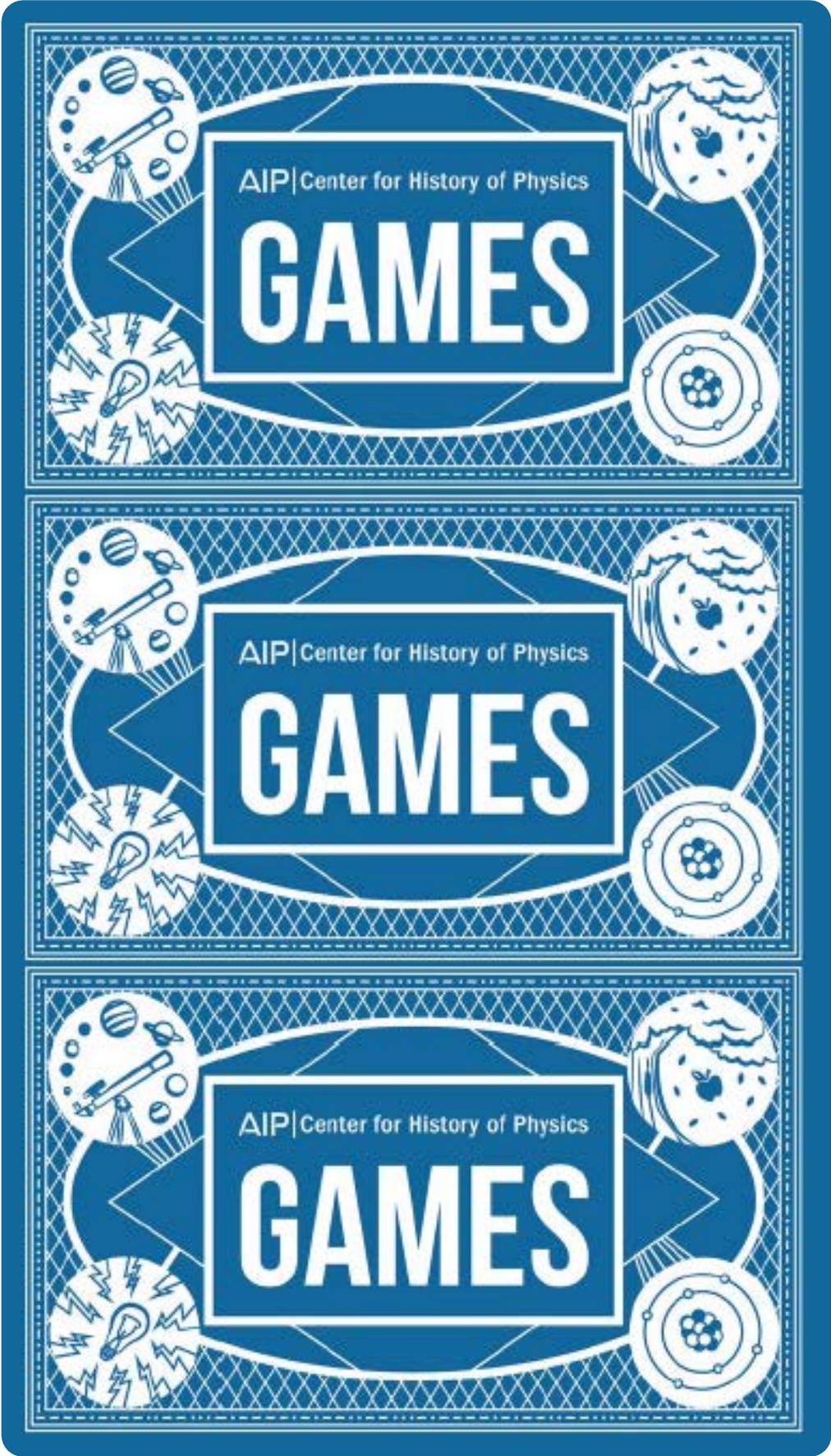
~ 700 BCE

Thales of Miletus argues that all matter is composed of water.

~ 585 BCE

Anaximander, the first known cosmologist, argues that the Earth is a disc surrounded by hollow shells. The stars are holes in the shells which allow the fire outside to shine through.

~ 555 BCE



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Empedocles of Acragas argues that all matter is composed of four elements, and that two immaterial principles (love & strife) cause change.

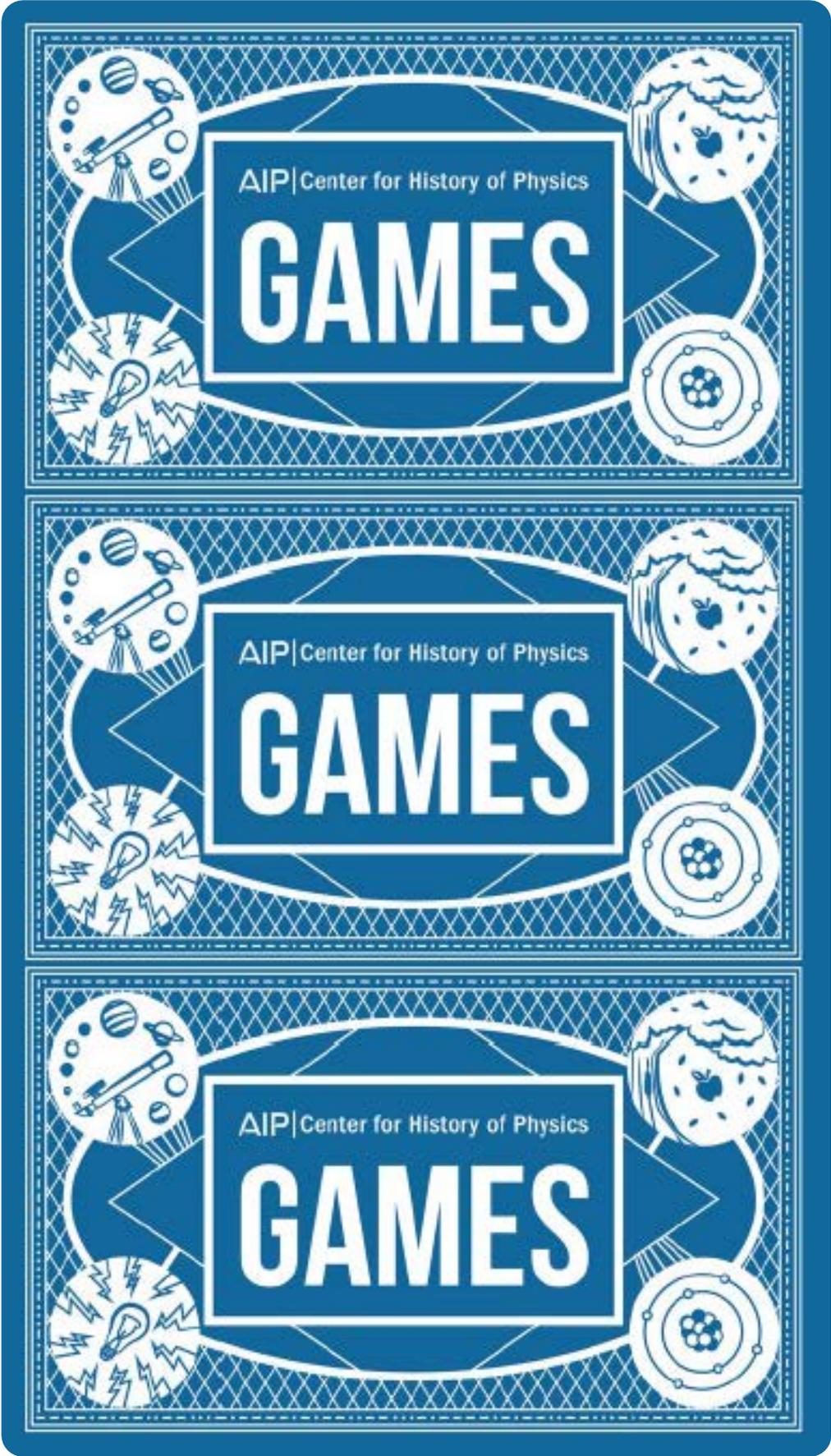
~ 450 BCE

Plato is born. He argued that the world was created on geometric principles with each element corresponding to a different geometric shape.

427 BCE

Democritus argues that the world comes from a mechanical sorting of lifeless atoms in an infinite void.

~ 410 BCE



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Socrates is executed.

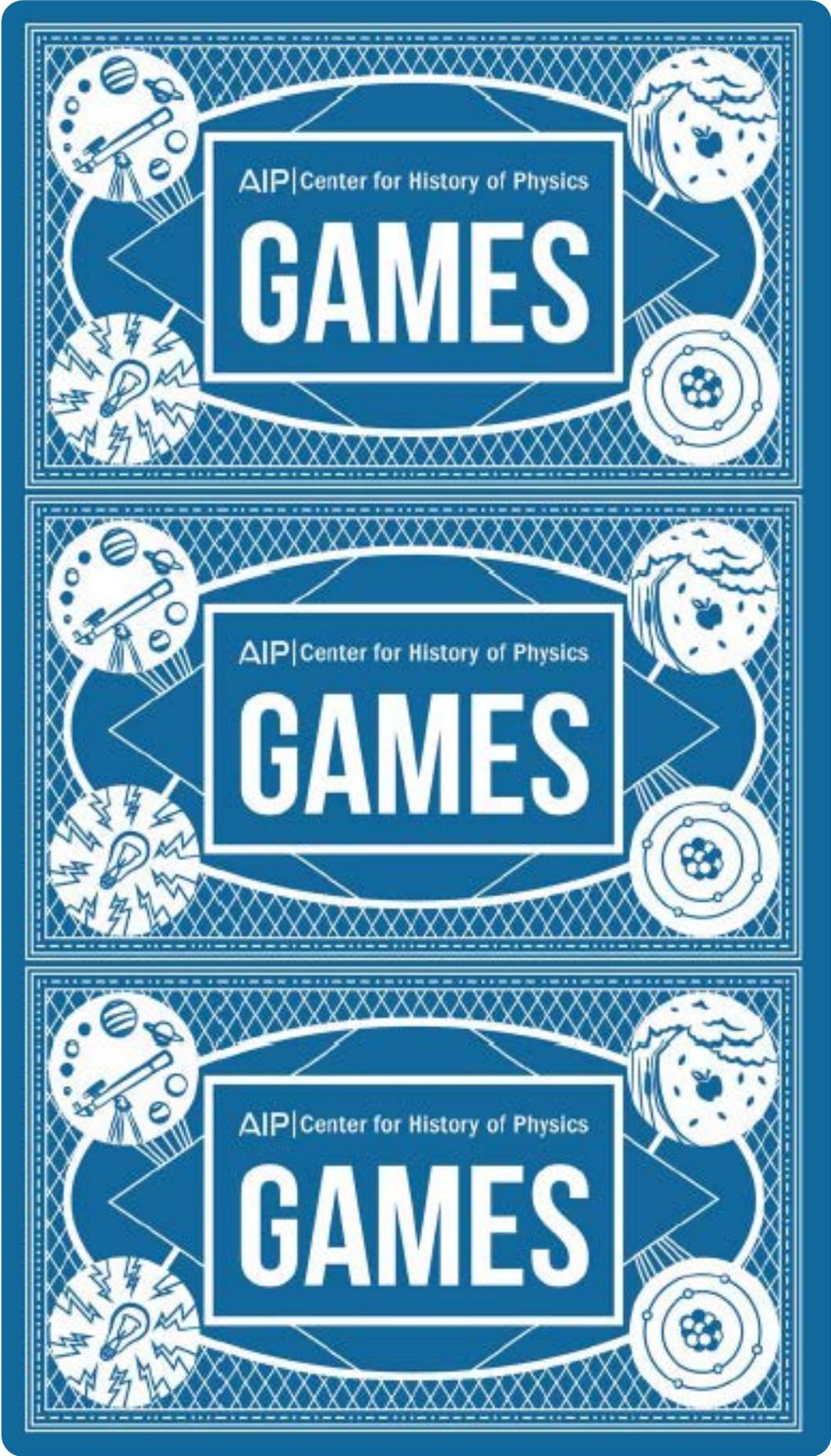
399 BCE

Heraclides of Pontus is born. He led the Academy after Plato and proposed that the Earth rotates once on its axis in 24 hours.

~ 390 BCE

Plato founds the Academy in Athens in which aspects of natural philosophy were debated.

388 BCE



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Aristotle is born. For more than a thousand years most of Western science was based on variations of his ideas of five elements and four causes.

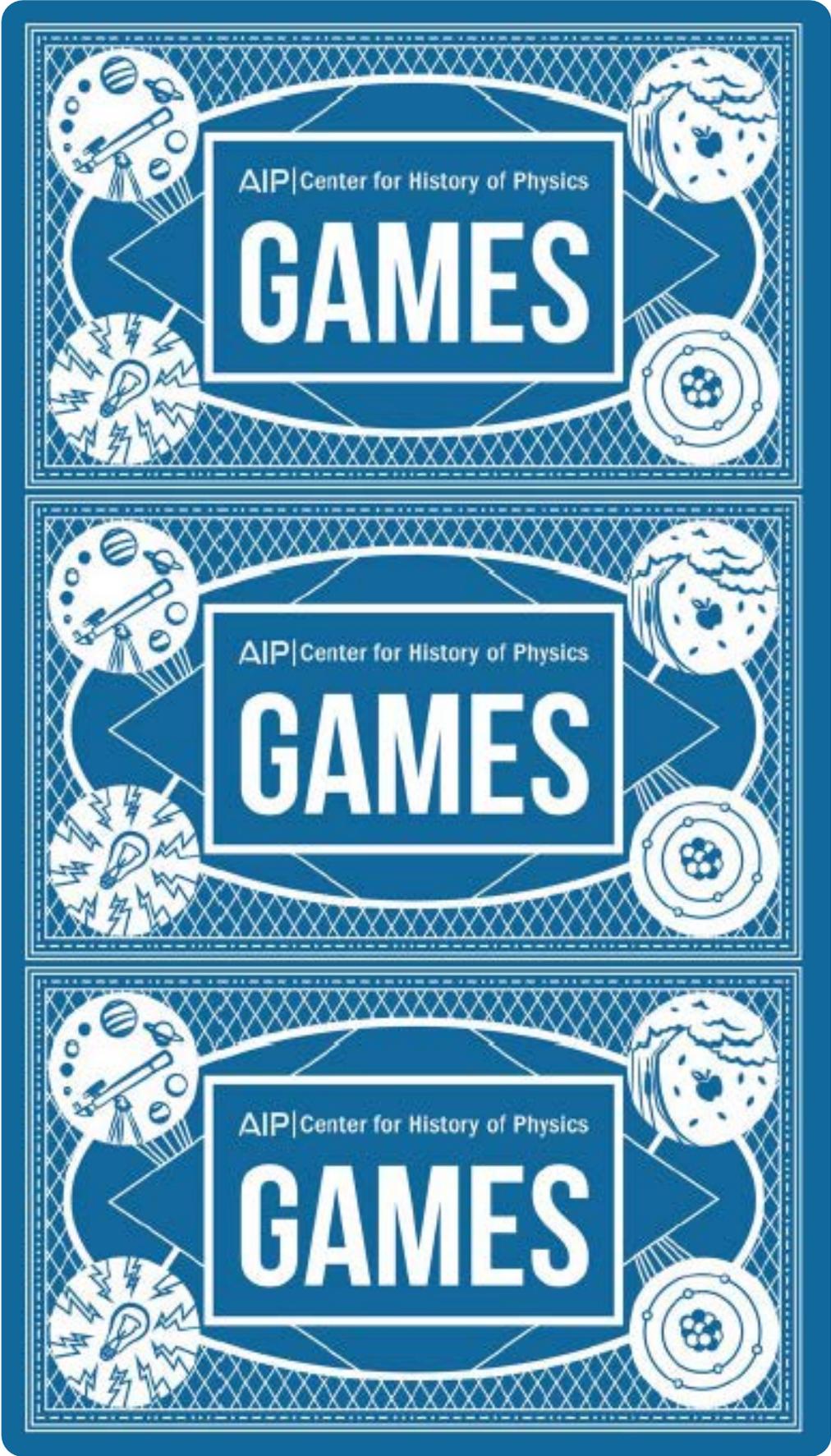
384 BCE

Alexander the Great is born. He is tutored by Aristotle.

356 BCE

Plato dies. Plato argued that the spherical earth was surrounded by a sphere of the heavens, on which the sun, stars, and planets moved.

347 BCE



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Epicurus is born. He argued for atomism.

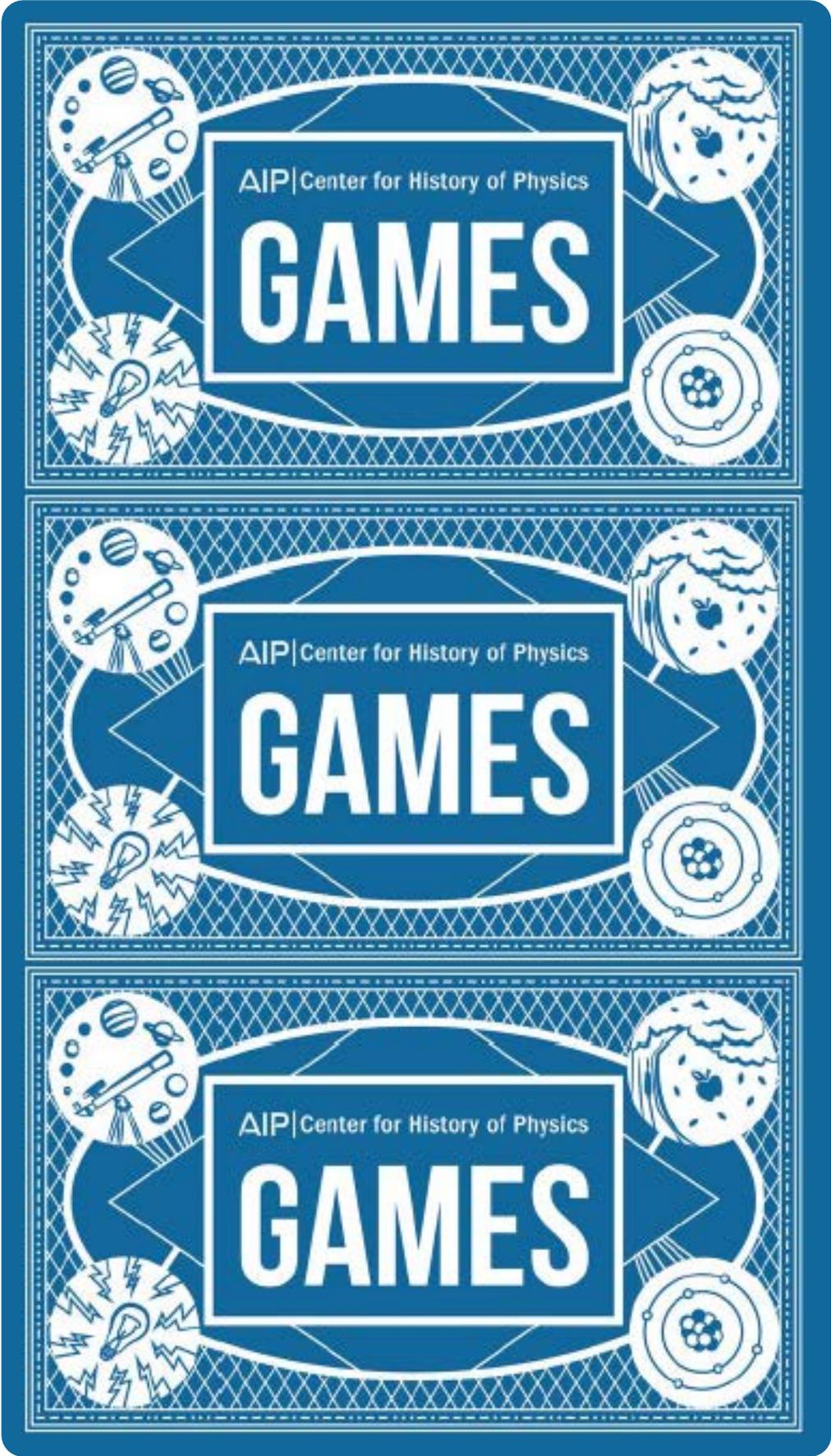
341 BCE

Eudoxus dies. He modeled the universe using 27 concentric spheres.

337 BCE

Alexandria, Egypt, is founded by Alexander the Great at the mouth of the Nile River.

331 BCE



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Alexander the Great dies. His military expansion also spread Hellenistic culture and knowledge.

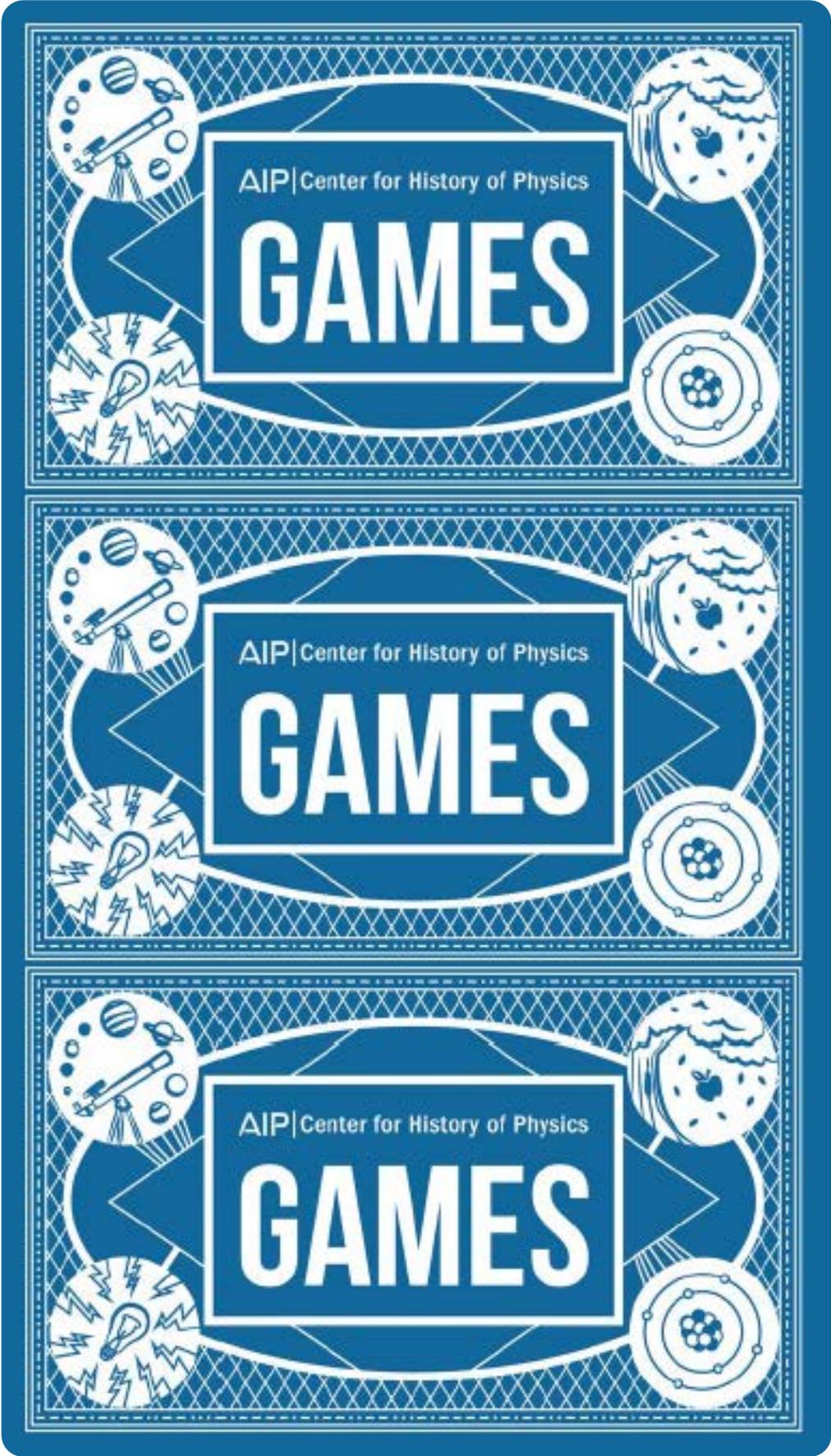
323 BCE

Aristotle dies. He argued that everything was composed of five elements: earth, water, air, fire, and aether.

322 BCE

Aristarchus of Samos proposes a heliocentric system, in which the sun is the center of the cosmos, and the Earth orbits the sun.

~ 310 BCE



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Strato of Lampsacus argues that falling bodies accelerate.

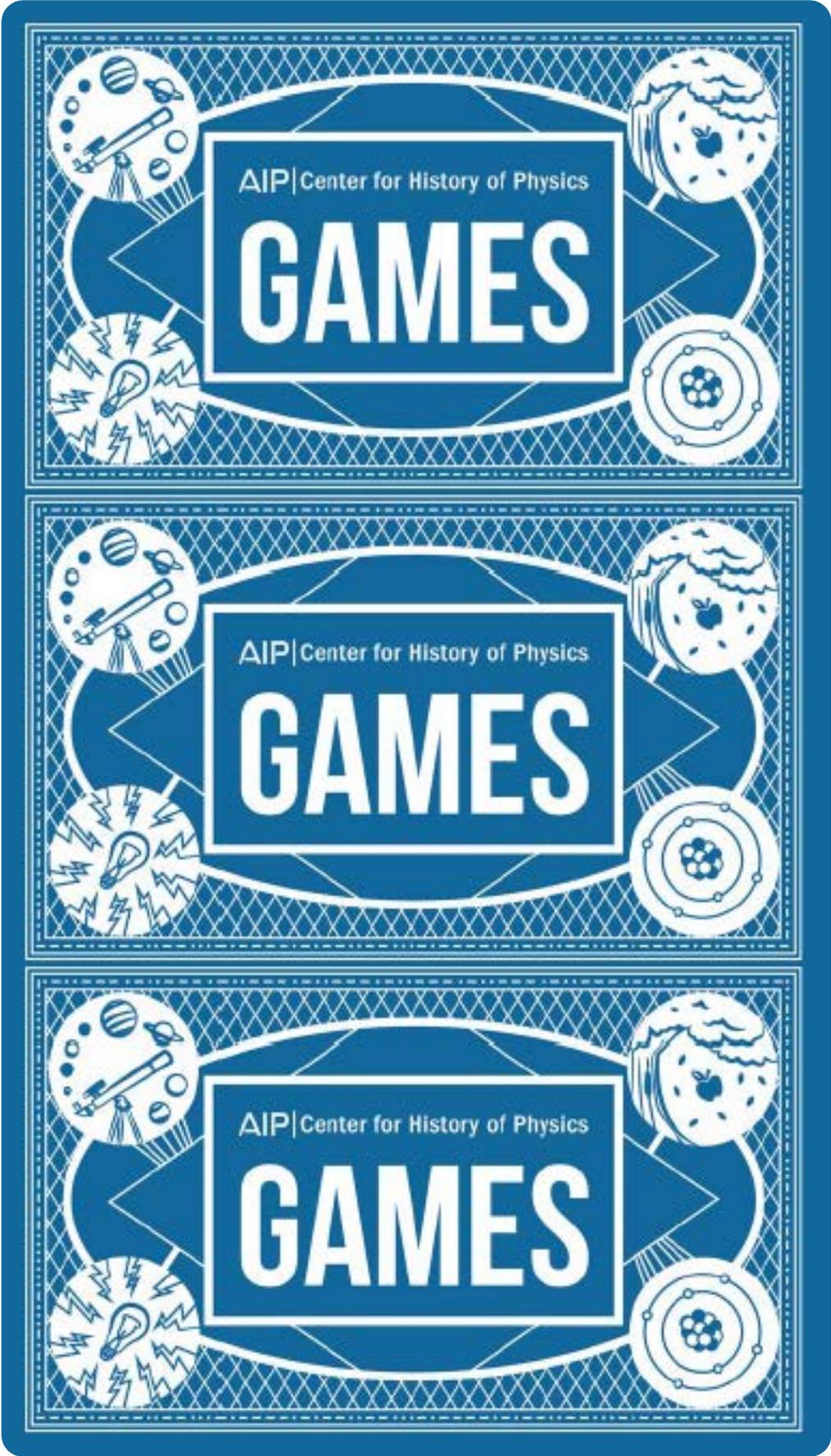
~ 300 BCE

The Museum and Library are founded in Alexandria, Egypt.

~ 300 BCE

Euclid develops principles of geometry in Alexandria, Egypt.

~ 300 BCE



Autolycus of Pitane defines a uniform motion as one in which equal distances are traversed in equal times.

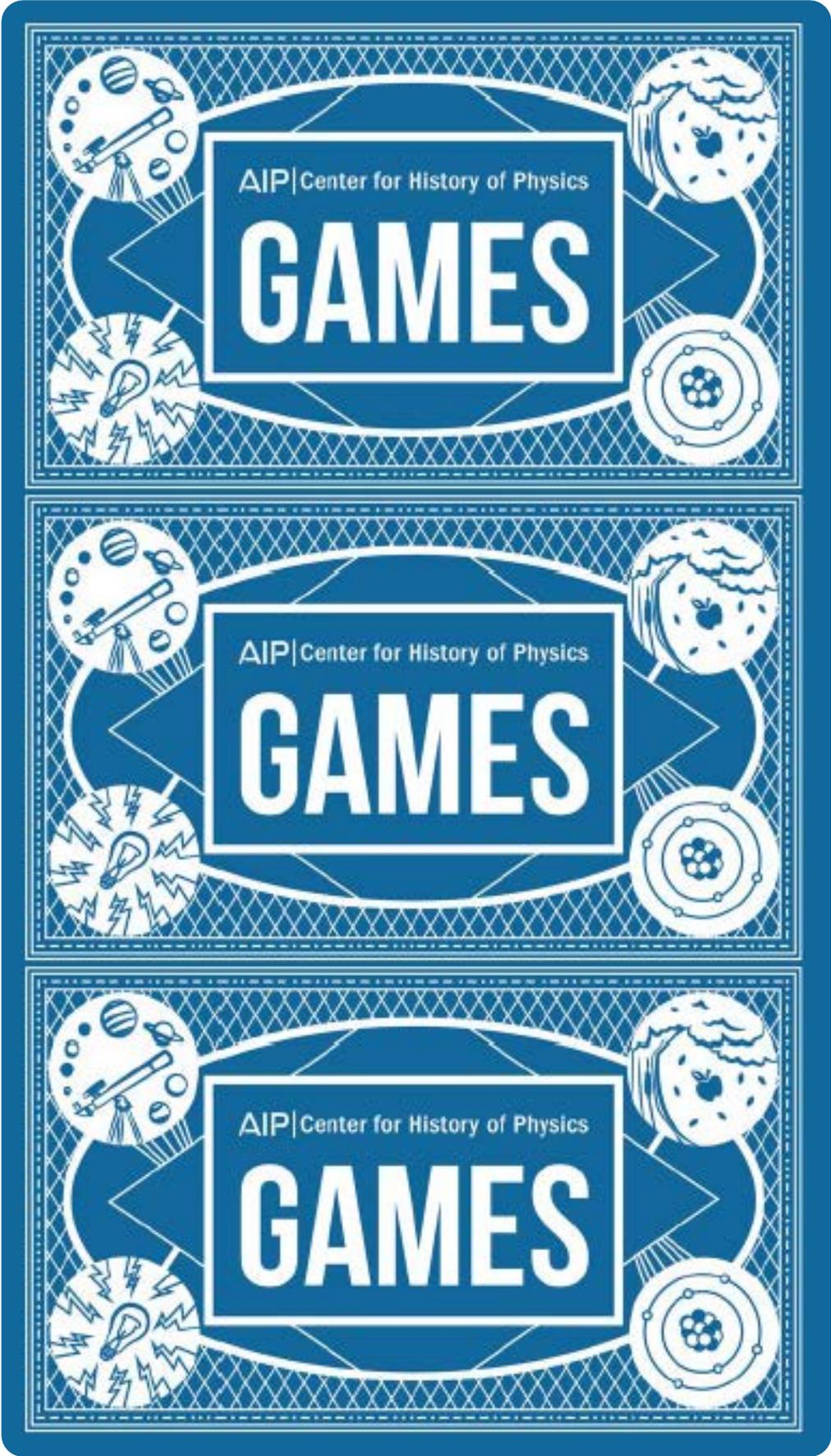
~ 300 BCE

Archimedes of Syracuse is born. He applied mathematics to physical phenomena.

287 BCE

Eratosthenes is born. He measured the circumference of the Earth.

276 BCE



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Epicurus dies. He deviated from Democritus's atomism by arguing that atoms could deviate from their expected motion, making free will possible.

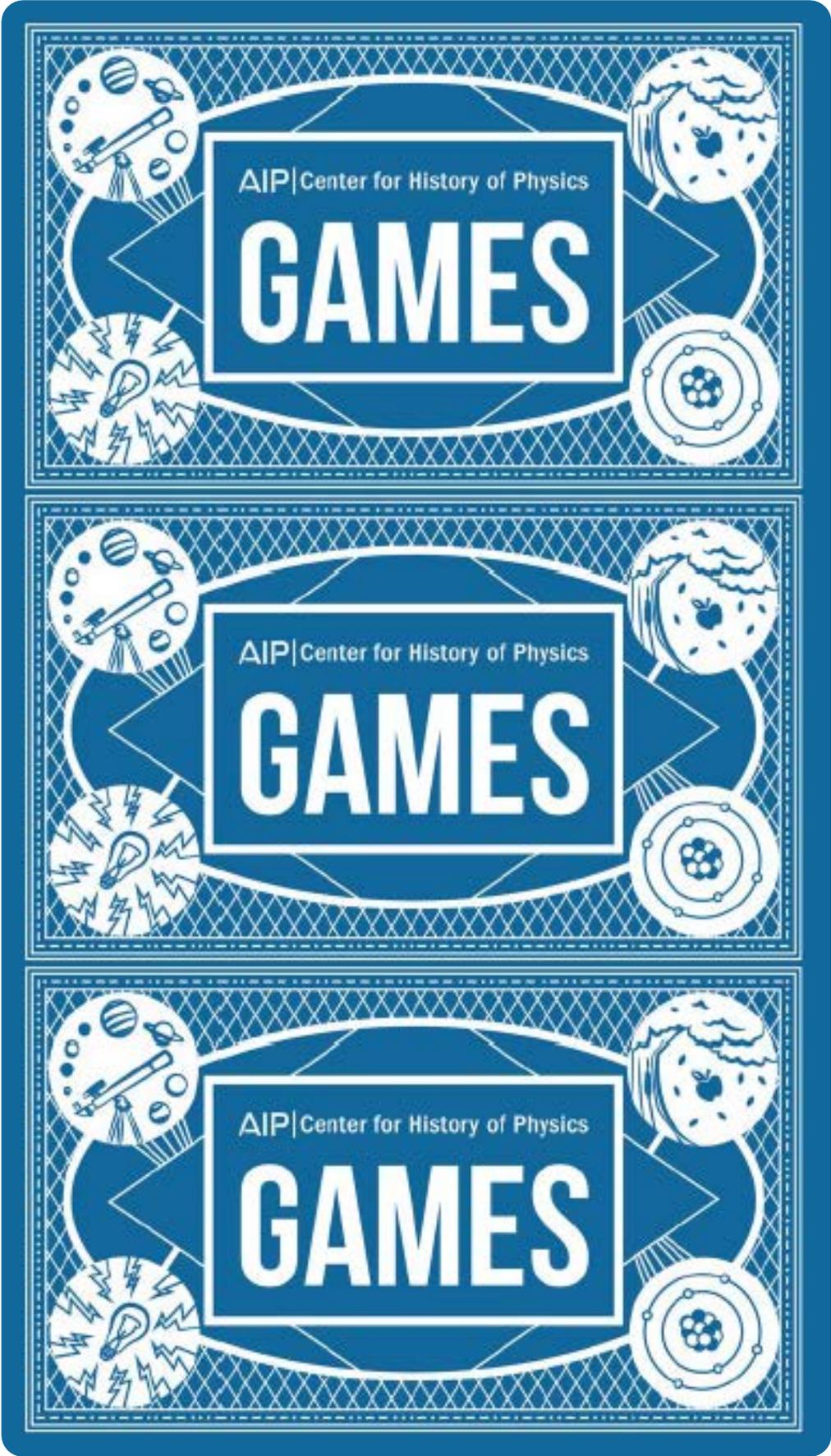
270 BCE

Archimedes of Syracuse dies. He derived an approximation of pi and explained the principle of the lever.

212 BCE

Eratosthenes dies. He measured the degree of obliquity of the ecliptic (in other words, the tilt of the Earth's axis).

~ 195 BCE



Hipparchus is born. He calculated the relative distance to the moon using a solar eclipse and measured the average length of the lunar month to within a second of the modern value.

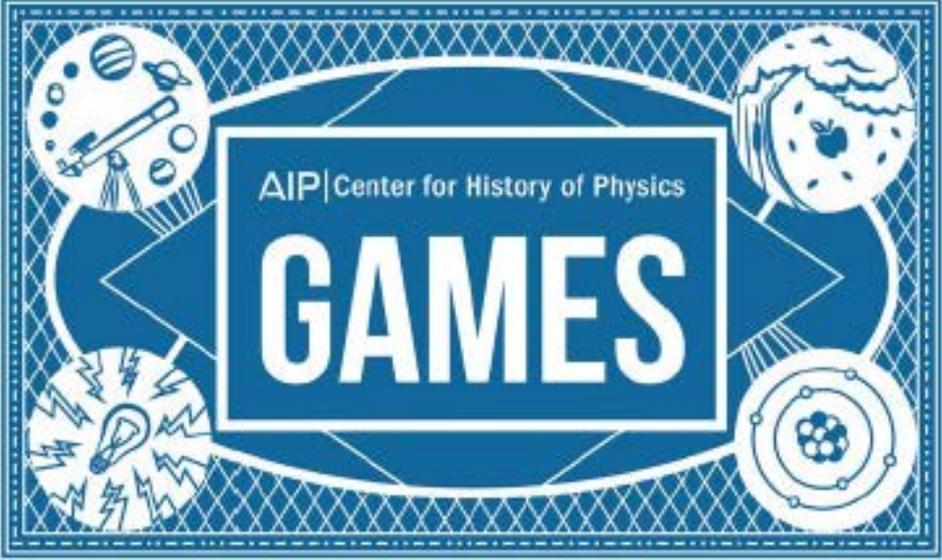
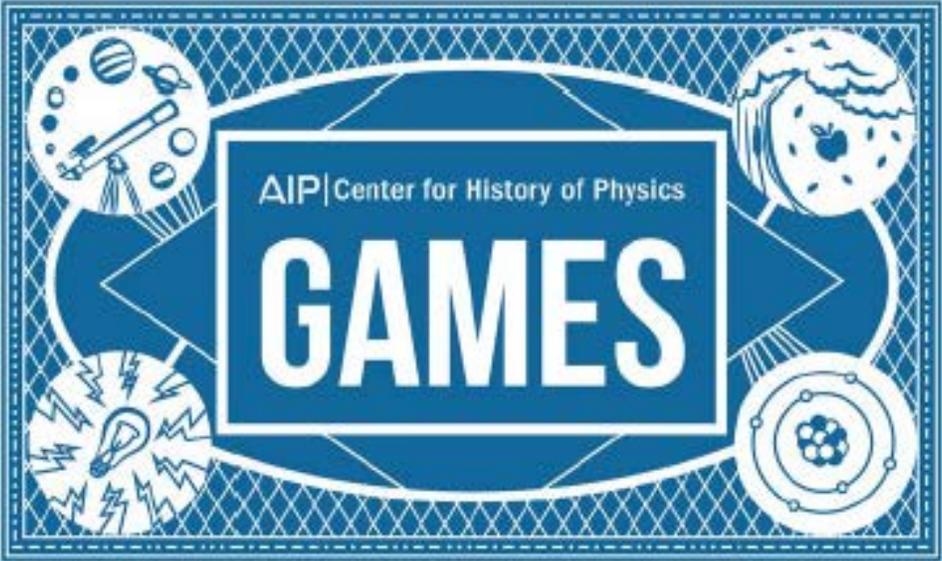
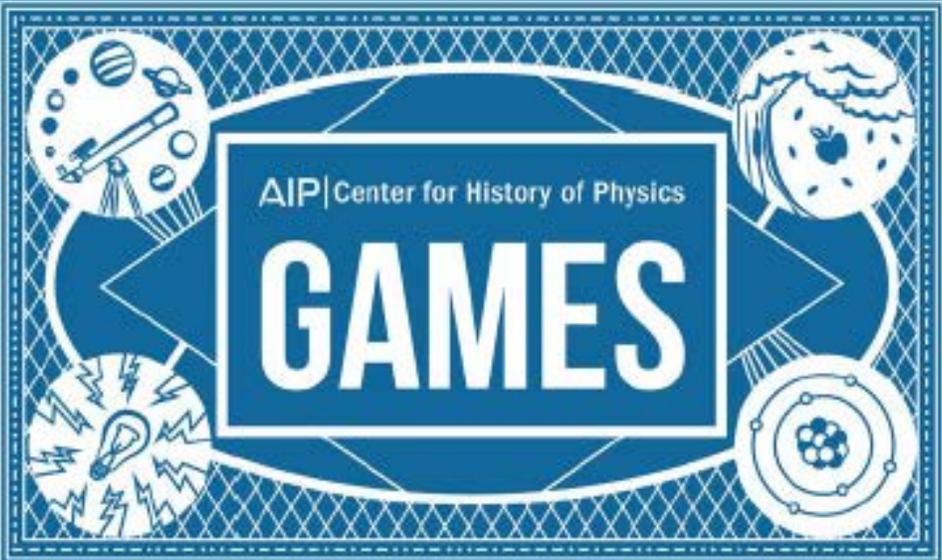
~ 190 BCE

Battle of Corinth, after which Greece comes under Roman control

146 BCE

Posidonius is born. He calculated a much worse estimate for the circumference of the Earth than Eratosthenes did. But Ptolemy picked up this value... and so did Christopher Columbus.

~ 135 BCE



Roman philosopher Lucretius writes *De Rarum Natura* about Epicurianism, including ideas about atomism and cosmology.

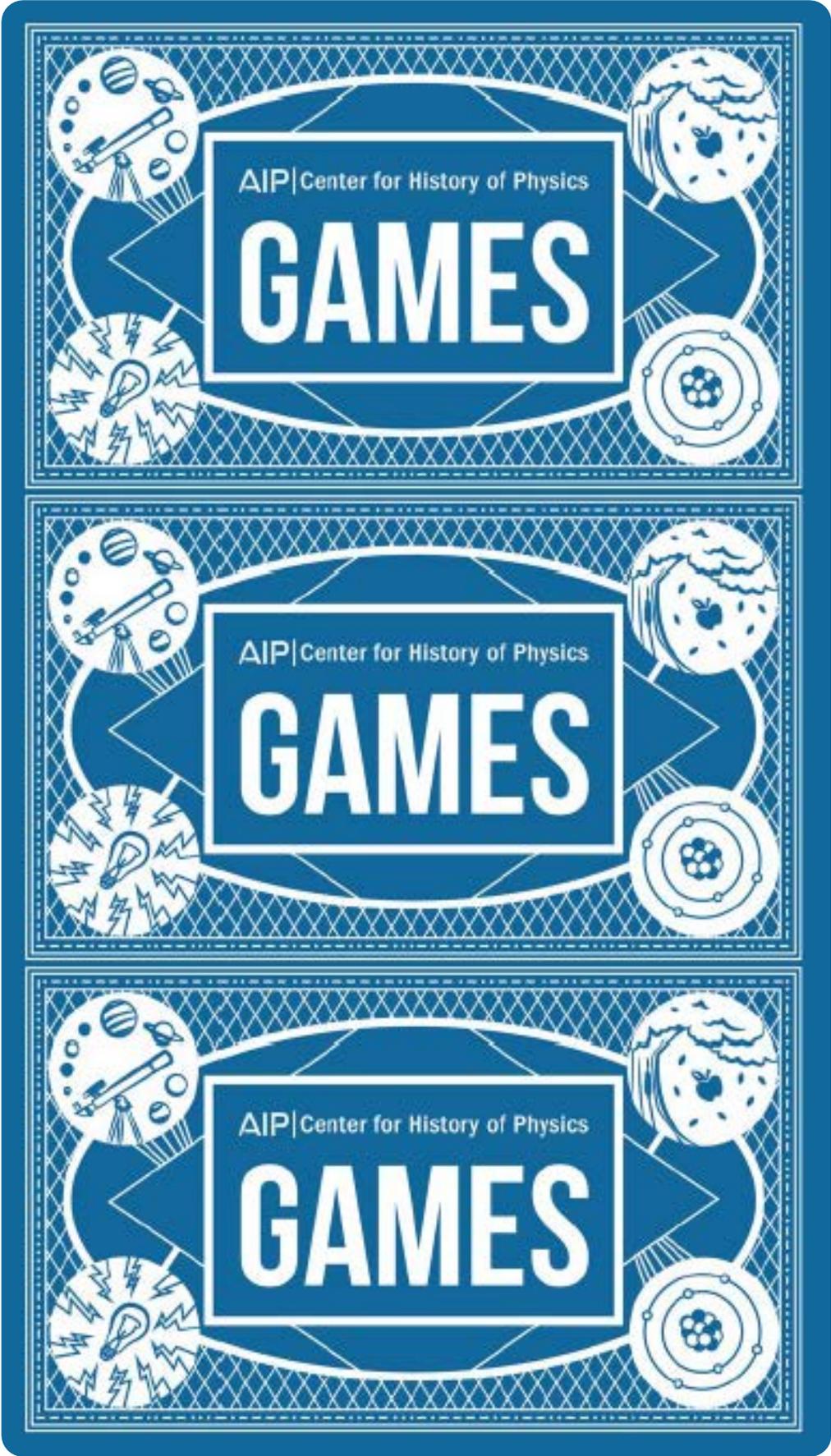
~ 60 BCE

Julius Caesar crosses the Rubicon River, which separated Rome from the province of Gaul. This began a civil war that ended the Roman Republic.

49 BCE

Julius Caesar is assassinated on the Ides of March (the 15th of March) on the steps of the Roman Senate.

44 BCE



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The colosseum in Rome is completed.

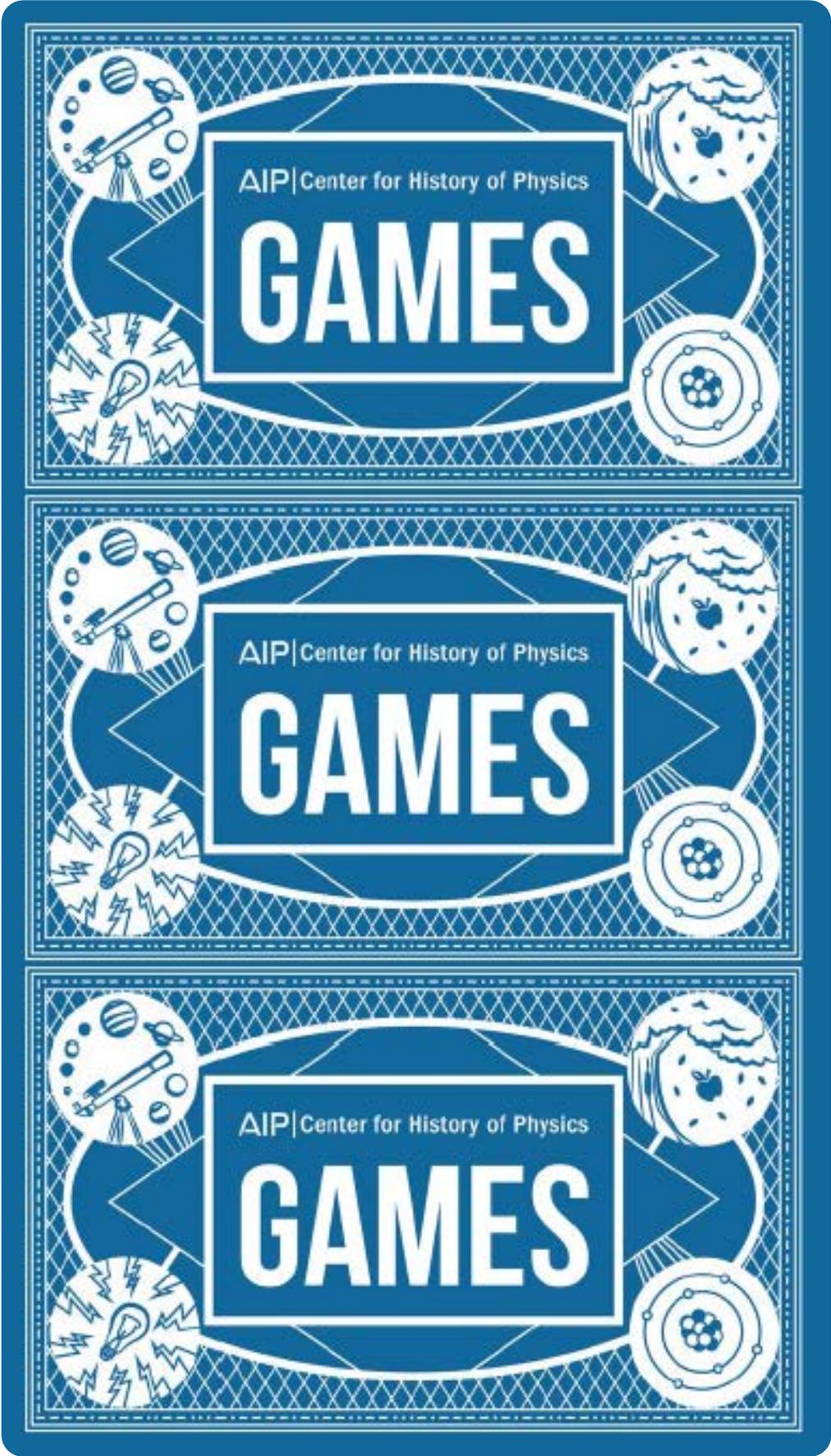
80 BCE

Ptolemy is born. His model of the universe was used for astronomical calculations for over a thousand years.

~ 90

The Classic Period of Mayan Civilization begins. This period was characterized by astronomical and mathematical study along with developments in art and architecture.

~ 250



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Hypatia is murdered. She was a mathematician, astronomer, and philosopher active in Alexandria, Egypt. She may even have edited Ptolemy's astronomical works.

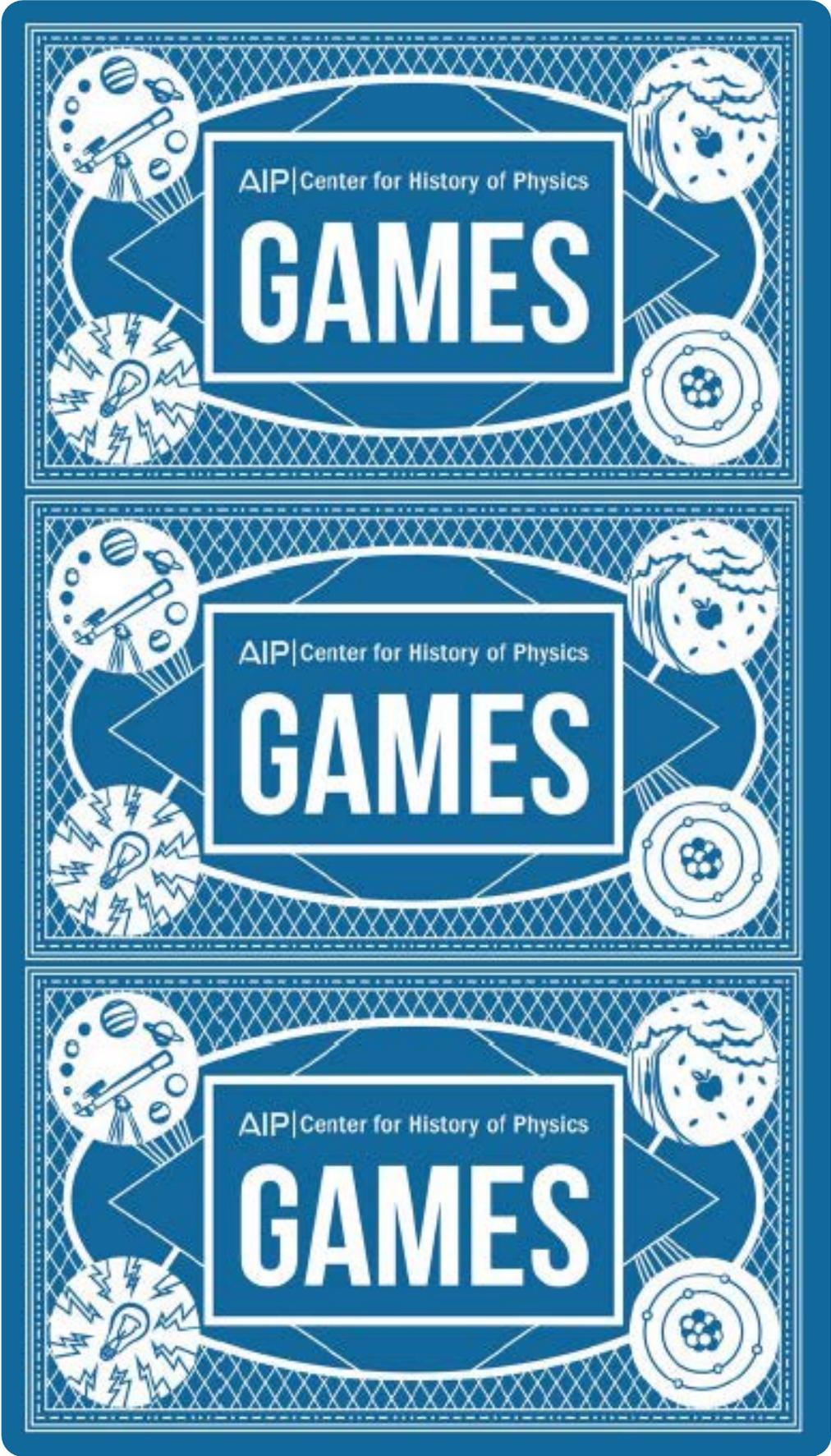
415

Martianus Capella, a North African from Carthage, writes *The Marriage of Philology and Mercury* which became one of the most popular school texts of the Middle Ages. The book covered cosmology, mathematics, and more.

~ 430

Earliest translations of Greek texts into Syriac. This was the beginning of a translation movement from Greek scientific knowledge into Syriac, then Arabic, and eventually into Latin.

~ 450



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Fall of the Western Roman Empire

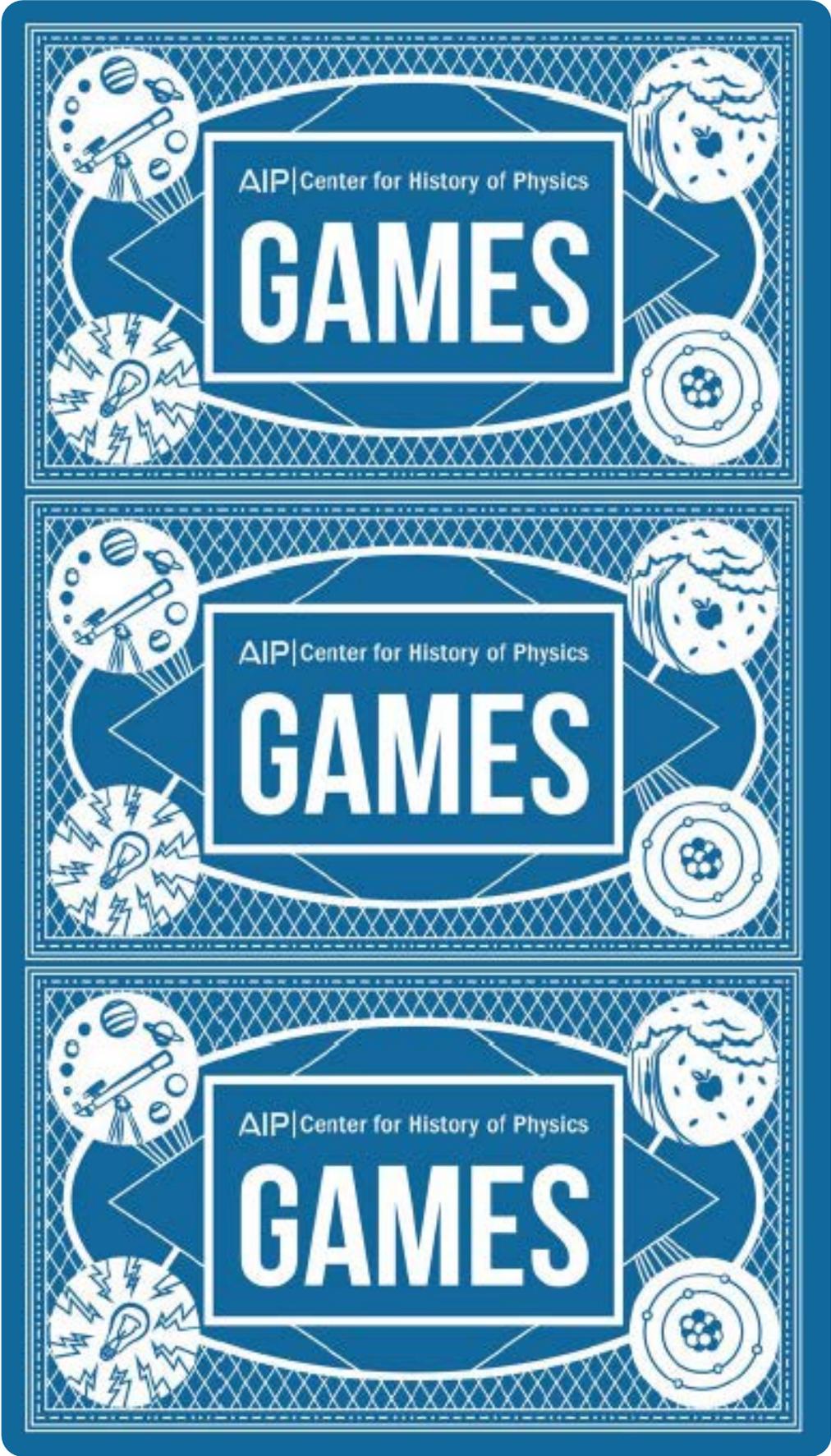
476

Emperor Justinian the Great of the Byzantine Empire closes the Academy of Athens. As a result, many Greek philosophers flee to Persia where they continue their scholarship.

529

Cosmos Indicopleustes writes the *only* known book in the Middle Ages to argue for the idea of a flat Earth. In the 1820s Washington Irving used this to create the myth that all Europeans believed in a flat Earth before Columbus.

~ 540



Muhammad is born.

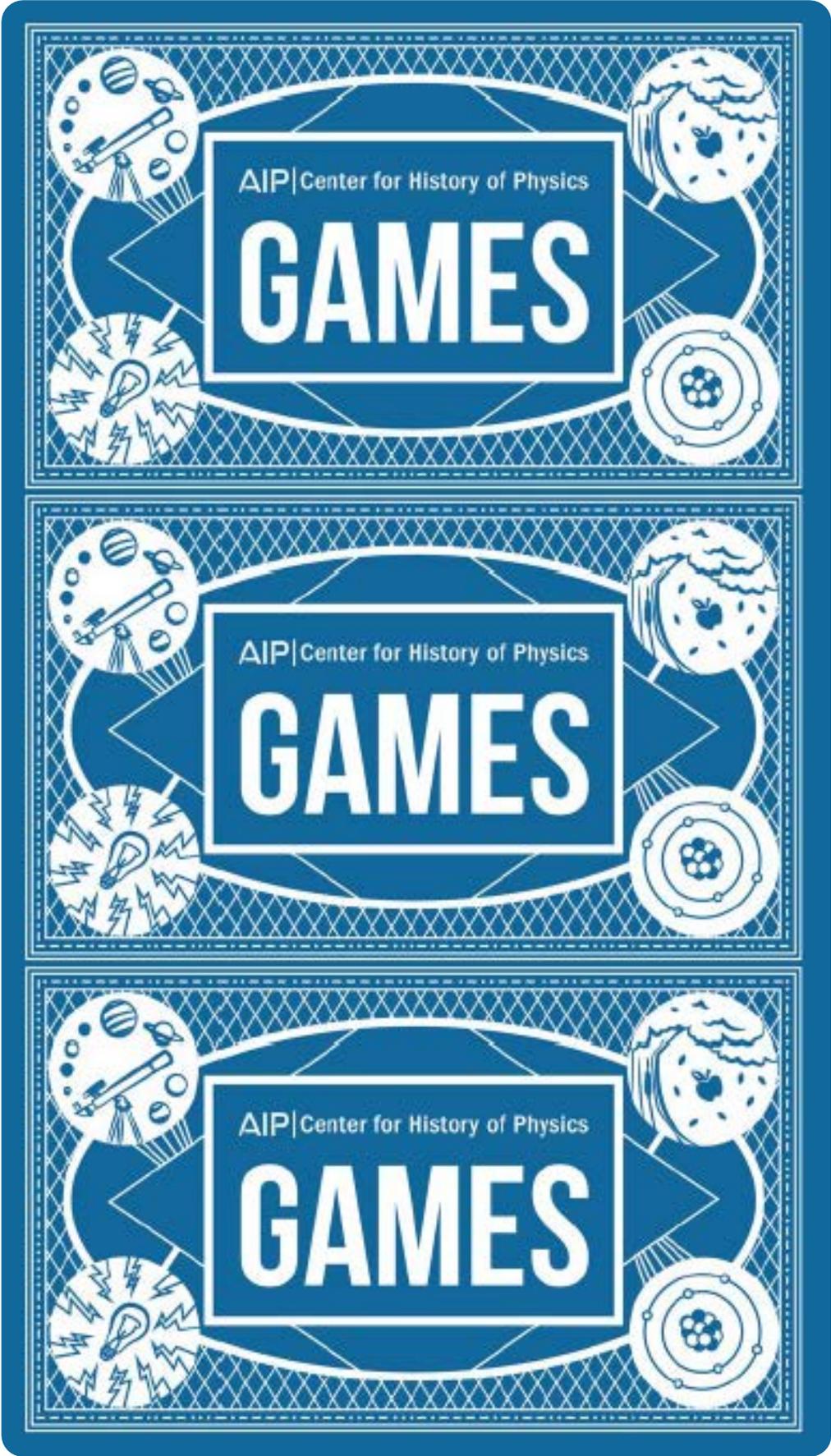
570

John Philoponus dies. While Aristotle had argued that a thrown projectile moved because the air around it caused it to move, Philoponus argued that the thrower imposed a force on the projectile and the medium resisted motion.

~ 575

Muhammad dies.

632



Beginning of the Umayyad Caliphate, which incorporated many Syrians and Persians in the bureaucracy, beginning a tradition of multicultural exchange.

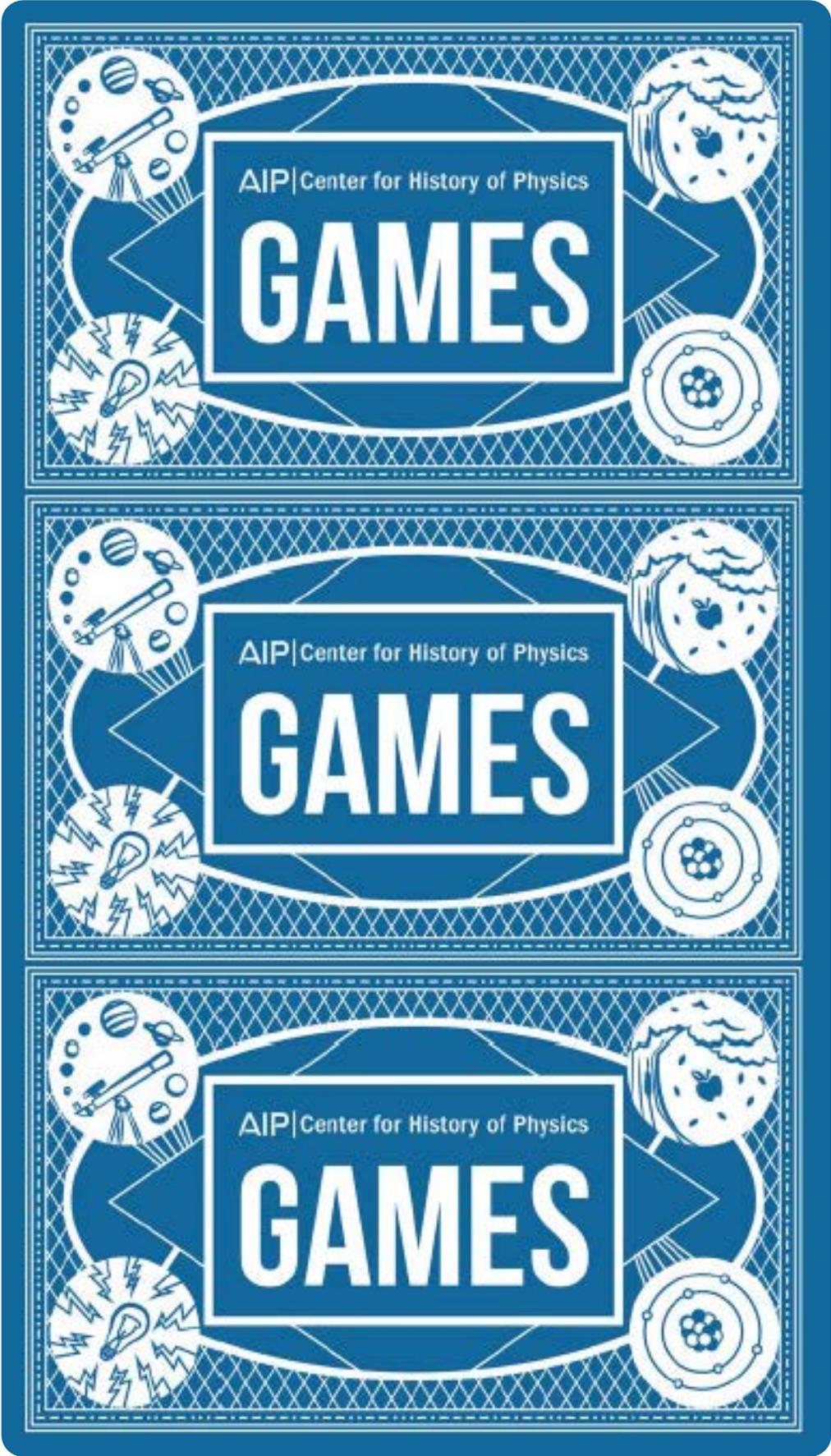
644

The Venerable Bede dies. Based in Northeastern England, he wrote multiple books including two on timekeeping and the calendar. His principles of calculating time and the calendar would be adopted throughout Christian Europe.

735

Beginning of the Abbasid Caliphate, which encouraged the study of philosophy, science, and medicine and the translation of texts.

750



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Beginning of the rule of al-Andalus (Muslim-controlled Spain) by an Umayyad dynasty. They built a capital in Cordoba with the largest library in Europe and began the “golden age” of al-Andalus.

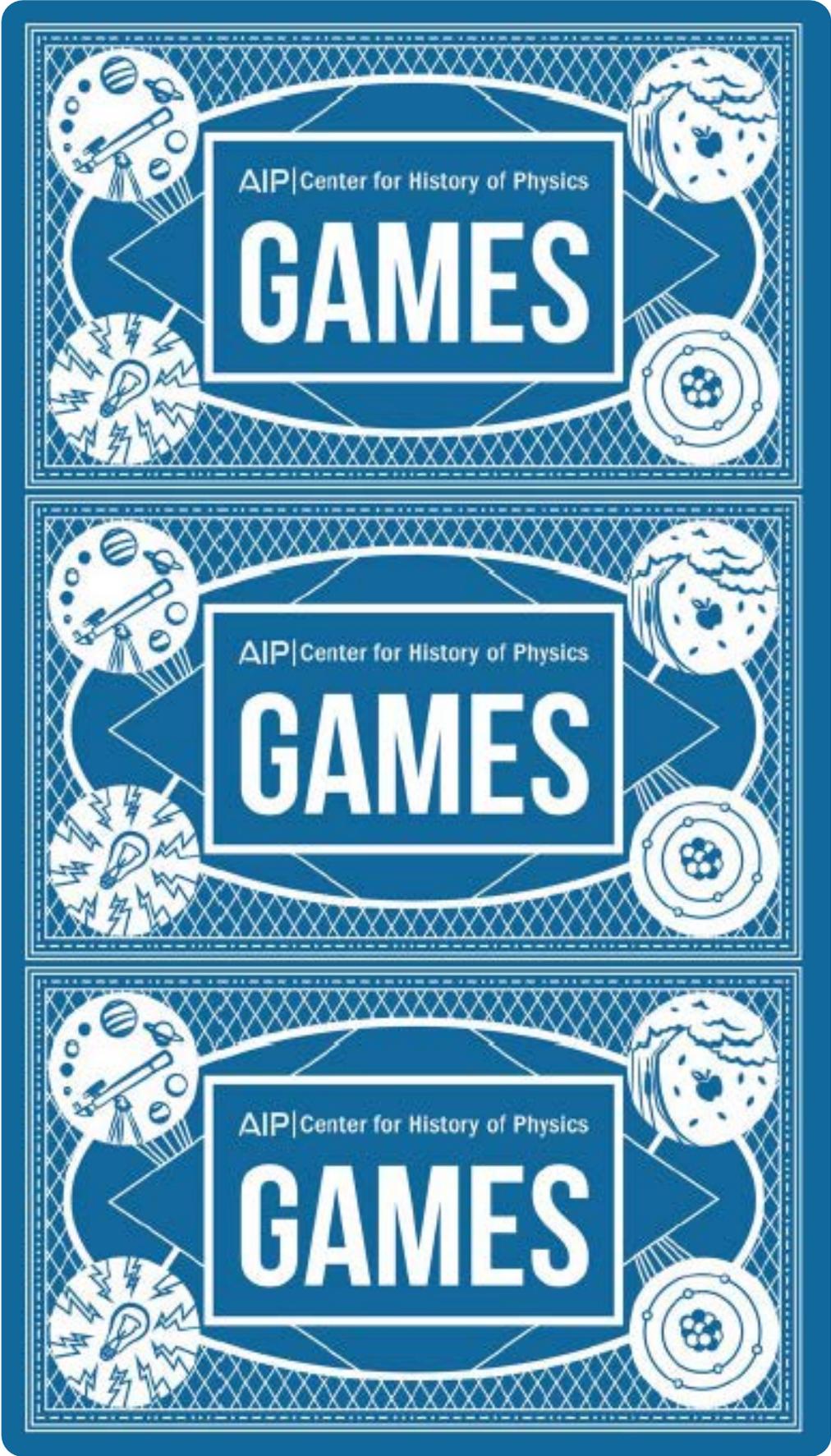
756

The city of Baghdad is founded by the Abbasid Caliph al-Mansur. The city became a center for the translation of scientific texts.

762

Muhammad ibn Musa al-Khwarizmi is born. His first book, *Algebra*, was on solving mathematical problems and his where we get the modern term “algebra.”

~ 780



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Coronation of Charlemagne, who unified much of Europe into the Holy Roman Empire.

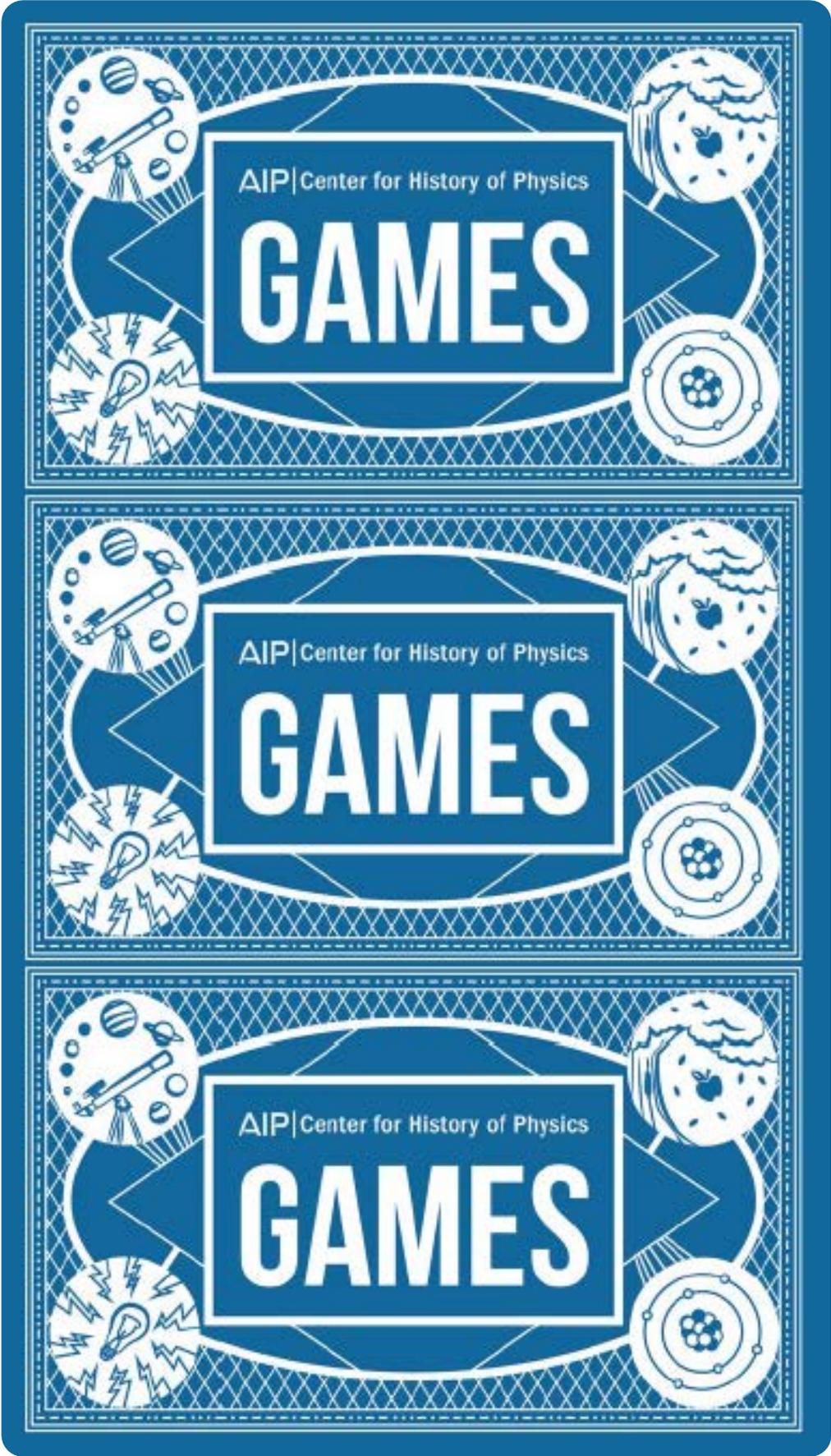
800

Hunayn ibn Ishaq is born. He led a group of translators in Baghdad who translated many scientific texts from Greek to Syriac and to Arabic. These texts included Aristotle's *Physics*, Euclid's *Elements*, and Ptolemy's *Almagest*.

808

Yahya ibn Abi Mansur dies. He produced the first Arabic astronomical tables independent of Greek originals.

832



Thabit ibn Qurra is born. He was from what is now southern Turkey and translated more than 100 mathematical & scientific treatises including Archimedes's works.

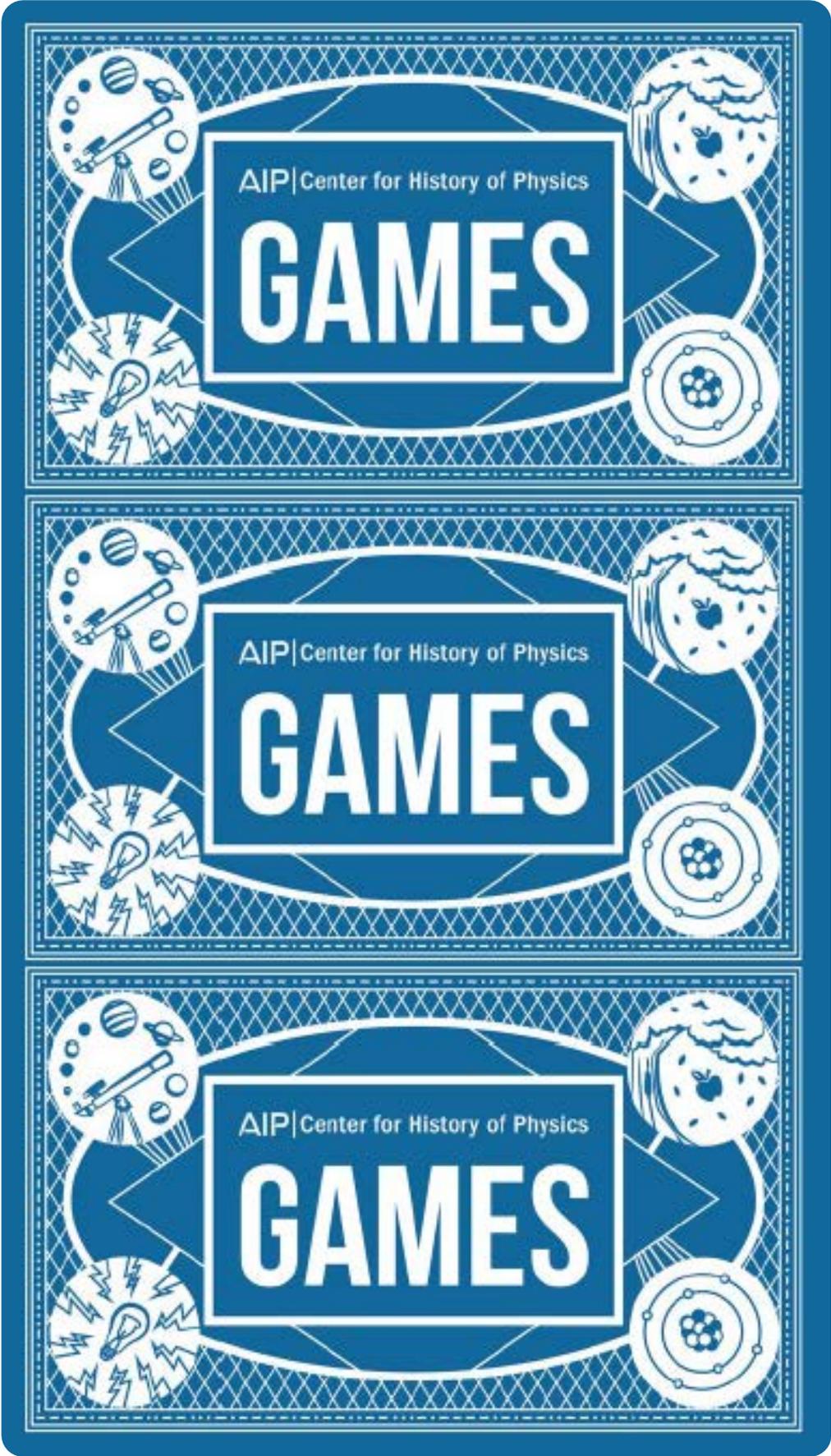
836

Al-Khwarizmi dies. He worked as a mathematician at the court in Baghdad. His second book, *Concerning Hindu Numbers*, brought the decimal system and what are now called "Arabic" or "Hindu-Arabic" numerals to popularity in the Islamic world.

~ 850

Abu Ishaq al-Kindi dies. He overturned Euclid's theory of vision and argued that light radiates in all directions from each point on the surface of an object.

~ 866



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The Classic Period of Mayan Civilization ends. During this period a calendar was developed called the “Long Count” based on a 360 day year.

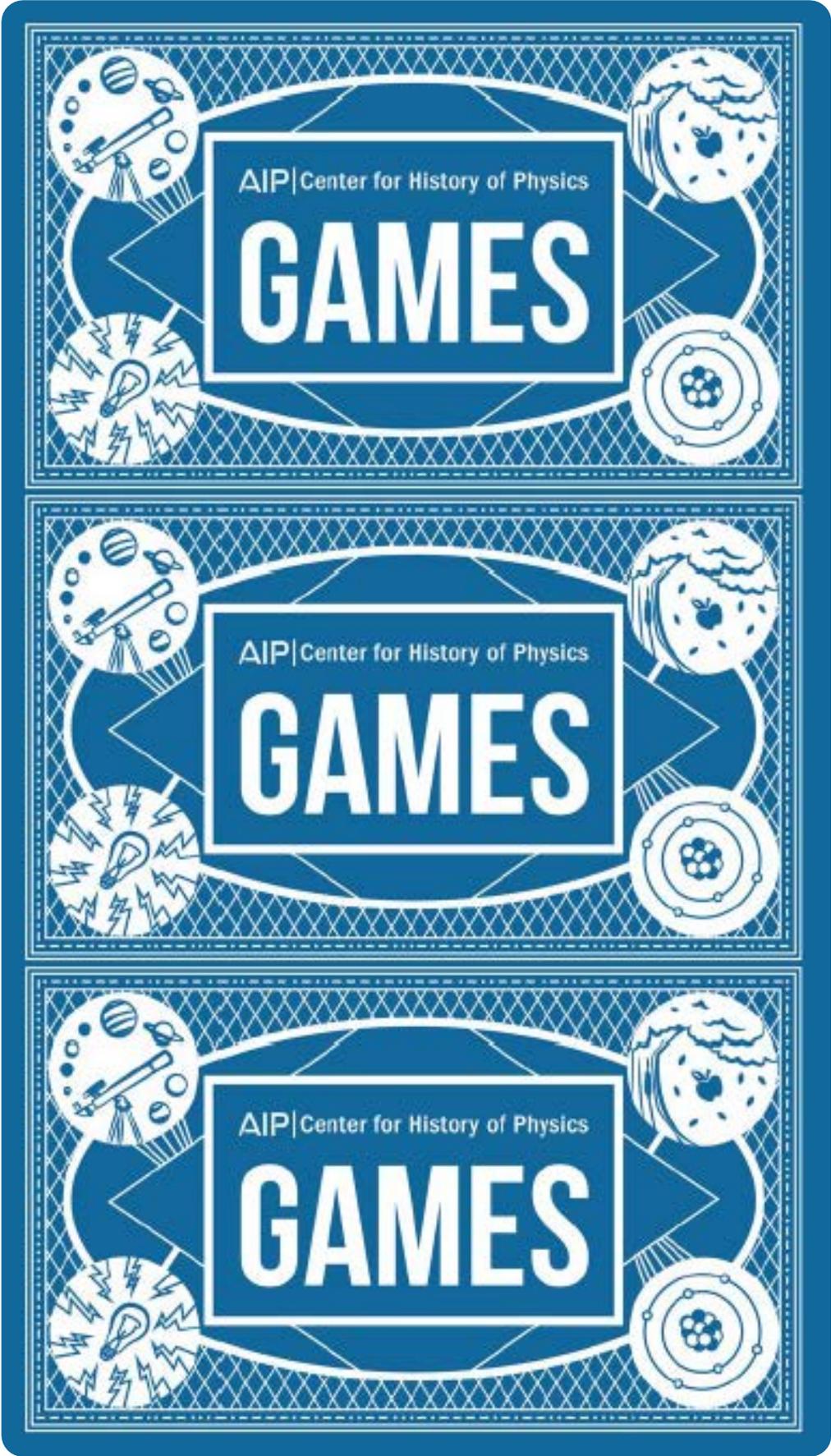
~ 900

Al-Battani dies. He lived in what is now modern-day Syria and discovered the shifting of the sun’s perigee (or closest approach to Earth). His observations were still cited years later by Kepler and Copernicus.

929

The Song Dynasty begins in China. This era was notable for its prosperity and many inventions, including paper money.

960



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Ibn al-Haytham, known to Europeans as Alhazen, is born. He was the first to argue that vision worked by light's bouncing off an object and entering the eye.

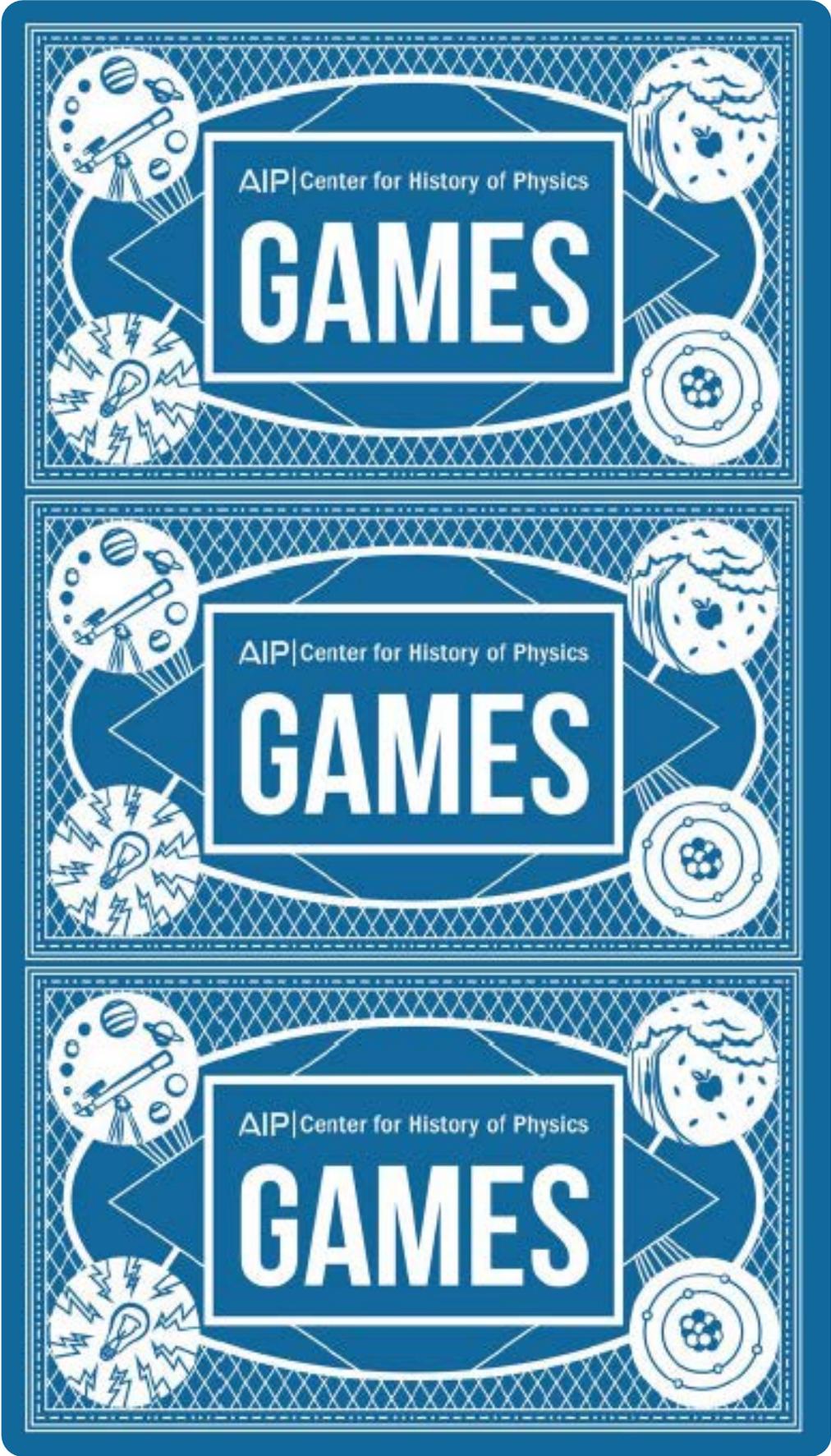
~ 965

Through extensive experiments, Abu Sa'd al-Ala ibn Sahl discovers the geometrical equivalent of the modern law of refraction. (This law became known as Snell's Law in the 1600s.)

~ 985

Gerbert of Aurillac is elected as Pope Sylvester II. He promoted the study of the mathematical "quadrivium." The quadrivium was at the core of a liberal arts education and consisted of arithmetic, geometry, music, and astronomy.

999



“The Tale of Genji,” likely the world’s first novel, is written by Murasaki Shikibu.

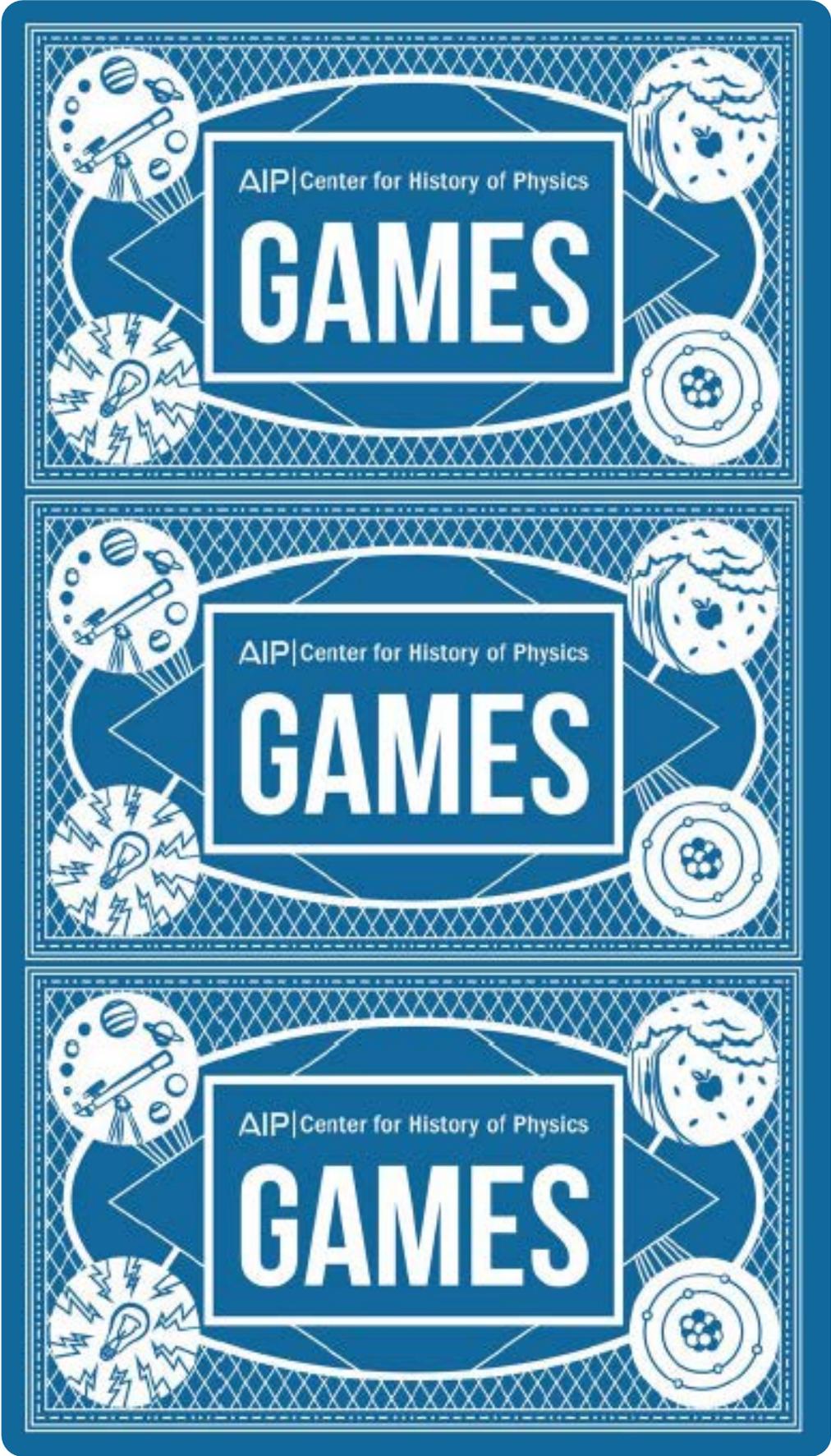
~ **1000**

Su Song is born. He was a statesman during the Song Dynasty and created a celestial atlas as well as a hydro-mechanical astronomical clock.

1020

Shen Kuo is born. He was the head of the Bureau of Astronomy in the Song Court, described a magnetic needle compass, and was the first to observe magnetic declination.

1031



Ibn al-Haytham dies. He attempted to resolve discrepancies between Ptolemy's mathematical astronomical models and Ptolemy's improbable physical model of the heavens which used only uniform circular motions.

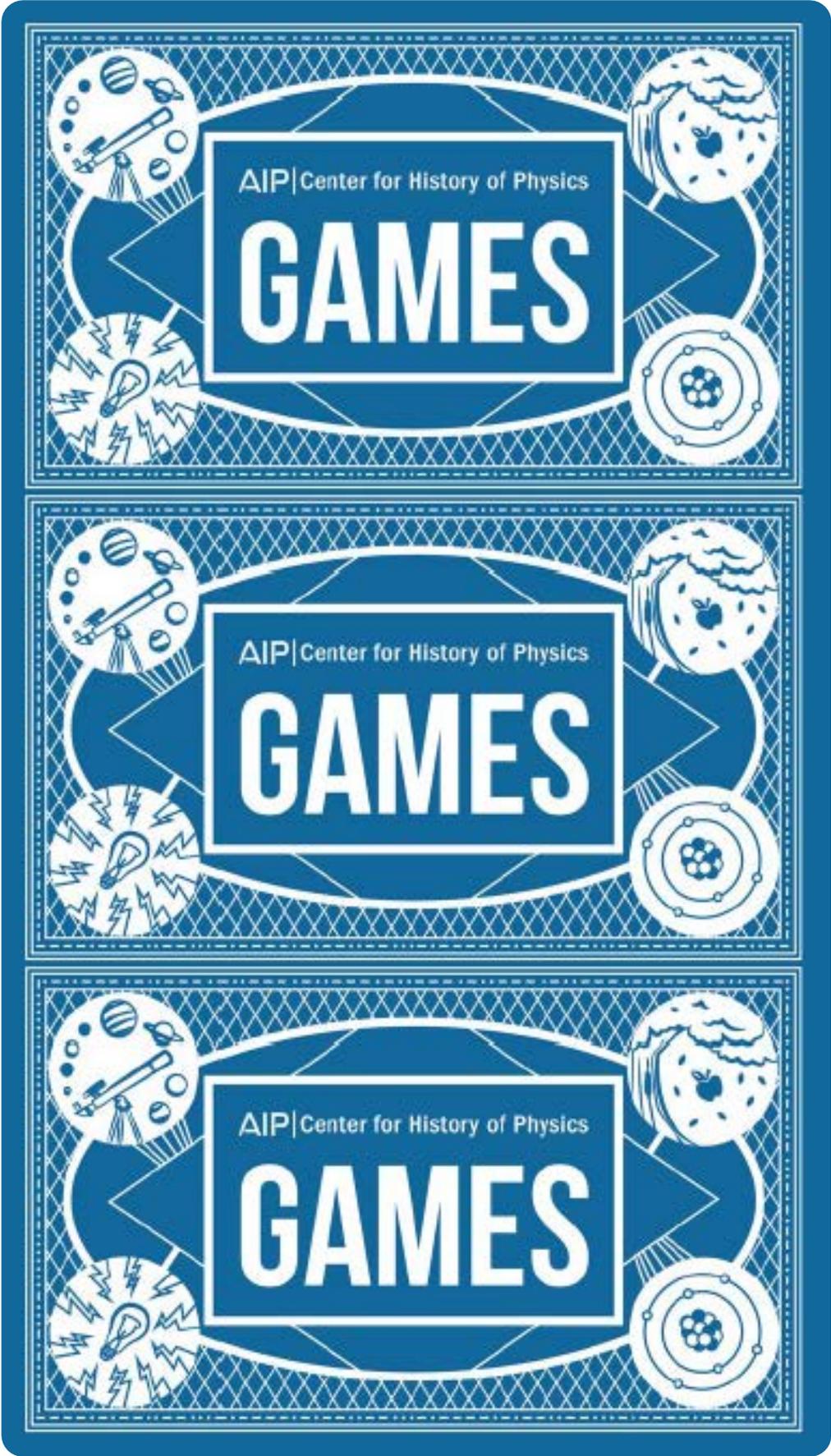
~ **1039**

The Great Schism splits European Christianity into the Eastern Orthodox Church and the Western Catholic Church.

1054

Toledo is conquered by Alfonso VI of Castile. Over the next two hundred years many scientific texts from the Toledo library were translated from Arabic into Latin.

1085



Shen Kuo writes about the invention of moveable type printing and attributes it to an artisan named Bi Sheng.

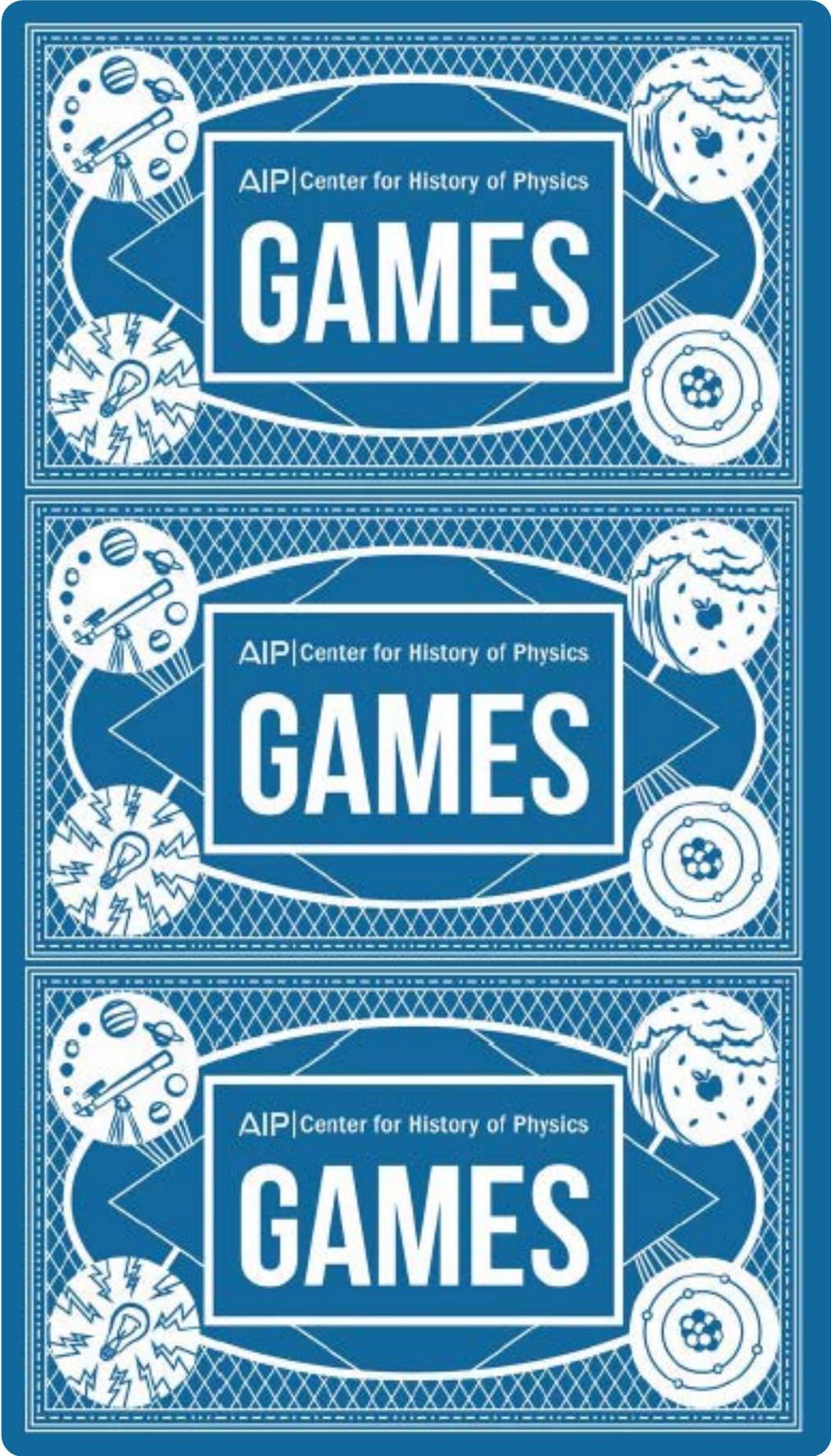
1088

Gerard of Cremona is born. He was one of the most important translators of scientific texts from Arabic into Latin. He translated around 70 to 80 books, including Aristotle's *Physics*, Euclid's *Elements*, and al-Khwarizmi's *Algebra*.

~ 1114

The University of Bologna becomes the first university in Europe.

1150



Gerard of Cremona dies. He traveled to Toledo in search of Ptolemy's *Almagest* and translated it into Latin from Arabic. This was one of the most important astronomical texts of the Middle Ages.

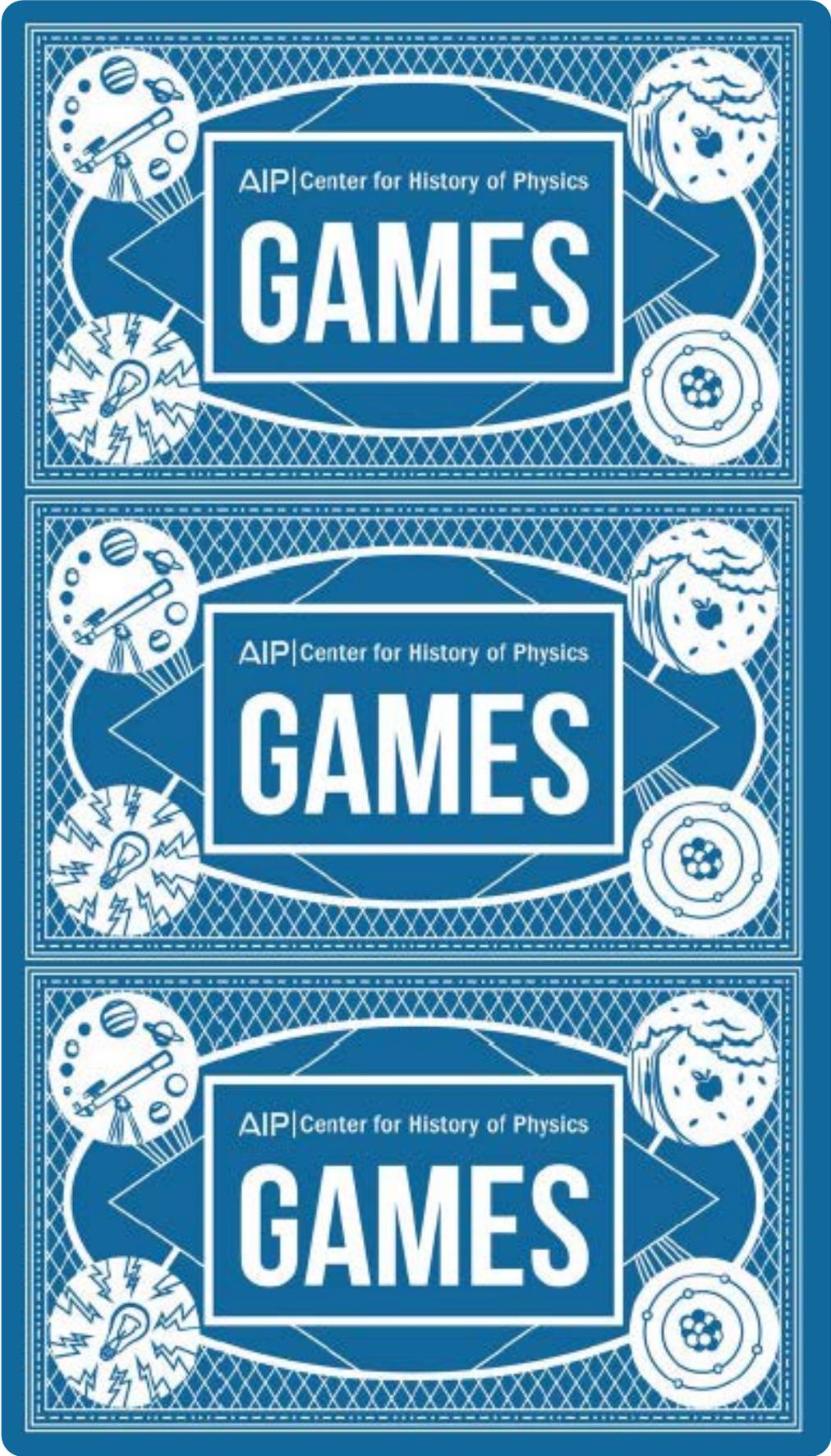
1187

The University of Paris becomes the second university in Europe.

1200

Nasir al-Din al-Tusi is born. He persuaded his patron, the grandson of Genghis Khan, to build the Maragha Observatory, located in modern-day Iran.

1201



A council of Bishops forbids the teaching of Aristotle's natural philosophy under the accusation that teaching his work encouraged pantheism (the worship of multiple gods).

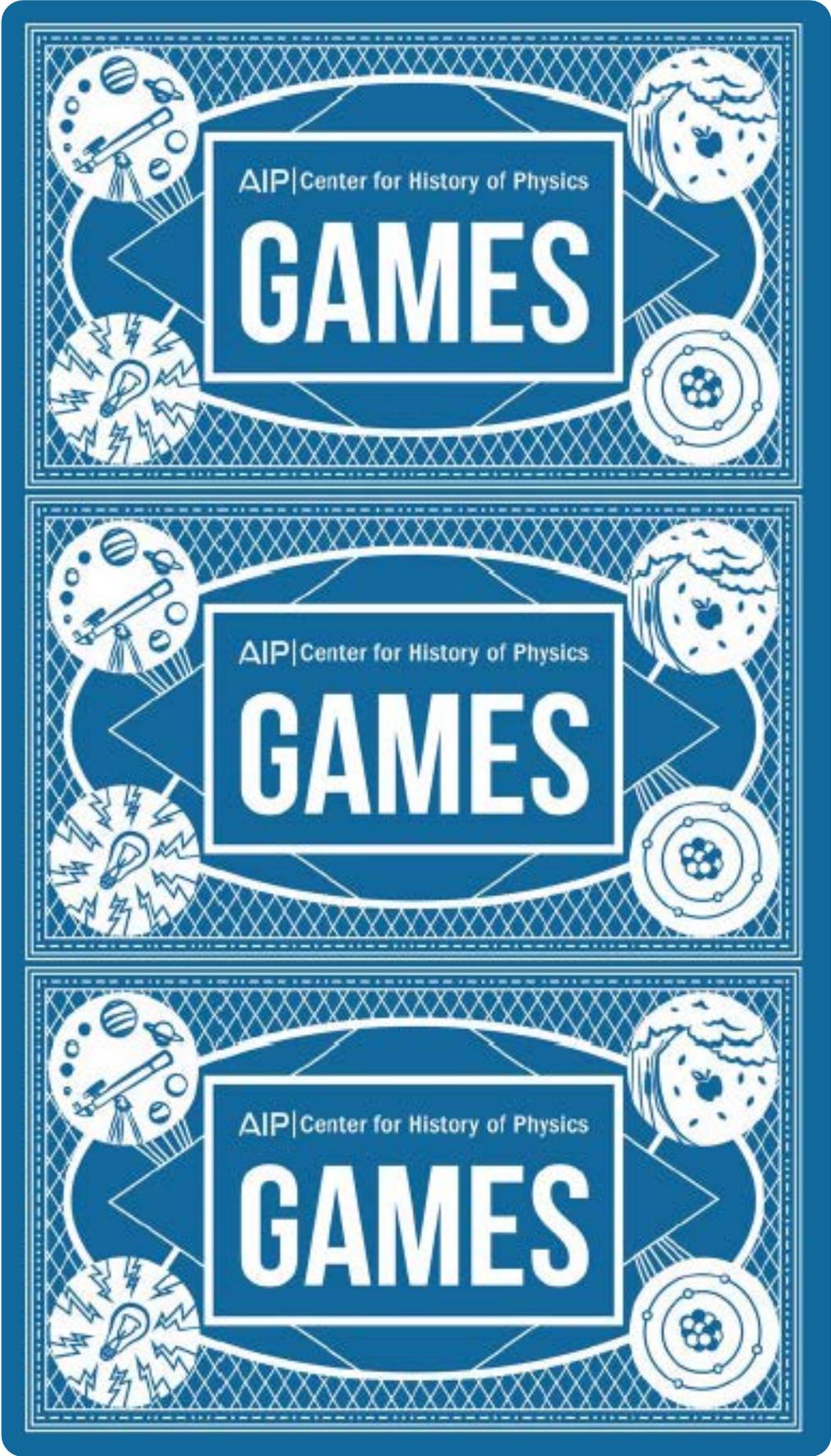
1210

The Magna Carta is signed by King John of England.

1215

Oxford University becomes the third university in Europe.

1220



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Genghis Khan is born. He was the founder and first Khan (emperor) of the Mongol Empire.

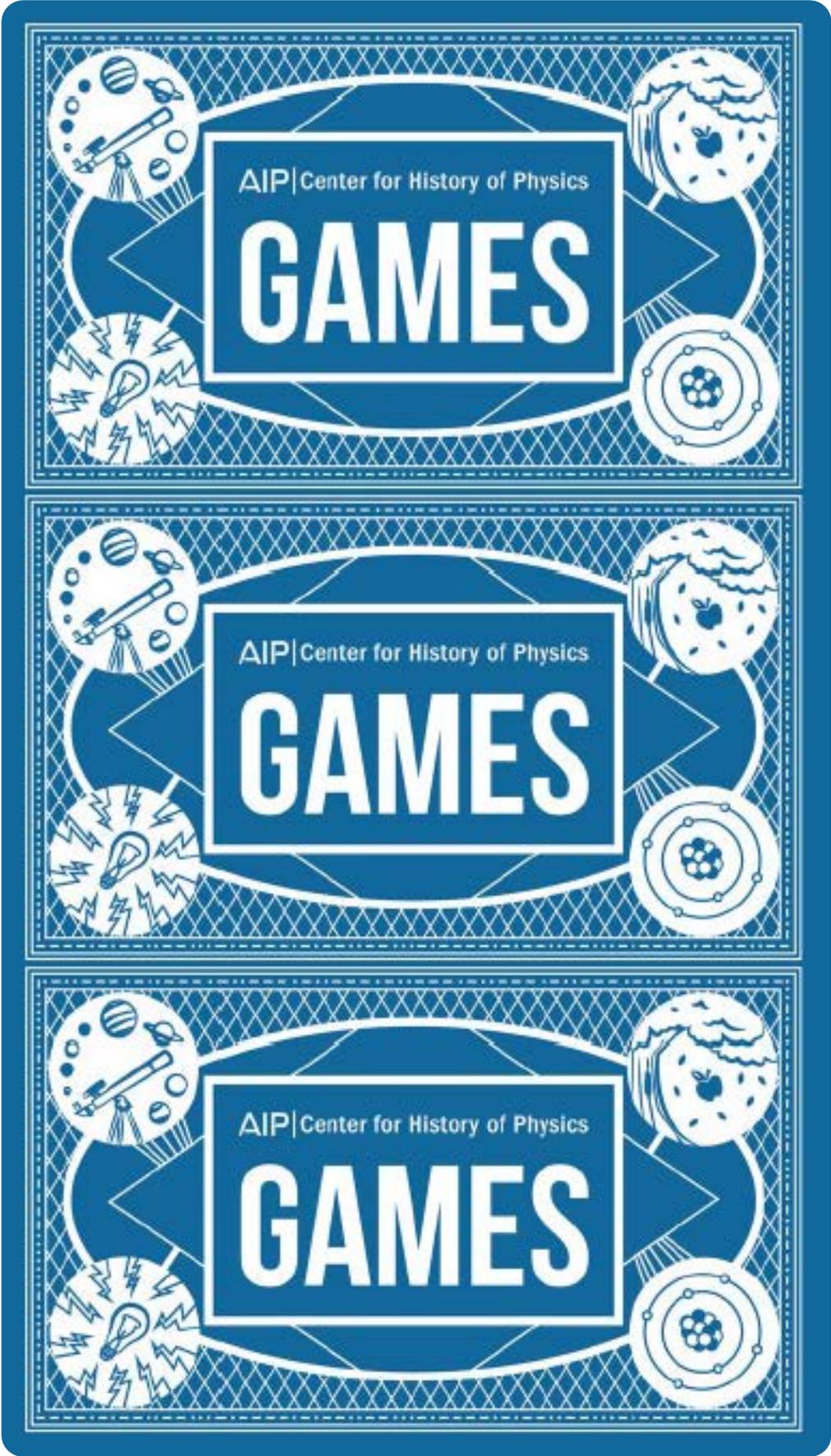
1227

Robert Grosseteste, the first Chancellor of Oxford University, dies. He argued that the cosmos was created by God from a dimensionless point of light that diffused outward in a sphere.

1253

Aristotelian natural philosophy becomes so popular that the ban on its teaching is lifted and the faculty of arts at the University of Paris makes its teaching mandatory.

1255



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The Maragha Observatory is founded in what is now Iran. Multiple astronomers were active at the observatory including Nasir al-Din al-Tusi and Mu'ayyad al-Din al-Urdi.

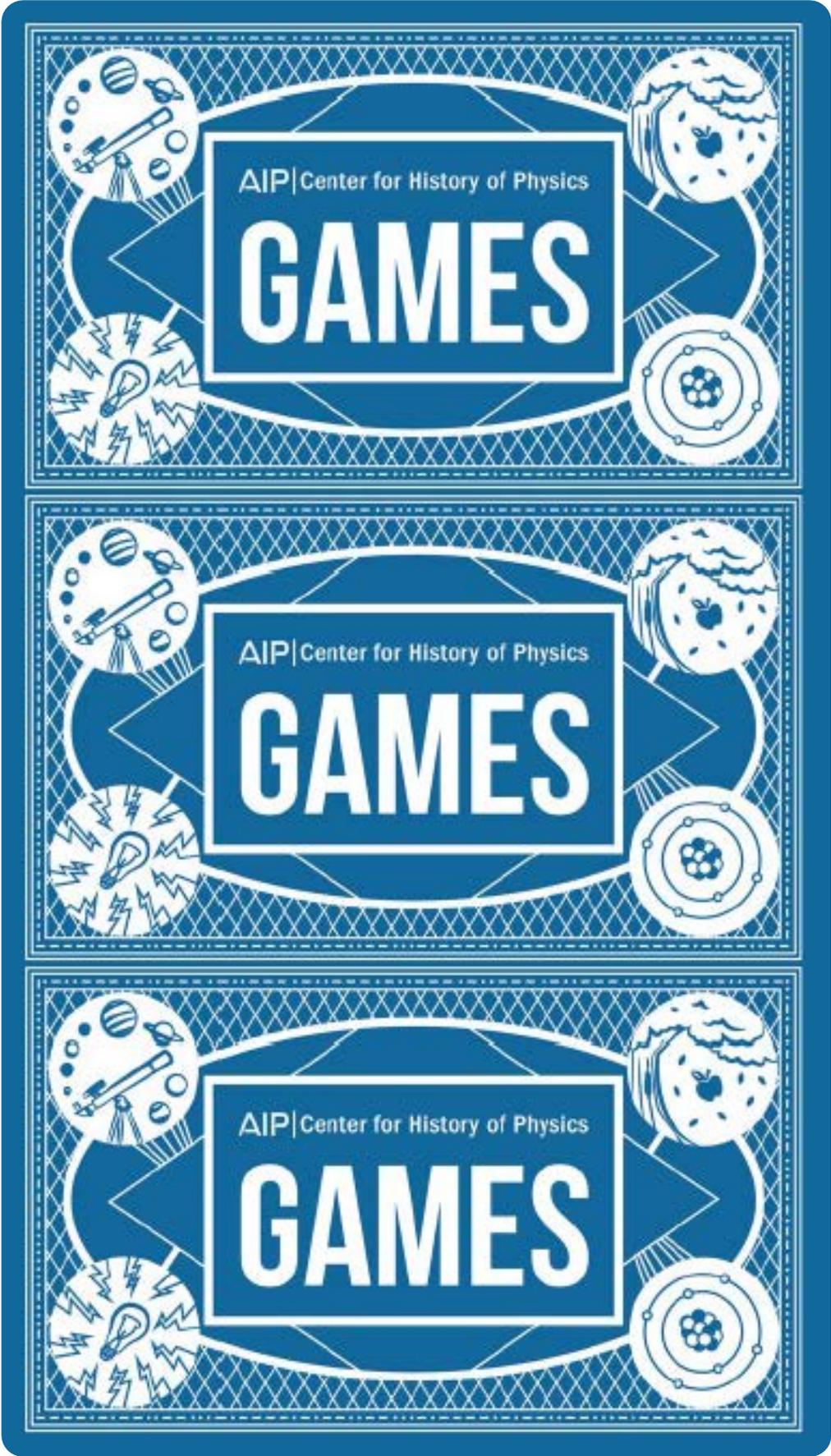
1259

Nasir al-Din al-Tusi dies. He invented the "Tusi couple," a geometric construction which converts two uniform circular motions into a back-and-forth straight-line motion.

1274

Etienne Tempier, the Bishop of Paris, forbids the teaching of 219 different Aristotelian ideas because they put limits on God's power. For instance, he condemned the idea that God could not create straight-line motions in the heavens.

1277



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Albert the Great, a Dominican friar active in Germany, dies. He offered the first comprehensive interpretation of Aristotle's philosophy in Western Christianity.

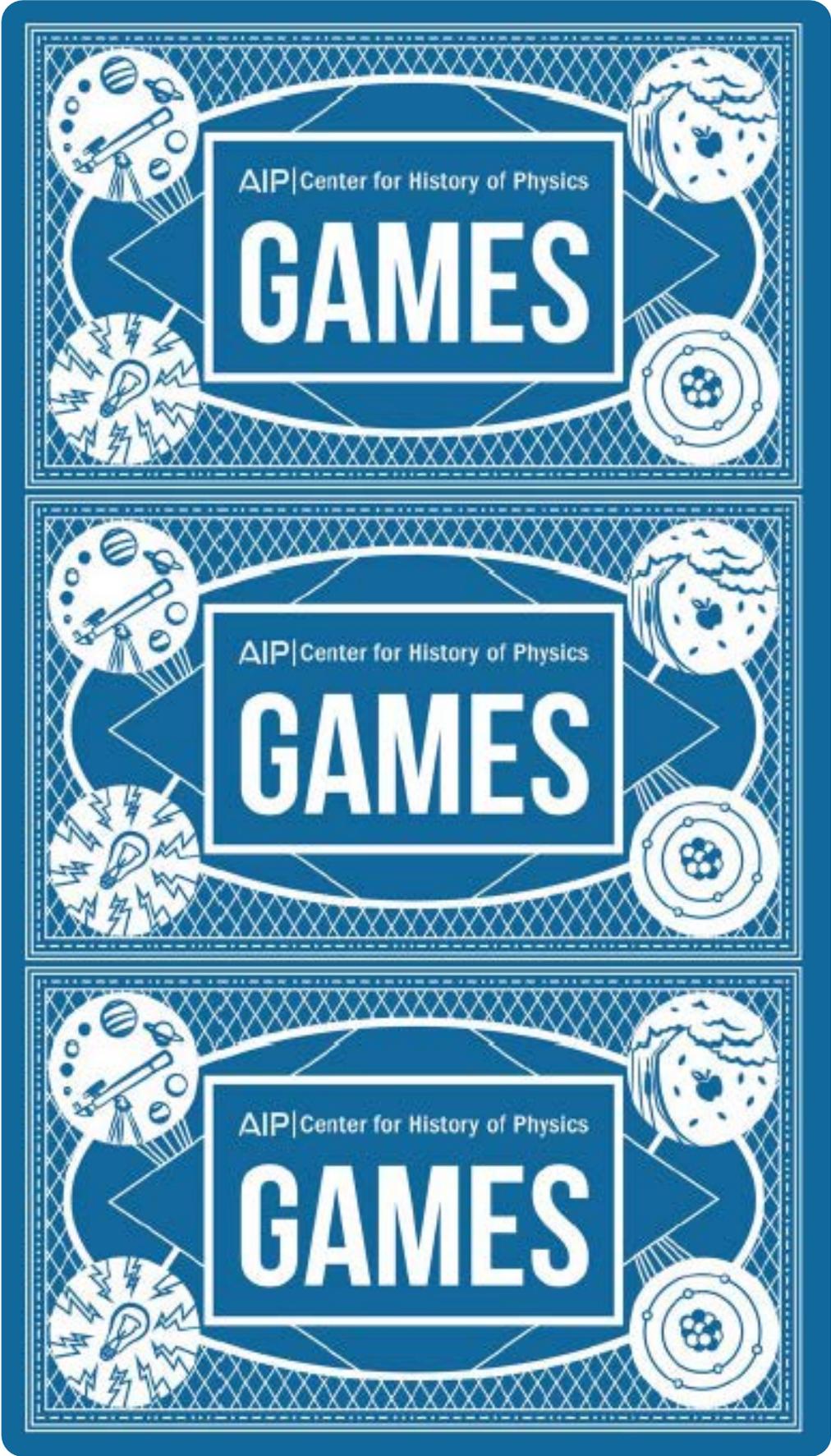
1280

Levi ben Gerson is born. He conducted many astronomical observations, including estimates of stellar distances, to refute aspects of Ptolemaic models.

1288

John Buridan is born. He was a professor at the University of Paris and argued that bodies moved because of internal forces imposed on them which he called "impetus." Impetus became the dominant theory of projectile motion until the 1600s.

~ 1295



Mansa Musa becomes the ruler of the West African empire of Mali. He converted the Sankore Masjid into a fully staffed madrasa (Islamic school or university) which housed one of the largest libraries in the world.

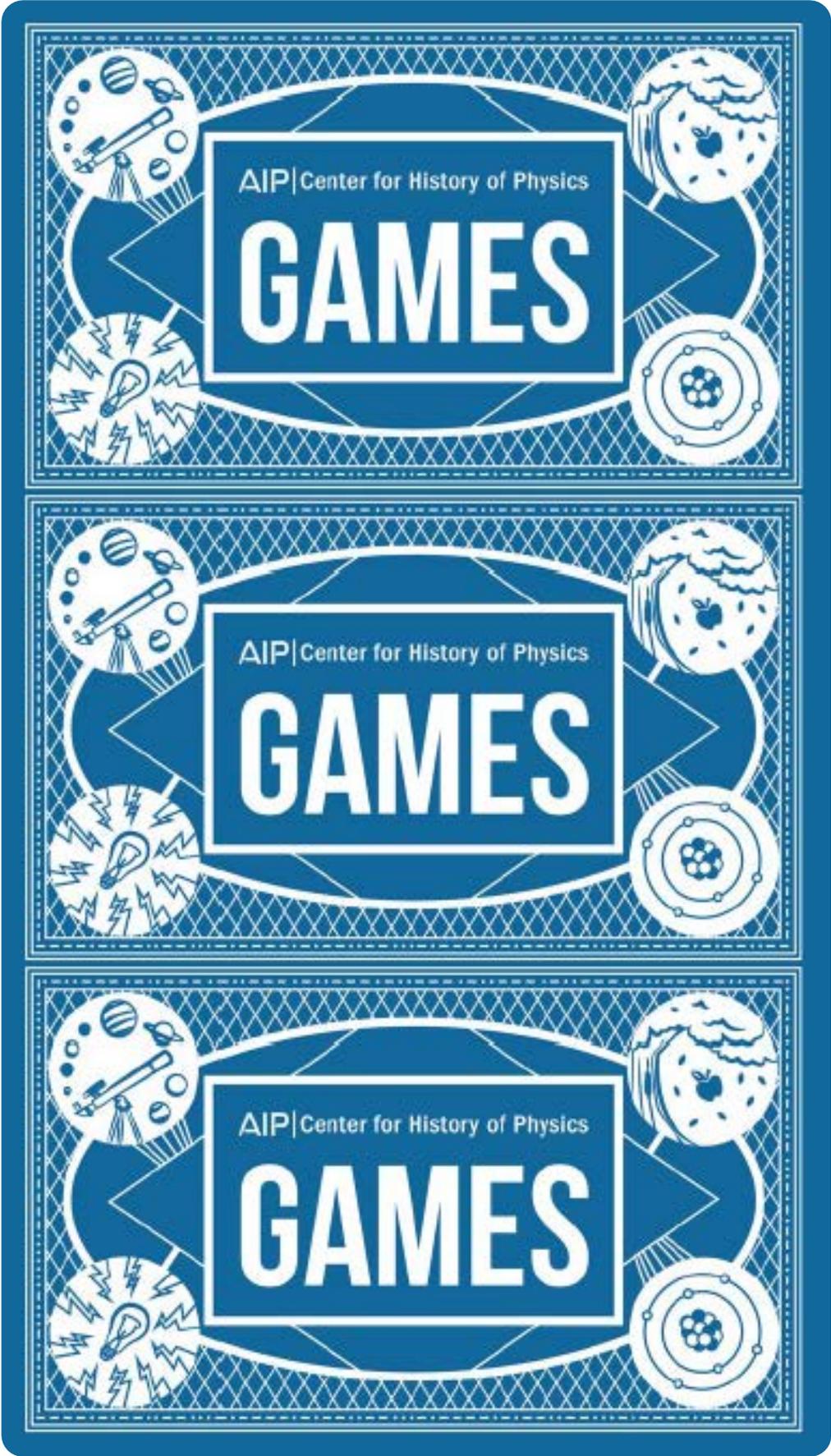
~ 1307

Theodoric of Freiberg, a German Dominican monk, dies. He independently conducted similar experiments as his contemporary al-Farisi with water-filled glass spheres to determine how a rainbow is formed by reflection and refraction.

~ 1310

Kamal al-Din al-Farisi dies. He used a water-filled glass sphere to simulate a drop of moisture and argued that a rainbow is created from the sun's rays experiencing a total internal reflection and being refracted twice in a droplet.

1319



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Dante completes his work the *Divine Comedy* which contains three parts: Inferno, Purgatorio, and Paradiso.

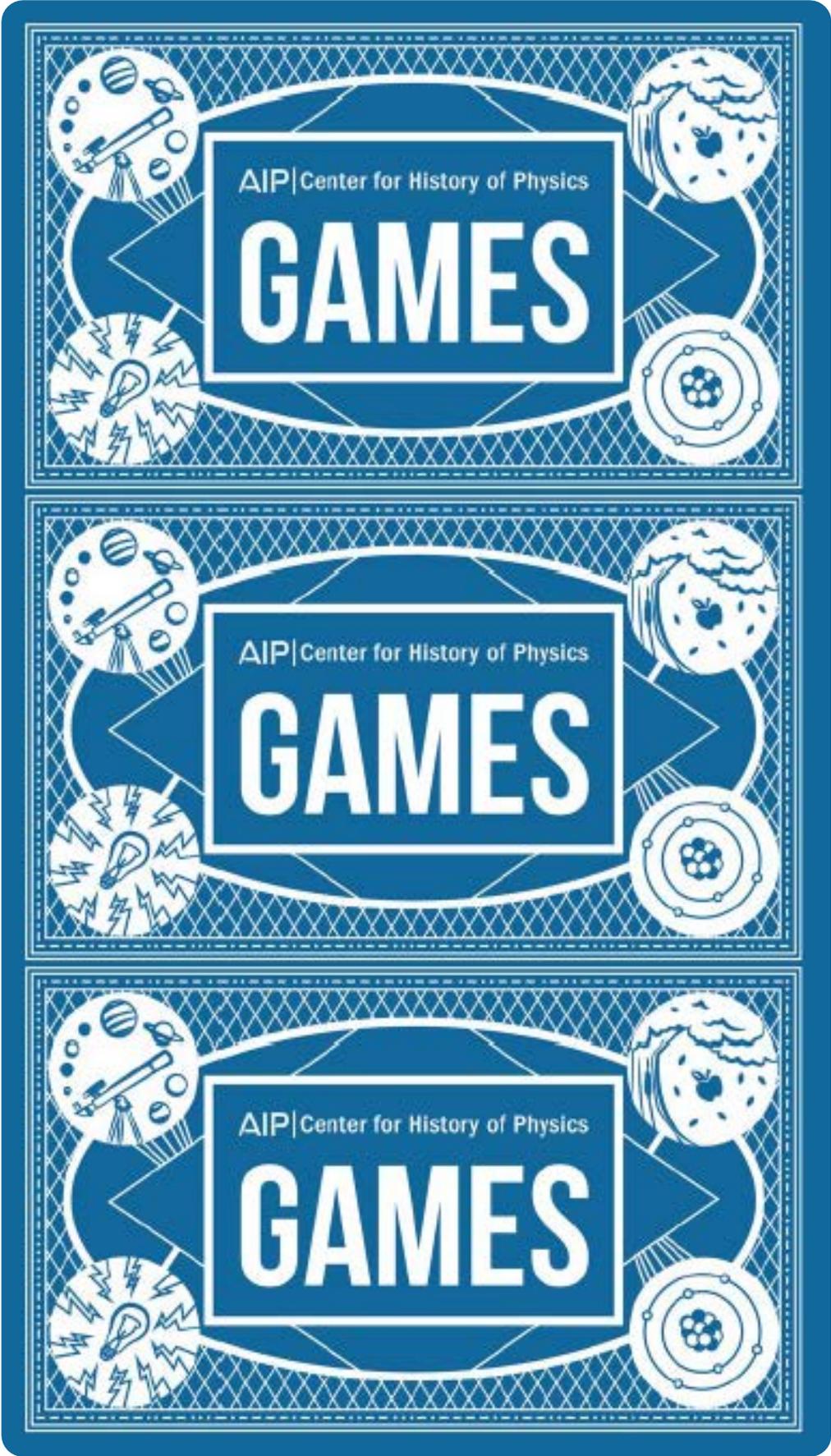
1320

Nicole Oresme is born. He argued that all motions are relative and would geometrically prove the “Merton Rule,” also known as the mean speed theorem.

~ 1325

William Heytesbury is the first to propose the mean-speed theorem. It is sometimes called the “Merton Rule” of uniform acceleration because Heytesbury worked at Merton College, Oxford University.

~ 1330



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The “Black Death” plague begins in Europe.

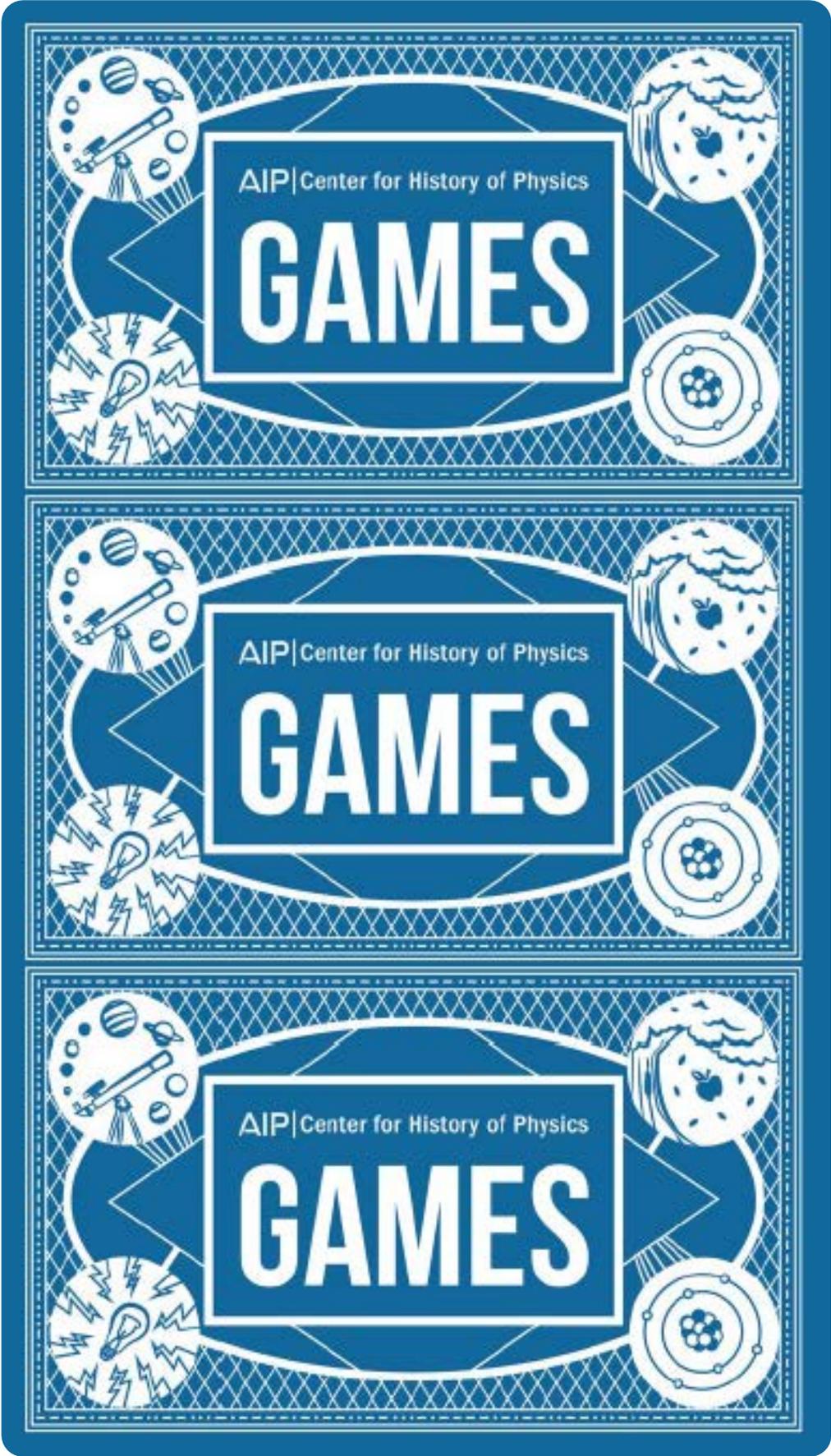
1347

Thomas Bradwardine dies of the Black Death after only 40 days as the Archbishop of Canterbury. He argued that God had created an infinite void outside the observed cosmos.

1349

Richard Swineshead dies. He was one of the "Merton Group," which also included Bradwardine, Heytesbury, and John of Dumbleton. They defined uniformly accelerated motion along with other kinematic theorems.

1355



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John Buridan dies. He proposed an experiment to test whether the Earth rotates on its axis. He argued the Earth does not move because, if you shoot an arrow vertically upward into the air on a windless day, the arrow returns to its starting point.

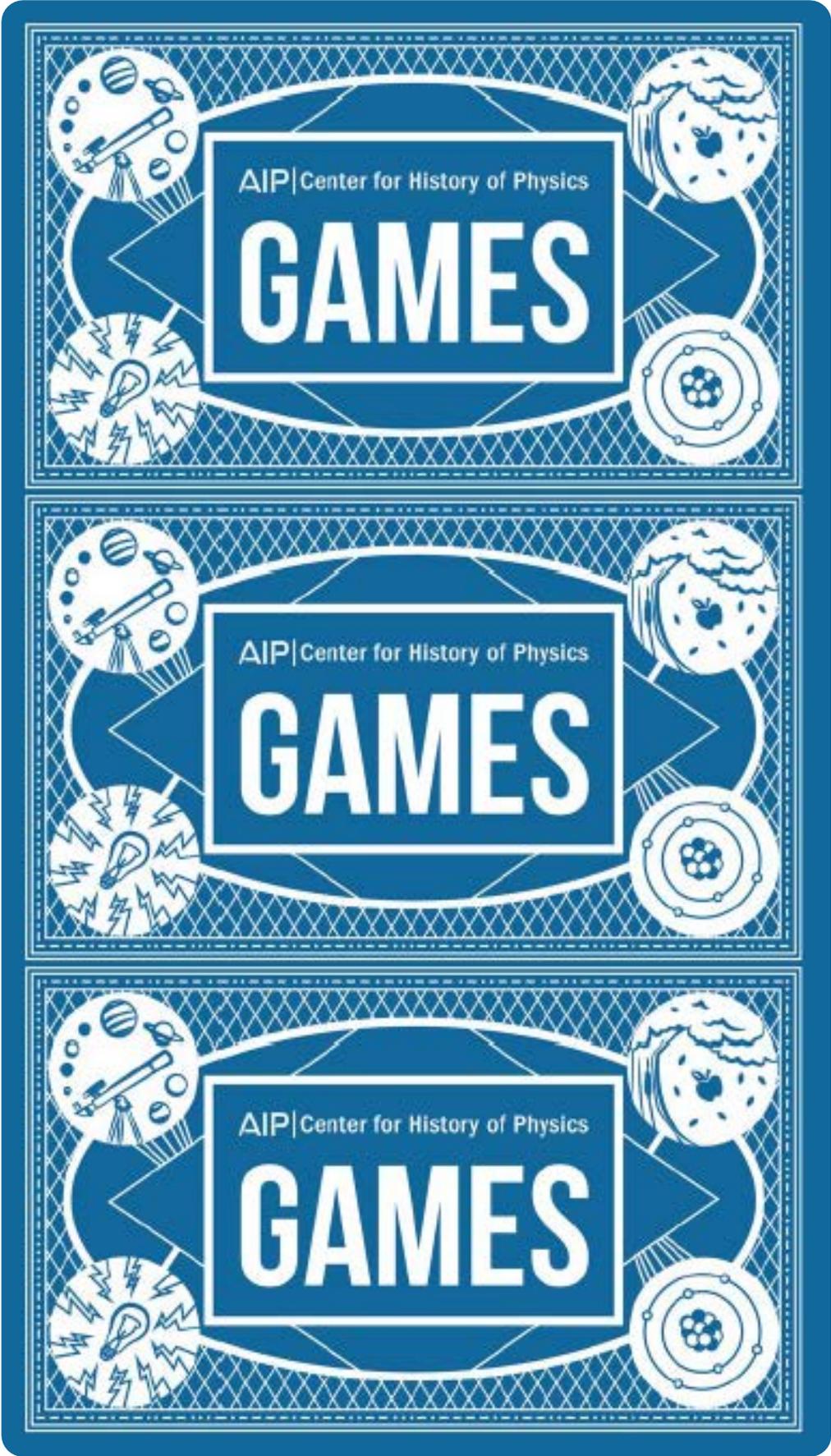
~ **1358**

Astronomer Ibn al-Shatir dies. He produced lunar and planetary models using only uniform circular motions which matched astronomical observations and Ptolemy's mathematical models fairly well.

~ **1375**

Nicole Oresme dies. He refuted John Buridan's experiment which argued for a stationary Earth by pointing out that an arrow shot vertically has the same horizontal relative motion as the earth so it will always land at the place where it was shot.

1382



The Samarqand Observatory is built in what is now modern-day Uzbekistan. The observatory was best known for its large underground sextant that had a radius of 40 meters. The sextant was used for making meridian observations.

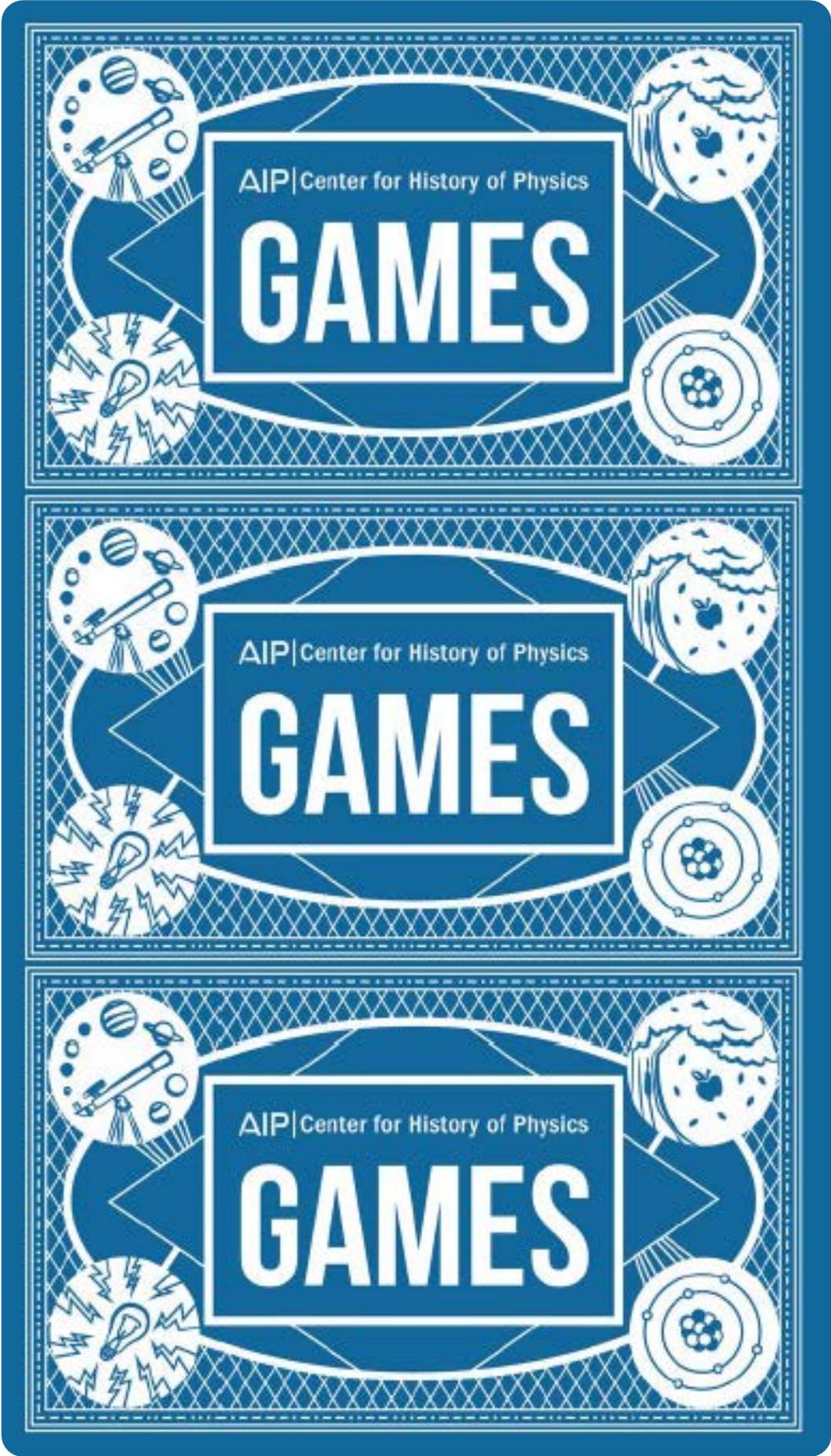
~ 1420

The Inca Empire begins. The Incas used knotted strings called khipu to make records and calculate in their base-10 number system.

~ 1438

Christopher Columbus is born.

~ 1450



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Gutenberg's Bible is printed. It's the first book made in Europe using movable typeface instead of being written out by hand.

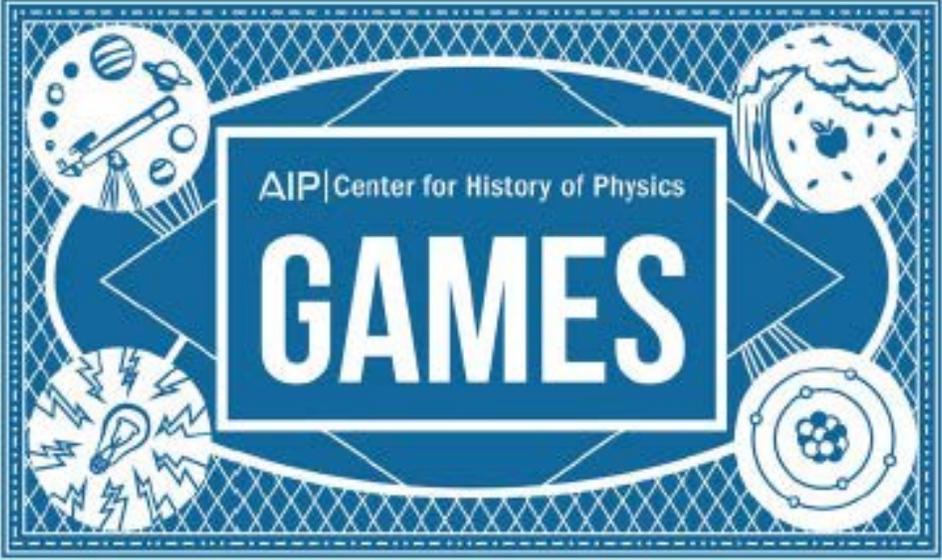
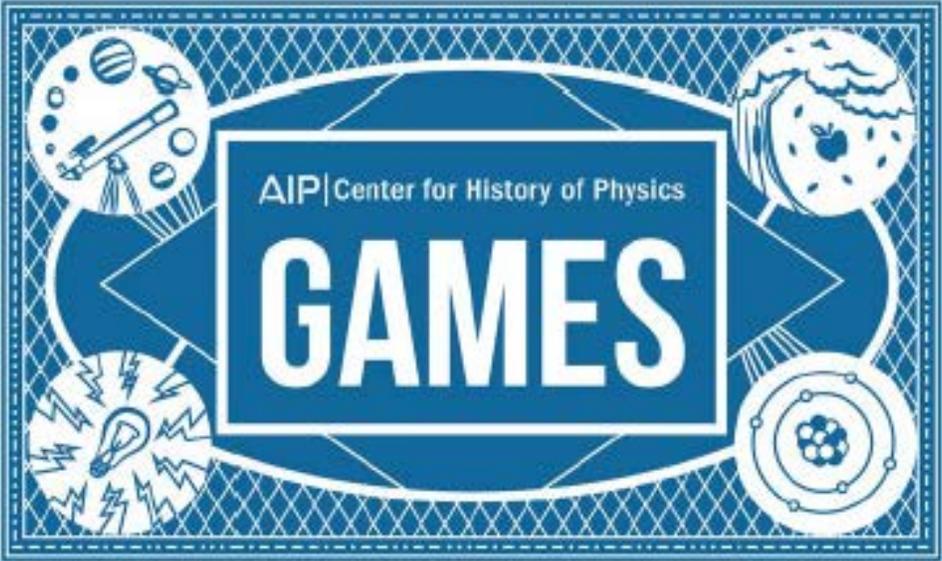
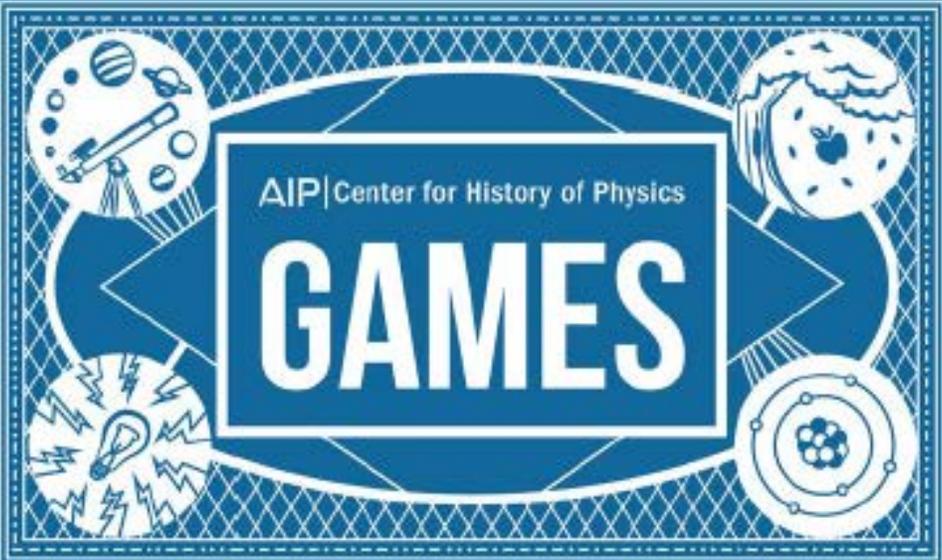
1455

Nicolaus Copernicus is born.

1473

Portuguese sailors are the first Europeans to sail around the Cape of Good Hope in Africa.

1488



Christopher Columbus makes his first voyage sailing west to what he thinks is Asia. He estimated the Earth was much smaller than it actually is and would have died en route if the western continents did not exist.

1492

The governments of Portugal and Spain agree to the Treaty of Tordesillas, which divided their spheres of influence in the Americas.

1494

Vasco de Gama makes the first successful trade voyage from Europe to India. Previously, all trade between Europe and Asia had been done over land.

1497

