Summer 2009
Issue 86

Battle Point Astronomical Association BPAA

Quarterly

www.bpastro.org Bainbridge Island, WA

Events Calendar

(unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

JUNE

June 3
BPAA Board Meeting 7 p.m.

June 7 ○
John Rudolph Memorial Planetarium Fund Kiwanis Brunch, Wing Point

June 12
Members Meeting 7 p.m., "The Birth and Life of Spiral Galaxies: from Cosmic Radiation to Immigrant Stars," talk by Rok Roskar, UW Graduate Student

June 13
8:30 p.m. Planetarium Show "Cool Constellations" and Star Party

June 15 ◑

June 20
Summer Solstice 10:46 p.m. PDT

June 22 ●

June 29 ◐

JULY

July 1
BPAA Board Meeting 7 p.m.

July 4
Grand Old Fourth in Winslow

July 5
John Rudolph Memorial Planetarium Fund Kiwanis Brunch, Wing Point

July 7 ○

July 10
Members Meeting 7 p.m. (subject to cancellation; check *bpaa@yahoogroups.com*)

July 15 ◑

July 15–19
Mt. Bachelor Star Party
www.mbsp.org

Calendar con't page 2

Regional Star Parties

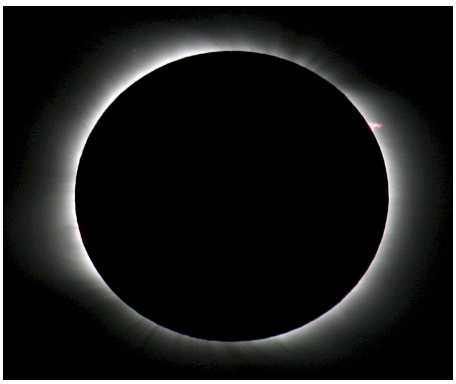
The Darkest Skies Near You

CALENDAR NOTES, SUMMER 2009: After our never-ending winter, it's hard to believe it's time to start planning for the regional dark sky star parties. These gatherings attract hundreds of amateur astronomers, who schmooze, attend seminars offered by experts, obsess about equipment, and stay up all night stargazing. The Mount Bachelor Star Party leads off for the big three, July 15–19. The big news this year is that it's not at Mount Bachelor, but instead, at a new site near Sunriver. Check out the details at *www.mbsp.org.*

The Table Mountain Star Party is scheduled for July 23–25. You need to register early: attendance is limited to 700 individual attendees. Registration now open and available online at *www.tmspa.com*.

Finally, the Oregon Star Party, which features the darkest skies of the three, will be held August 19–23. The OSP continues to increase its observing award programs, giving the goal-oriented astronomer yet another reason for attending this premier event. Information on the award programs and other activities at OSP are found at *www.oregonstarparty.org,* and on page 2.

The recent end of our 'never-ending' winter also presents us with increased opportunities for viewing the night sky. June marks the transition between the spring and summer constellations. On June 19, Venus, Mars and the Moon will create a beautiful sight in the eastern sky, rising about two hours before dawn. On July 4 and again on July 31, the Moon and the bright star Antares will be paired in the southern sky. On July 25, Saturn and the Moon will make a joint appearance in the west. An August highlight: the Perseids meteor showers. The most reliable of the meteor showers, they seldom disappoint. The Pacific Northwest will miss the biggest event of the summer, a total solar eclipse on July 22, unless of course you can afford one of those expensive eclipse tours advertised in *Sky & Telescope* or on *www.eclipsetraveler.com*.



Solar Eclipse. Photo courtesy NASA

BPAA's monthly planetarium shows continue through the summer, with some new topics. The June presentation will provide an overview of the constellations

con't page 2

July 18
8:30 p.m. Planetarium Show: "Dying Stars and the Fate of our Sun" and Star Party

July 20
40th Anniversary (1969), 1st Man on the Moon (Apollo 11)

July 21 ●

July 23–25
Table Mountain Star Party
www.tmspa.com

July 28 ◐

AUGUST

August 2
John Rudolf Memorial Planetarium Fund Kiwanis Brunch, Wing Point

August 5 ○
BPAA Board Meeting 7 p.m.

August 10
Deadline for Fall issue of *BPAA Quarterly*

August 12
Perseids Meteor Shower Peak

August 13 ◑
August 14 Members Meeting 7 p.m. (subject to cancellation; check *bpaa@yahoogroups.com*)

August 15
8 p.m. Planetarium Show: "Goodbye to the Summer Triangle, Kinda" and Star Party

August 19–23
Oregon Star Party
www.oregonstarparty.org

August 20 ●

August 27 ◐

Any member who is planning to observe can invite others to join in by sending an email to *bpaa@yahoogroups.com*. To join our email group, send an email with your name to *bpaa-owner@yahoogroups.com* and we can enroll you. If you want to have web access to the messages and files, you can join the Yahoogroups by clicking the register link for new users on *http://groups.yahoo.com/*. Request to join at *http://groups.yahoo.com/group/bpaa/*. The system will send us a message, and we'll approve your request after we verify your membership.

CALENDAR, con't from p.1

and their related stories. In July, the show will focus on how a star like our Sun transitions from a normal star to a brilliant showcase of color and light during the end stages of life, and in August, we'll monitor the exit of the Summer Triangle from the celestial stage.

In June, the members meeting will feature a graduate student from the University of Washington Astronomy Department, Rok Roskar. Rok will present us with some fundamental ideas about the growth of galaxies like our own Milky Way, and then explain why stars like our Sun may be galactic travelers, rapidly changing their residences within the Milky Way.


Spiral Galaxy NGC 2841 courtesy NASA

Finally, here's something for all astronomers with opposable thumbs. Plans are underway to institute an AstroTwitter Web site. Based on the Twitter.com concept, AstroTwitter will ask "What are you observing?" Current plans include links to Google Maps to plot both where viewers are located and what they're viewing. There is much ongoing discussion of the aging of the amateur astronomical community and the need to interest new generations of observers. Perhaps AstroTwitter will lead the way. Information on this concept and other interesting projects is available on the International Year of Astronomy Web site *http://astronomy2009.us/projects*.— *Diane Colvin, BPAA Events Manager*

Star Burgers and Other Joys of Summer Astronomy

PRESIDENT'S MESSAGE: We are finally beginning to get some clear nights, making it worthwhile to set up a telescope for some backyard astronomy. And it is that time of the year when many begin to finalize summer star party adventures. For information on the three largest events in our area see "Calendar Notes," page 1.

As I write this the Table Mountain Star Party (TMSP) still has space but that could change anytime. The advantage of the TMSP site is its proximity to Seattle; the downside it that the site has become increasingly more light-polluted over the years with many light domes from surrounding small cities. The Mount Bachelor Star Party in Oregon has moved to a different site this year that I hope will be less windy and wet. I am not familiar with the new site, but it will likely have good southern horizons and dark skies. Though if you want dark skies and great viewing horizons nothing beats the Oregon Star Party (OSP). The only downside is that the site is remote, over an hour's drive to the nearest commercial area. It is sanicans only, usually

con't page 3

windy and dusty, with hot days and cold nights. Suffice it is say that one needs to be prepared. Offsetting these somewhat stark conditions, OSP

If the cuisine and the lack of sleep do not stop your heart…the night views will.

offers wi-fi, showers, an espresso vendor, and a food vendor. Prepaid meals are available, but I recommend a steady diet of 'Star Burgers,' replete with bacon, cheese, and grilled onions, direct from the food stand. Did I mention the strawberry short cake? And that the stand is open until about 3 am? I suggest pairing the starburger with triple mocas—one about midnight and another about closing time.

They also serve tasty breakfasts to order with the requisite amount of grease and carbs. If the cuisine and the lack of sleep do not stop your heart, I am certain the night views will.

For really dark skies, I'd recommend volunteering as an astronomer in one of our national parks. Diane and I volunteered a few years ago at Bryce National Park in Utah. It was public outreach on steroids. We recently received a plaque recognizing our service. I am telling you this not to brag about the plaque, but to encourage you to consider serving as an astronomy ranger. At Bryce, we got to experience some of the darkest skies in North America. Our duties included guiding hundreds of Park visitors through the night sky each night and conducting solar tours during the day. If you're interested in more information on Bryce's program go to *www.nps.gov/brca* and click on Astronomy Programs, then on Astronomy Volunteers. See also the newsletter article we wrote on our experience at Bryce: *BPAA Newsletter Spring 2006* pp 5–6, *www.bpastro.org/uploads/bpnlr73.pdf*.

Finally, a reminder about BPAA's loaner telescopes. We have a wide array of scopes available, some perfect for beginners, others suitable for more experienced stargazers. If you wish to check one out, contact Russ Heglund. Also we are nearing completion of the 20"portable telescope. When this instrument is set up in a dark sky location it will provide views of objects many of us have rarely seen. Enjoy the summer, and get out there and stargaze, whether it be from your own backyard, from the Ritchie Observatory or a dark and remote site. —*Harry Colvin*

Picture Gallery

ITALY SPRING 2009

Ancient Clocks and Other Instruments

The clock above is at the Piazza San Marco in Venice. It is by far the most elaborate one I saw. It appears to be a fully functional Ptolemaic clock. I took the photo 3/26/2009 at about 17:45. The earth is at the center. The moon is near new and is very close to the position of the sun. The sun is approximately placed correctly in the constellations. My guess is that it has not compensated for the 25,000 year precession cycle.

The clock face to the right was in my guide book with the following description: "San Giacomo di Rialto clock face (1410) which has been a poor timekeeper over the years, adorns one of Venice's oldest churches." I really like these 24 hour clocks. If you have a modern clock that is broken, at least it's correct twice a day. When you have an ancient clock like this one and it is broken, it's only correct once a day. The time of the photo is approximately correct.

con't page 4

In Europe, but particularly in Italy, there seems to be a church every few hundred feet. In Venice, they were everywhere. It seems like there are more churches in Venice (and Florence and Rome) than Seattle has coffee stands. When we walked to catch our train in Venice about noon, we heard, off in the distance, a few church bells and, then the sound grew, until, for about ninety seconds, there was a crescendo of church bells across the city.

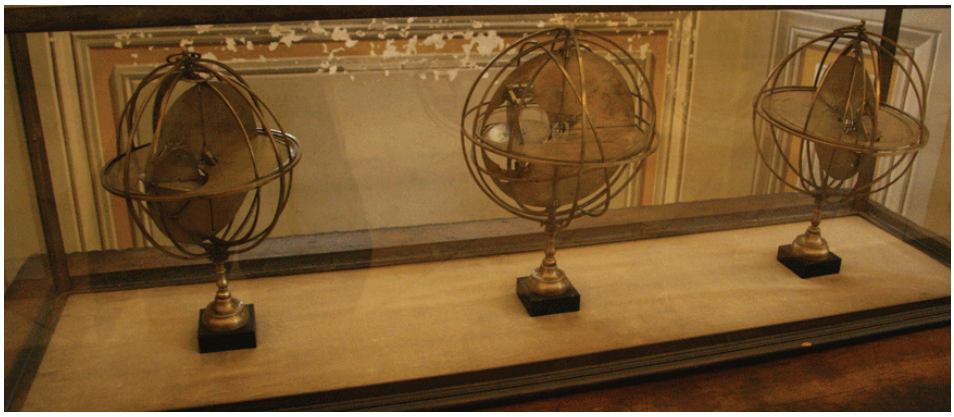
I thought Russ (*ed. note: Russell Heglund, BPAA Sundial Czar—see article p. 5.*) would get a kick out of the sundial above. It is in Florence on the side of the "Istituto Geografico Militare" and includes seasonal and analemma compensations. Unfortunately, it was raining when I saw it, so I cannot tell if it is accurate.

To the left, the clock that is inside the Domo in Florence. The exposure is 0.6 seconds (handheld) so it is a little blurry. The photo was taken about 17:00 so my guess is that this clock is broken. An interesting item is that the first hour is at the bottom of the dial. The two clocks in Venice had their first hour on the right side of the clock.

Modern clocks on the island of Murano (l) and the island of Capri (r).

From the Vatican Museum: Below, an astrolabe.

To the right, a "Planetarium". This device tracks the motion of the planets in the Ptolemaic system with a very elaborate clockwork.



Also from the Vatican Museum, a series of armillary spheres.—*Stephen Ruhl*

Battle Point Sundial Model on the Berm and Sundial Workshop in the Observatory

BPAA hopes to install a large bowstring sundial on the grounds of the Ritchie Observatory in Battle Point Park. On May 16, 2009, a sunny Saturday, we temporarily placed a full-sized wooden model of our proposed sundial near the top of the berm north of the Observatory. Bill Baran-Mickle, the designer, assembled a full-scale plywood model—10 ft in diameter, and about 8 ft tall—with the help of his sons and friends.

About 20 people and a reporter from the Bainbridge Review (read his report and see a video at *http://www.pnwlocalnews.com/kitsap/bir/lifestyle/45299687.html)* gathered on the berm to look and learn

Bill Baran-Mickle, sons, & friends set up the model.

Russ speaking by the sundial model.

about the proposed sundial. I gave a short history of the park and the construction of the Observatory, and explained that the sundial design was approved by the BPAA Board.

The model attracted attention. People wandered over from the soccer fields, hockey rink, and picnic areas, to find out what it was. Which is just what we hope for the final, metal sundial: that it will attract people to come and look and learn. We plan to provide informational plaques about Earth's motion in the solar system and its relationship to the Sun.

After an hour or so, we moved to the Observatory meeting room for a short sundial workshop. First we gave a slide tour of sundials around the world: wall dials, pocket dials, large horizontal dials in plazas, small antique dials. Following the 'sundial tour of the world,' we handed out instructions on two methods of building a horizontal garden dial, with an explanatory slide show. We also helped kids and adults constuct

Making sundials.

their own small paper "pocket" sundials, with a little help from the presenter.

Now we need to raise the money to build the sundial on the berm. If people want to help or contribute, they can contact me at *rmheglund@yahoo.com*, send contributions to BPAA Sundial Project, PO Box 10914, Bainbridge Island, WA 98110, or contribute through *www.bpastro.org*. — *Russell M. Heglund*

GDR postage stamp commemorating Kepler.

Johannes Kepler (1571-1630)

SEEING STARS: *Astronomia Nova* (*The New Astronomy),* published by Johannes Kepler in 1609, is as basic to establishing astronomy as a scientific discipline as Galileo Galilei's observations with a telescope that same year.

As you may have heard, the International Year of Astronomy is commemorating these men and their discoveries this year, 2009.

Kepler and Galileo had much in common. They never met, but they wrote each other. Neither of their families was well off, and both boys were encouraged to go into the ministry, in part to find financial security. Both soon left the ministry, and both ran afoul of the established belief of a geocentric universe, to their own loss. For both, it was their genius to discover and understand something they were not looking for. Both recognized each other's contributions to astronomy although they didn't always agree. Their personalities, on the other hand, had little in common: Galileo could be blindly proud while Kepler could laugh at himself.

Many details of Kepler's life are known because he kept a chronicle that has survived along with much of his correspondence. They show him as a keen scientist and acute observer of himself and others. His childhood was difficult: His father was a soldier of fortune who deserted his family when Kepler was five. His mother (according to her son) was a slovenly, poorly-educated, quarrelsome gossip. His grandfather, in whose crowded house he lived, was arrogant and licentious; one aunt was poisoned; one was a wastrel; one was burned at the stake as a witch— later his mother escaped the same fate thanks to Kepler's defense. Kepler was a sickly child, suffering from smallpox which left him with crippled hands and poor eyesight. His skin was covered with running sores. Nor did he have a great opinion of himself. He was a hypochondriac, and compared himself to a dog that grabbed and wolfed down whatever he saw, growled when it was taken away, and barked at scoundrels. Like a dog he disliked baths, bathing once only, he reported, at the insistence of his wife. (He thought it nearly killed him.)

In school his classmates bullied him, and he responded by hating them heartily. Perhaps it was the contrast between the scruffy child and his inescapable mathematical genius that provoked his schoolmates' taunts. And perhaps he not only bothered them with his incessant "whys?" but also committed the unforgivable sin of understanding more than his teachers. Although he was slower to learn Latin than most children his age, when he finished university at the age of 23, he was appointed professor of mathematics and astronomy at the university in Graz.

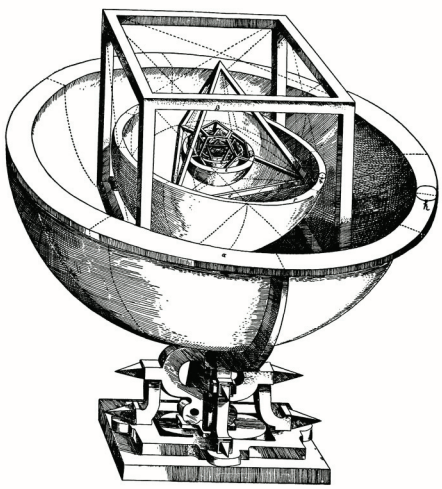
At that time astronomers were expected to make astrological predictions, and one of his first forecasts at Graz was of a cold winter and an invasion by the Ottoman Turks. Both happened, and as a result Kepler's reputation and his pay soared. However, he also saw himself as a mule that refused to put his foot into the dirty pool of horoscopes until he was cursed and beaten.

He …saw himself as a mule that refused to put his foot into the dirty pool of horoscopes until he was cursed and beaten.

Kepler's undergraduate professor at the University of Tübingen, Michael Mästlin, who taught the hallowed Ptolemaic geocentric version of astronomy also taught him the controversial theory of Nicholas Copernicus' that the planets circled the Sun. It was Kepler's acceptance of the Copernican heliocentric system that excluded him from the ministry. It also set him questioning established beliefs.

One day, teaching geometry, he was suddenly struck with the similarity between the ratio of two circles to the distance of Jupiter and Saturn to the Sun. He had been showing the class the circles

both inscribed inside and outside a triangle. The larger circle having twice the radius of the inner he realized was comparable to Saturn's orbit of twice that of Jupiter. (Almost.) Kepler thought he had solved one of the great riddles of the universe, even though he knew the mathematics needed a bit of tweaking. Then he went on to see the relations in cubic terms. Doing so he substituted the five regular solids of classical geometry: a sphere to represent Saturn's orbit, a tetrahedron between it and Jupiter, a square between Mars, an octahedron



Keplerian model of the Solar System.

for Earth, a dodecahedron for Venus, and an icosahedron for Mercury. He was sure he had shown not only that the Copernican theory of a heliocentric system was right, but also that there were six planets and six only. He never gave up either idea. He published his first book, *Mysterium Cosmographicum* (*The Cosmic Mystery)*, in 1596 as his proof.

The facts are that the planets' orbital sizes have nothing to do with squares and icosahedrons, that there happen to be more planets than Kepler knew about, and that these parts of Kepler's ideas were total nonsense. However, Kepler the mathematician intrigued both Galileo and another astronomer, Tycho Brahe, who in 1600 invited Kepler to help him finish his great work of astronomical tables. Kepler fit his needs even though the two disagreed about Copernicus. The collaboration was cut short by Brahe's untimely death the next year.

Fortunately, Kepler managed to continue working with Brahe's data, first in order to determine the orbit of Mars. He began using the conventional model of circles about circles to explain Mars' retrograde movements. The data did not fit the model. Out of the blue, he saw what he was not looking for: that rather than a circle, the orbit of Mars fit an ellipse, with the Sun at one focus of the ellipse. Going on from that, he got the idea that the Sun radiated a magnetic power (he called it a "soul," first, but changed that to "force") which weakened with distance and which could be measured mathematically. (It was left to Newton to call it gravity.)

Using the aphelion (farthest) and perihelion (nearest) measurements of the Earth and Mars, he found that the planet's movement sped up as it moved toward the Sun, and slowed as it moved away. He published his ideas, with a typically detailed discussion of how he arrived at them—basically, describing the scientific method—in *Astronomia Nova.*

These ideas were the first two of Kepler's Laws (which shortly he applied to all the planets):

1. The orbit of a planet about the Sun is an ellipse with the Sun at a focus.
2. A planet's movement is inversely proportional to its distance from the Sun.

Ten years later Kepler published another book, *Harmonices Mundi* (*The Harmony of the World)*, in which, among other discussions, he used the relations between the sizes of the orbits of the planets and the length of time it takes them to make one complete orbit around the sun (sidereal period) to show a third fundamental geometric measurement:

3. The square of a planet's sidereal period is proportional to the cube of the length of its orbit's semi-major axis. Or, $P^2 = a^3$.

(Others later realized that this also suggests that the nearer the planet is to the Sun the shorter will be its year.)

In 1628 Kepler finally published Brahe's data as the *Rudolphine Tables*, the most comprehensive set to that time of specific predictions for the locations of the stars and planets (ephemerides). With it he added 228 more stars to Brahe's original 777. Its remarkable accuracy made it the standard for three centuries.

The quality and quantity of Kepler's "Firsts" is astounding. Kepler is considered the founder of modern optics: He explained how the eye sees by refraction; he explained how both eyes enable us to see in depth (parallax); and he was the first to explain how a telescope works. His 'Laws' are the first universal, verifiable and precise "natural laws." He was the first to derive logarithms based solely on mathematics. He was the first to connect the tides and the Moon, the first to coin the word "satellite," and the first to say that the Sun rotates on its axis.

He had a variety of interests beyond the stars: As he watched wine being measured at his wedding he started puzzling at the mathematics of measuring a contained liquid, and then wrote up his calculations in *The*

con't page 8

KEPLER, con't from p. 7

Stereometry of Wine Barrels, which has led to infinitesimal calculus. He was interested in religion, but not slavish to it. He translated the motions of the planets into music. Nor do these exhaust the list.

Kepler Space Telescope image courtesy NASA

NASA has named the space-based telescope it sent into space on March 6, 2009 "Kepler" in recognition of Kepler's contributions. With it scientists hope to find a number of Earth-sized exoplanets circling their stars at a distance hospitable to life.* The craft will focus on the region of the constellations of Cygnus and Lyra: these are in a location similar to our solar system relative to the center of our galaxy and close to the galactic plane. The spacecraft is expected to make detailed measurements over at least 3 ½ years.

Both Johannes Kepler's and Galileo Galilei's ideas are indispensible to the work of scientists in many disciplines today. They have enabled others to question, reason, and arrive at theories that lead to new understandings. Will we have their insight to understand any unexpected "New Astronomy" that the Kepler Spacecraft may find?
—*Anna Edmonds*

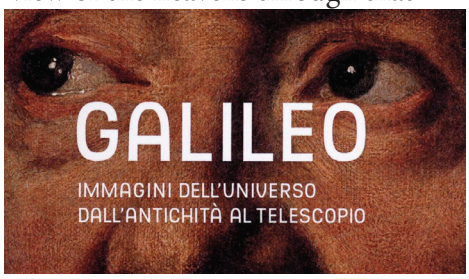
*The presence of such exoplanets can be determined by measuring a star's apparent magnitude as an object transits it. The degree of change in brightness can measure the planet's mass. The timings of the transits give information about the planet's orbit and an estimate of its temperature.

Sources:
Encyclopedia Britannica, 11th edition, "Kepler" *http://galileo.phys.virginia.edu/classes/109N/1995/lectures/kepler.html*
Kolb, Rocky: *Blind Watchers of the Sky.*
Kepler Mission: *kepler.nasa.gov/johannes/gap_system.org/~history/Biographies/Kepler/html*

The International Year of Astronomy A Hometown View

Towards the end of 1609, Galileo Galilei pointed a telescope towards the sky and looked at the moon, Venus, Jupiter, and (via projection) the Sun. His discoveries turned the view of man's place in the universe on its head. Western Civilization's geocentric view of the universe was lost.

The International Year of Astronomy (IAY) celebrates the 400th anniversary of Galileo's first view of the heavens through that



Exhibition logo (translation: Galileo: Images of the Universe from Antiquity to the Telescope)

telescope. Florence, the city Galileo called home, has put an exhibit documenting the human view of the earth's place in the heavens prior to the the telescope to commemorate the IAY. This exhibit runs from March 13th through August 30th at the Plazzo Strozzi.

The exhibit is divided into sections, each representing different human views on the cosmos through recorded history. The first dates back to the dawn of astronomy. I was most impressed by the cuneiform tablets dating back more than 2000 BCE. The tag in the museum said that some of these spoke of the phases of the moons and the ill omens of eclipses. Imprecise,

Tablet of the Sun King; 860-850 BCE. Gray shale.

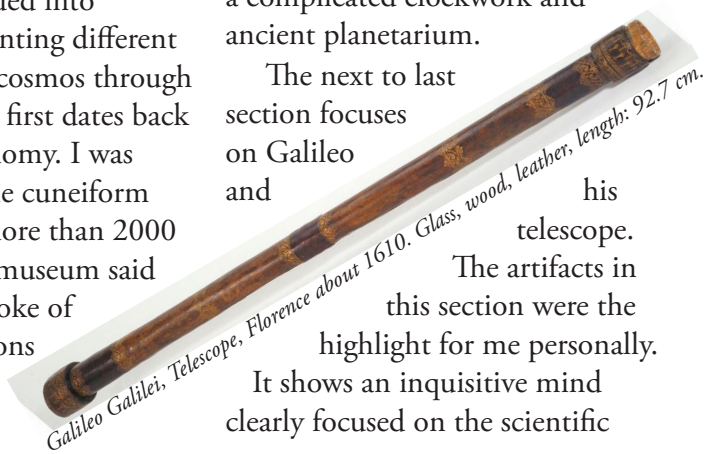
but unless you can read ancient cuneiform, you have to trust the translation.

Other sections describe the design of the spherical universe developed from ancient Greece (Plato and Aristotle) and develop the Greek idea of the geometric cosmos (Ptolemy). Other sections are on Islam, the Christianization of the cosmos, and astronomy's rebirth with Copernicus' heliocentric theory and Tycho Brahe's observations.

Celestial globe (known as the Kugel Globe), the second century BC - I century AD Silver, Diameter: 6.3 cm.

One exhibit from this era that particularly fascinated me was an animation of how they think the Antikythera mechanism worked. This mechanism from about 150-100 BCE is believed to be a complicated clockwork and ancient planetarium.

The next to last section focuses on Galileo and his telescope. The artifacts in this section were the highlight for me personally. It shows an inquisitive mind clearly focused on the scientific



Galileo Galilei, Telescope, Florence about 1610. Glass, wood, leather, length: 92.7 cm.

con't p. 9

The Rolex of its day: A sundial book, sixteenth-century Germany. Brass, silver and gold; 6.4 x5 cm.

Six celestial charts in gnomic projection, J.G. Doppelmaier, 1742. Colored engraving.

method to enhance his (and thereby humanity's) knowledge of the universe.

One of the two telescopes that Galileo used that are still in existence is displayed. The objective lens is actually mounted in carved ivory plaque. Unfortunately, the objective lens was broken in the 17th century so we are unable to accurately reproduce what Galileo saw. In modern terms, you might call the optics 'substandard.' He apparently stopped down the lens to increase resolution and get rid of some chromatic issues.

Several of his notebooks of his observations of the moon, Jupiter, Saturn, and the Sun were on display. The historical significance of his notebook from early 1610 echoed in my mind as I gazed over the scribbled record of his observations of Jupiter and its moons. Galileo also used a projection technique to record images of the sun and its spots. His sun images include an impressive amount of almost photographic detail.

In a different era, they had a different concept of how to honor heroes. At left, what I would consider a ghoulish "pull my finger" desecration. The caption says it all.

Parallel to these scientific developments, the technology of the printing press was influencing society. These Doppelmaier engravings show the ancient constellations. You may have seen them before. Note that the star positions and brightness are recorded on the sides—an early attempt to bring order to the stars.

Middle finger of the right hand of Galileo, about 1737. Marble and glass.

From an astronomical point of view, a more significant item in the collection is a first printing of the Uranometria, the definitive star chart of its day. You can buy an updated version from Sky Publishing. The Uranometria was developed by J. Bayer who originated the systematic naming of stars,(i.e. Betelgeuse = alpha orionis, Rigel = beta orionis, etc.) that is used to this day.

The last section of the exhibit transitions to Kepler and Newton (who was born in 1642, the year Galileo died) marking the ascendence of modern science.

Some personal observations: One unfortunate aspect of the exhibit was that it did not allow photography. (The images here are from the press kit, and I was unable to include many interesting artifacts.)

The atmosphere of this exhibit was different from the other museums we visited in Florence and the rest of Italy. When you go to the Uffizi or the Vatican, ninety percent of the people are tourists and English seems to be the dominant language. The Plazzo Strozzi does not host fixed exhibits. Their shows are transient. As a result, 90 percent of the people in the museum were Italian and I rarely heard any English spoken.— *Stephen Ruhl*

10–Summer 2009

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In this Issue

Columns

In Brief

Feature

BPAA Quarterly is a publication of the Battle Point Astronomical Association. Submissions due on the 10th of the month before the quarter begins: quarters begin December, March, June, and September. Query newsletter@bpastro.org. Send graphics as separate files. Newsletter Editor **Vicki Saunders**.

Battle Point Astronomical Association
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Bainbridge Island, WA 98110

What does this object have to do with the International Year of Astronomy? *(page 9)*

BPAA would like to thank One Call for All for their generous support