WEST VIRGINIA UNIVERSITY
EBERLY COLLEGE OF ARTS AND SCIENCES
THE DEPARTMENT OF PHYSICS
TOMCHIN PLANETARIUM AND OBSERVATORY

Mountaineer Skies

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On **January 3, 2011**, the Earth will be at **perihelion**. Perihelion occurs when the Earth is closest to the Sun in its orbit. Six months later, on July 4, 2011, the Earth will be at **aphelion** or the day when the Earth is farthest from the Sun. The difference is not very large, just over 3 million miles. If the distance from the Earth to the Sun is constant, that would indicate the Earth's orbit is circular. However, since there is a difference, this suggests that the orbit is elliptical or a flattened circle.

Also on **January 3, 2011** the **Quadrantid Meteor Shower** peaks. The meteor will appear to come from the constellation **Bootes**, the Herdsman, and have an estimated maximum incidence rate of about 210 per hour.

The **Year of the Rabbit**, the **Chinese New Year,** begins on **February 3, 2011**.

Daylight Saving Time begins on **March 13**. This is the day when you set your clocks ahead one hour and is also a good time to change the batteries in your smoke detectors.

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In The Sky This Quarter

Visible Planets in the Night Sky

Beginning of January, 2011

	Const	Rise	Transit	Set	Mag
Sun		07:41	12:23	17:06	-26.8
Mercury	Oph	06:00	10:51	15:45	0.0
Venus	Lib	03:57	09:07	14:17	-4.5
Mars	Sgr	08:17	12:58	17:39	1.2
Jupiter	Psc	11:27	17:25	23:19	-2.4
Saturn	Vir	00:50	06:38	12:30	0.8

Beginning of February, 2011

	Const	Rise	Transit	Set	Mag
Sun		07:27	12:33	17:39	-26.8
Mercury	Sgr	06:46	11:32	16:14	-0.4
Venus	Sgr	04:32	09:22	14:11	-4.3
Mars	Cap	07:35	12:37	17:39	1.1
Jupiter	Psc	09:37	15:42	21:43	-2.2
Saturn	Vir	22:51	04:38	10:26	0.6

Beginning of March, 2011

	Const	Rise	Transit	Set	Mag
Sun		06:52	12:32	18:12	-26.8
Mercury	Aqr	07:11	12:49	18:28	-1.6
Venus	Cap	04:54	09:50	14:45	-4.1
Mars	Aqr	06:44	12:13	17:42	1.1
Jupiter	Cet	08:01	14:14	20:23	-2.1
Saturn	Vir	20:56	02:45	08:34	0.5

Oph	Ophiuchus, The Serpent Holder
Lib	Libra, The Scales
Sgr	Sagittarius, The Archer
Psc	Pisces, The Fishes
Vir	The Maid
Cap	The Goat
Aqr	The Water Bearer
Cet	The Whale or Sea Monster

About: The Amazing Antikythera Device, Part 2

In the last edition (**October – November – December, 2010**) we learned how the **Antikythera device** was found and how, after x-raying it, it was discovered to be essentially a planetarium analog computer containing at least 30 intermeshing gears and moved by a hand crank located on the top or side of the device. The crank was used to set the date and time. But specifically, what does it do? (Much of the following information comes from the **Antikythera Mechanism Research Project).**

Side One contains two main dials, one inside the other, and features the following:

A. **The outer dial contains an Egyptian yearly calendar of 365 days. It also has the ability to add a day every fourth year. (We call it a leap year.)**

B. **The inner dial is divided into the significant signs of the Zodiac written in Greek.**

C. **There are metal arrows radiating from the center of the dials that point to the location of the Sun, Moon, and almost certainly the five visible planets: Mercury, Venus, Mars, Jupiter, and Saturn.**

D. **It also contained a spherical representation of the phases of the Moon. It is about the size of a marble.**

E. **Additionally it has a very early almanac that shows the rising and setting of significant stars.**

Side Two contains two separate main dials, an upper and lower one, each configured in a spiral.

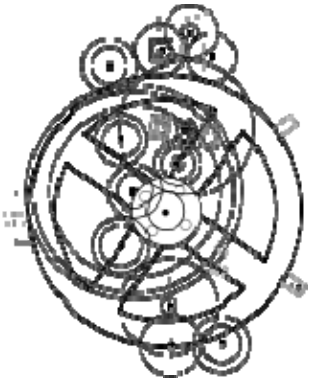
A. **The upper dial consists of 47 divisions per turn displaying the 235 months of the 19 year Metonic cycle of the Moon. This dial contains a smaller subsidiary dial which displays the 76 Callippic cycle. (One Callippic = four Metonic cycles.) The thing that makes the Metonic cycle interesting is that every 19 years the Moon cycle repeats itself. If at the beginning of the cycle the Moon is full, then in 19 years it will be full again in the same constellation and the same longitude. That is the reason it is called a cycle.**

B. **Inside the upper spiral are two small arrows which appear to keep track of when the next Olympic Games begin.**

C. **The lower spiral dial is divided into 223 months divisions showing the Saros eclipse cycle. Like the upper dial it also contains a smaller subsidiary dial that shows the 54 year Exeligmos cycle. (One Exeligmos cycle = 3 Saros cycles). They recognized and understood that eclipses of both the Sun and the Moon are cyclical.**

It took a lot of years of data collecting by a lot of people to realize that these events happen in predictable cycles.

As you can see, this is a very sophisticated machine. **The Antikythera Mechanism Research Project** investigation continues**.**



A schematic of the artifact's mechanism from Wikipedia.Org

This is a product of a real genius. Who was he? The first (and only) guess would the **Archimedes of Syracuse**, Greece. However, as he died in 212 B.C, he could not have made the device since it is thought to have been made around 150 B.C., some 70 years after his death. It is unlikely that the person will ever be known, but an appreciation for his incredible work will remain.

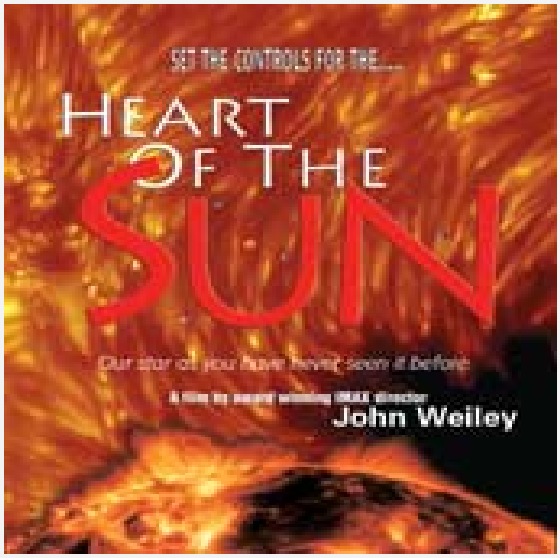
As I do not have a model that I can make a drawing of, try these sites for more visual information about this incredible mechanism.

http://www.youtube.com/watch?v=DiQSHiAYt98

http://www.youtube.com/watch?v=znM0-arQvHc&feature=channel

There are other sites. Just search for them.

2011 Planetarium Shows



January 8 & 22, 2011 **7:00 P.M.** ***Heart of the Sun*** **8:00 P.M.** ***Amazing Astronomers of Antiquity***	**February 11 & 25, 2011** **7:00 P.M.** ***Heart of the Sun*** **8:00 P.M.** ***Amazing Astronomers of Antiquity***	**March 11 & 25, 2011** **8:00 P.M.** ***Heart of the Sun*** **9:00 P.M.** ***Amazing Astronomers of Antiquity***
April 8 & 22, 2011 **8:00 P.M.** ***Heart of the Sun*** **9:00 P.M.** ***Amazing Astronomers of Antiquity***	**May 13 & 27, 2011** **8:00 P.M.** ***Heart of the Sun*** **9:00 P.M.** ***Amazing Astronomers of Antiquity***	**June 10, 2011** **8:00 P.M.** ***Heart of the Sun*** **9:00 P.M.** ***Amazing Astronomers of Antiquity***

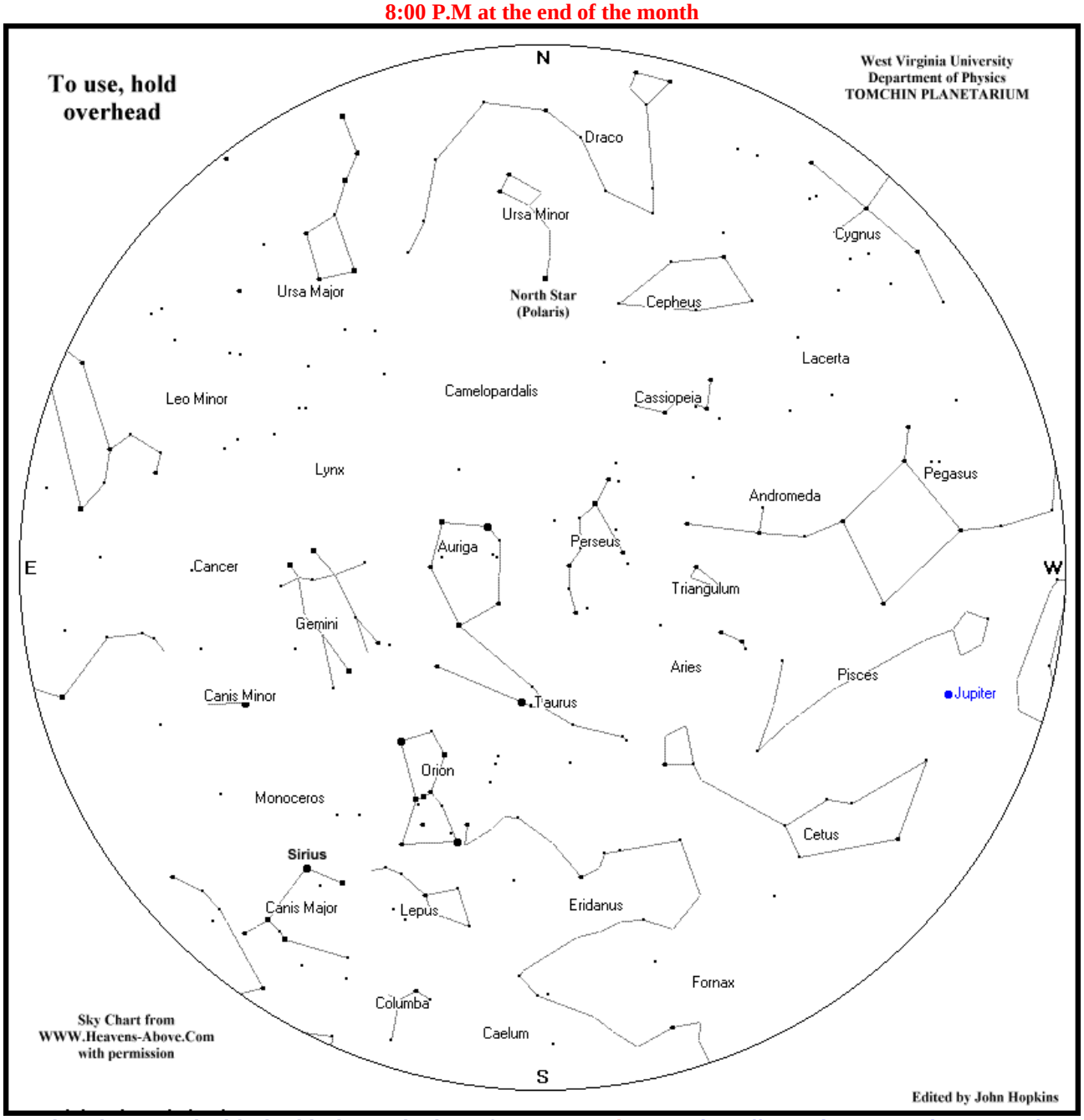
For those who are interested in bringing a group, such as schools or scouts, during the day, please call for more information. These shows are usually given on Tuesday or Thursday mornings.

For further information or reservations, please call John Hopkins at (304)293-3422, extension 1443 or by email at: jhopkins@mail.wvu.edu

Selected Sunrise/Sunset and Moon Rise/Moon Set Times

Date	Sunrise	Sunset	Moon Rise	Moon Set	Moon Phase
Jan 4	7:40 A.M.	5:07 P.M.	7:48 A.M.	5:41 P.M.	New
Jan 12	7:39 A.M.	5:15 P.M.	11:28 A.M.	12:36 A.M.	First Qtr
Jan 19	7:37 A.M.	5:23 P.M.	5:31 P.M.	7:15 A.M.	Full
Jan 26	7:32 A.M.	5:31 P.M.	12:49 A.M.	11:10 A.M.	Last Qtr
Feb 2	7:27 A.M.	5:39 P.M.	6:57 A.M.	5:34 P.M.	New
Feb 11	7:17 A.M.	5:50 P.M.	11:11A.M.	1:24 A.M.	First Qtr
Feb 18	7:09 A.M.	5:58 P.M.	6:49 P.M.	6:57 A.M.	Full
Feb 24	7:00 A.M.	6:04 P.M.	12:56 A.M.	10:35 A.M.	Last Qtr
Mar 4	6:49 A.M.	6:13 P.M.	6:21 A.M.	6:23 P.M.	New
Mar 12	6:36 A.M.	6:22 P.M.	10:41 A.M.	1:11 A.M.	First Qtr
Mar 19	7:25 A.M.	7:29 P.M.	7:52 P.M.	6:55 A.M.	Full
Mar 26	7:14 A.M.	7:36 P.M.	2:40 A.M.	12:17 P.M.	Last Qtr

January 2011 Sky Chart* for:
10:00 P.M at the beginning of the month
9:00 P.M in the middle of the month
8:00 P.M at the end of the month



***Sky Chart used with the kind permission of Heavens-Above at http://www.heavens-above.com/**

The TOMCHIN PLANETARIUM is named in honor of the late Harold Tomchin, of Princeton, W.Va., who made a generous donation to ensure its continuing operation, and whose family continues to support the planetarium for the educational benefit of WVU students, staff, and faculty members, as well as the local community. Contributions can be made in support of the planetarium through the WVU Planetarium Project at the WVU Foundation, Inc., phone (304)284-4000. Thank You.

Edited by John Hopkins
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