Issue 2018-05

IO – May 2018

The Newsletter of the Eugene Astronomical Society

PO Box 7264
Springfield, OR 97475

Next Meeting: *Thursday, May 17*

Giant Telescopes of the Future!

Within ten years, ground-based optical astronomy will undergo a revolution. For 27 years (1948 – 1975) the 5-meter Hale reflector on Mt. Palomar was the largest telescope in the world. Today, *eighteen* telescopes have apertures greater than 6 meters, with *nine* of those having apertures of 8 meters or larger. But by 2025, at least three new telescopes will be in operation with apertures in the range *25 – 39 meters*. This presentation will be a progress report on those giant telescopes, the European Extremely Large Telescope (EELT – 39.3 meters); the Thirty Meter Telescope (TMT); and the Giant Magellan Telescope (GMT – 25.5 meters). Finally, the unique optics, detector, and mission of the Large Synoptic Survey Telescope (LSST – a *mere* 8.4 meters) will be discussed.

EAS

President
Diane Martin (541-554-8570)

Secretary
Jerry Oltion (541-343-4758)

Additional Board members
Jim Murray
John Loper
Andy Edelen

Annual Club Dues $25

EAS is a proud member of the Astronomical League

First Quarter Friday Report

Our First Quarter Friday for April was clouded out, but we were able to convene on Saturday night for a successful evening. 50 people joined a dozen EAS members and telescopes at the College Hill Reservoir for observing the Moon, some springtime double stars, globular cluster M3, Jupiter, and some washed-out looks at springtime galaxies.

The remainder of our First Quarter Fridays for 2018 are:

May 18 (15% lit)	June 15 (6% lit)	July 20 (60% lit)	August 17 (45% lit)
September 14 (29% lit)	October 12 (15% lit)	November 9 (5% lit)	December 14 (44% lit)

April Meeting Report

At our April 19th meeting, Andy Edelen discussed galactic morphology—the shapes of the galaxies and the physics behind those shapes.

Andy began with a bit of the history behind our understanding of the galaxies. William Herschel was possibly the first astronomer to attempt the mapping of the Milky Way, based simply upon its appearance in the Earth's night sky; Herschel had no real way to know about the galaxy's spiral form. The existence of spiral form in galaxies was first understood by Lord Rosse of Ireland, who discovered the shape of the Whirlpool Galaxy, M51, with his 72-inch "Leviathan of Parsonstown" reflector in 1845. But Rosse began to see spiral shape in almost every nebulous object he observed—even in globular clusters! And discovering the shape of spiral galaxies was a far cry from understanding that galaxies were entire island universes unto themselves, as opposed to solar systems in formation (which is how galaxies were thought of until much later).

It was not until Edwin Hubble's work in 1945 that the true nature of the galaxies began to be understood, and with it the importance of those shapes. Hubble created the galaxy classification system often known as "Hubble's tuning fork," a system still in use in somewhat modified form; the left end of the fork consists of elliptical galaxies, with the two "tines" consisting of regular spiral galaxies and barred spiral galaxies (like the Milky Way).

Elliptical galaxies are those without spiral arms or the gas and dust needed for star formation; they usually appear as round glows of varying degrees of ellipticity (hence the name). The degree of ellipticity is measured from 0 (no ellipticity) to 7 (greatest ellipticity), and these are classified and written as E0... E7. Elliptical galaxies consist mostly of older, cooler stars, and appear yellowish or orange as a result. Three other categories—*dE* (dwarf elliptical), *gE* (giant elliptical) and *cD* (superluminous diffuse giant elliptical)—also exist, the former being the most common type of galaxy in the universe and the latter two being considerably rare.

Spiral galaxies are our semantic prototype of galaxies—the kind that everyone thinks of when they picture galaxies in their minds. A spiral galaxy consists of a nuclear bulge, which contains mostly older stars (as in an elliptical galaxy) and one (rarely) or more winding spiral arms, which contain hydrogen gas, dust, and younger, bluer stars. The forms of these arms are caused by density waves, perturbations of gravity caused by the individual motions of billions of stars in the galaxy; the effect is like the movement of cars in a traffic jam, or the ripples in a pond when a stone is thrown in. (Density waves are also responsible for the shapes of Saturn's rings.)

Spiral galaxies are classified by the "openness" of their arms. A galaxy with very tightly-wrapped arms would be classified as *Sa*, while a galaxy with very widespread arms would be classified as *Sc*. There is also a type known as a lenticular galaxy—a lens-shaped galaxy with gas and dust but no spiral arms, which is classified as *S0*. This type is different from an elliptical, which is not flat; even an E7 elliptical is spindle-shaped, rather than disk-shaped.

Barred spiral galaxies are those whose spiral arms extend from the ends of a bar which runs across the middle of the galaxy; the Milky Way is one such galaxy. These central bars were long thought to be highly unstable, but density waves can also account for these semi-stable bars in galaxies. Barred spirals are written as SB and with an *a*, *b*, or *c* designation based on the openness of their arms, just as with "standard" spirals.

A fourth class of galaxies also exists; these are the irregular galaxies, and their primary characteristic is that they have little definable shape. Irregular galaxies are classified as *Irr I* (those with hints of structure) with a subcategory of *Sm* (those with hints of spiral structure, as in the Large Magellanic Cloud; the *m* in the designation stands for *Magellanic*). *Irr II* galaxies have no visible structure at all. *dI* galaxies—dwarf irregulars—also exist, and may coalesce into larger galaxies; our Local Group of galaxies has dozens of dwarf irregulars in it.

The final galaxy classification is that of the peculiar galaxies (written as *Pec*). These are galaxies with distorted shapes, often due to collisions with other galaxies. The peculiar galaxies lie beyond the reach of Hubble's tuning fork, even in its modified versions, as their shapes and the physical causes of those shapes are neither predictable nor easily categorizable.

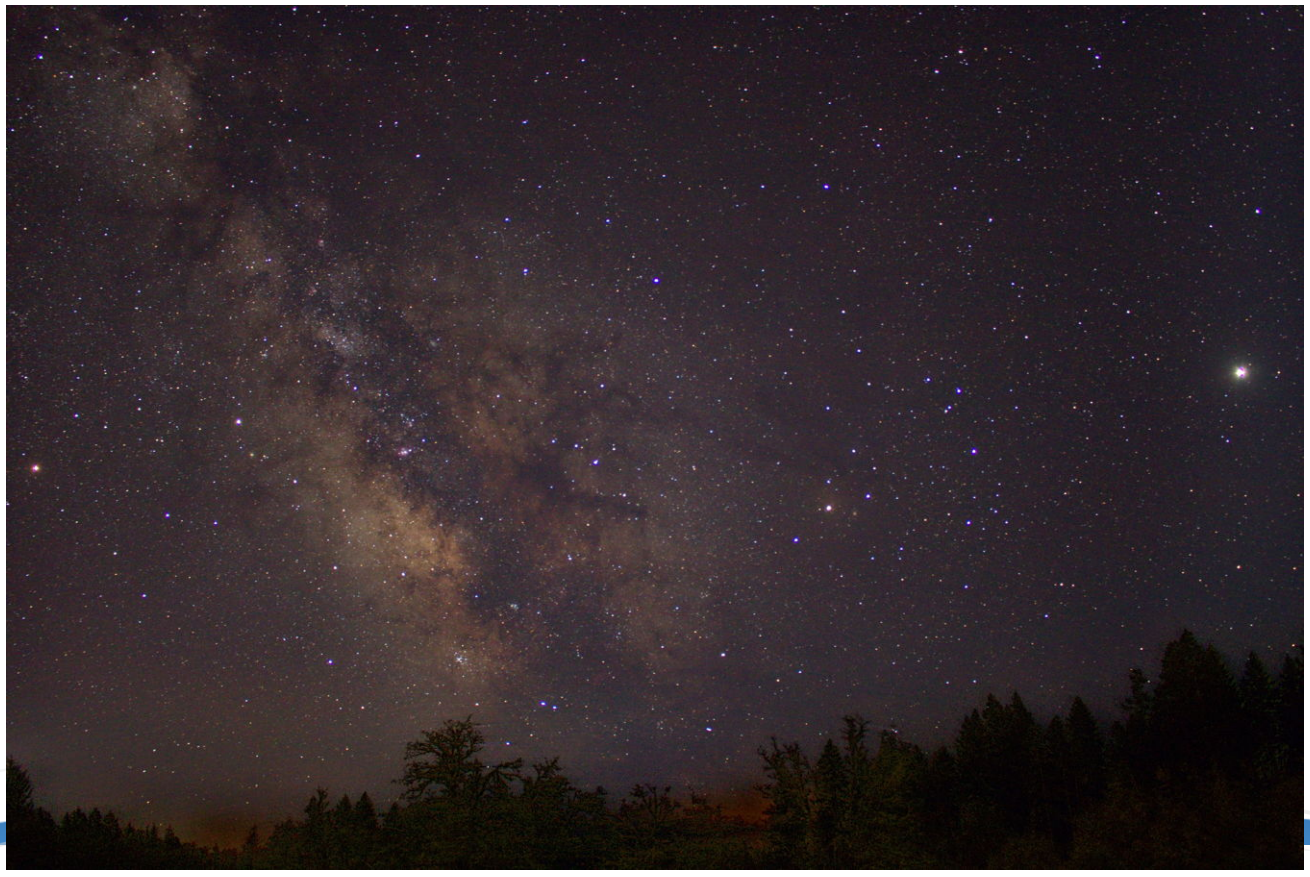
Looking out into springtime night skies brings hundreds of galaxies into the grasp of even modest telescopes. With a little care, it's possible to guess at their type simply by looking at many of them, and to know the physics that shapes them as well.

EAS in the Community

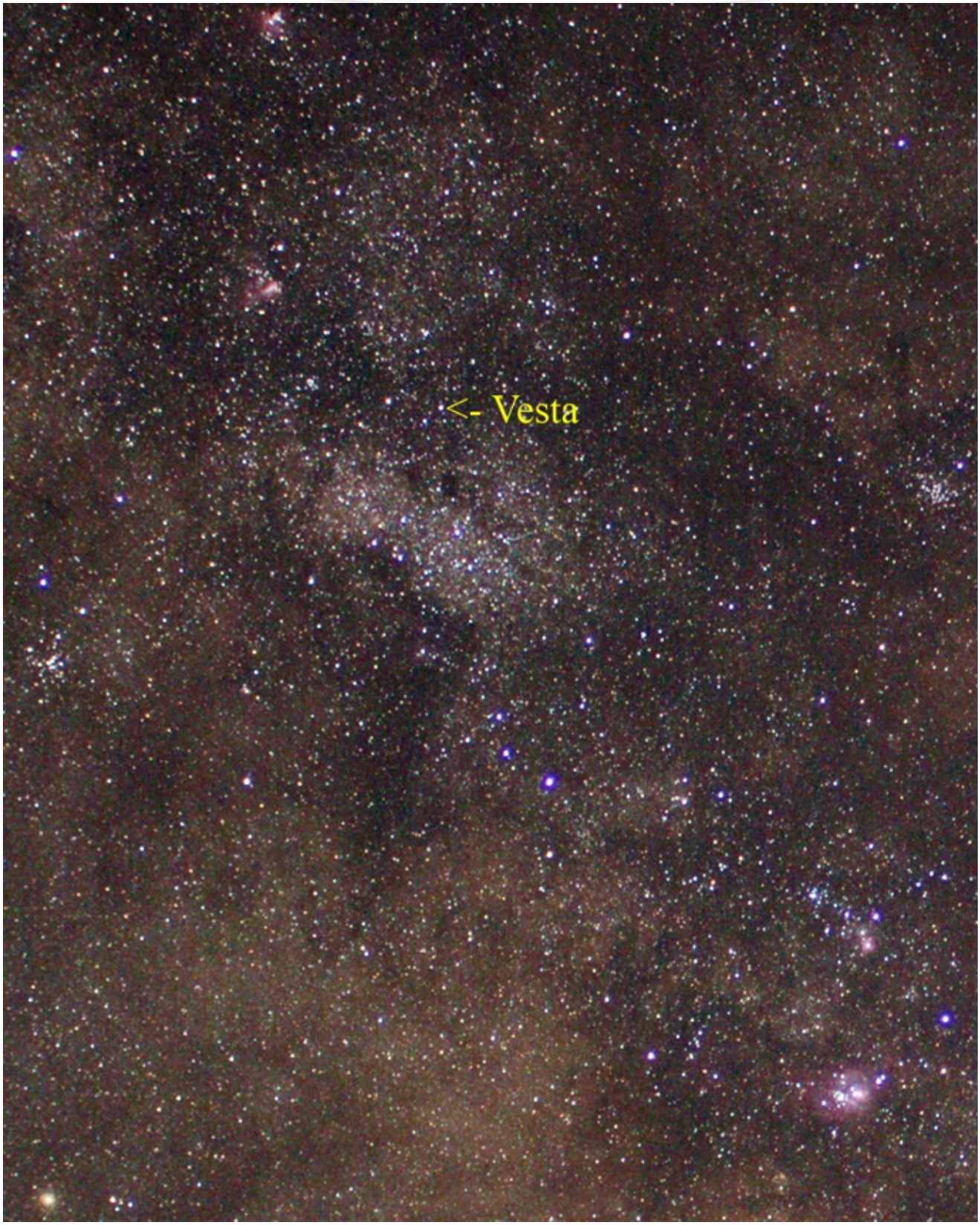
Briggs Middle School in Springfield is hosting a star party for their 8th-grade classes on Monday, May 14th. This will be held at Grove Camp (37028 Shoreview Drive, Dorena OR). EAS Outreach Coordinator Bruce Hindrichs will give the students a presentation on the Universe from 8-8:45 PM, and observing will start around 9:45. There may be more than 50 kids present for this event, so we need all the telescopes and volunteers we can get! Contact Bruce at brucehindrichs@yahoo.com to volunteer. Dorena has dark skies, so the observing should be great!

EAS Members' Gallery

Above: The Moon, May 3rd. Below: Jupiter (right), Mars (left), and the Milky Way. *Photos by Alan Gillespie.*



The Rho Ophiuchi region. *Photo by Alan Gillespie.*



Minor planet Vesta among the Sagittarius Milky Way. *Photo by Alan Gillespie.*

Sun & Moon rise and set for May

Date	MoonRise	Moon Set	Twilight Begin	Sunrise	Sun Set	Twilight End
5/1/2018	22:06	07:26	04:09	06:04	20:16	22:11
5/2/2018	23:05	08:02	04:07	06:02	20:17	22:13
5/3/2018	23:59	08:42	04:05	06:01	20:18	22:15
5/4/2018		09:27	04:03	06:00	20:19	22:16
5/5/2018	00:48	10:17	04:01	05:58	20:21	22:18
5/6/2018	01:32	11:10	03:59	05:57	20:22	22:20
5/7/2018	02:11	12:07	03:57	05:56	20:23	22:22
5/8/2018	02:46	13:06	03:55	05:54	20:24	22:24
5/9/2018	03:17	14:07	03:53	05:53	20:25	22:26
5/10/2018	03:46	15:10	03:51	05:52	20:26	22:28
5/11/2018	04:14	16:15	03:49	05:51	20:28	22:30
5/12/2018	04:43	17:22	03:47	05:49	20:29	22:32
5/13/2018	05:12	18:31	03:45	05:48	20:30	22:34
5/14/2018	05:44	19:43	03:43	05:47	20:31	22:36
5/15/2018	06:20	20:56	03:42	05:46	20:32	22:37
5/16/2018	07:02	22:08	03:40	05:45	20:33	22:39
5/17/2018	07:52	23:15	03:38	05:44	20:34	22:41
5/18/2018	08:50		03:36	05:43	20:35	22:43
5/19/2018	09:55	00:15	03:34	05:42	20:36	22:45
5/20/2018	11:03	01:07	03:33	05:41	20:37	22:47
5/21/2018	12:14	01:50	03:31	05:40	20:38	22:49
5/22/2018	13:24	02:27	03:29	05:39	20:40	22:50
5/23/2018	14:33	03:00	03:28	05:38	20:41	22:52
5/24/2018	15:40	03:29	03:26	05:38	20:41	22:54
5/25/2018	16:46	03:57	03:24	05:37	20:42	22:56
5/26/2018	17:51	04:25	03:23	05:36	20:43	22:57
5/27/2018	18:54	04:54	03:21	05:35	20:44	22:59
5/28/2018	19:56	05:25	03:20	05:35	20:45	23:01
5/29/2018	20:56	06:00	03:18	05:34	20:46	23:02
5/30/2018	21:52	06:38	03:17	05:33	20:47	23:04
5/31/2018	22:43	07:21	03:16	05:33	20:48	23:05

STORAGE JUNCTION

Thank you, Storage Junction

Storage Junction has donated the use of a storage unit for us to hold our loaner telescopes when they're not in use. EAS would like to thank Storage Junction for their generosity and support for our group. Please give them a call if you need a storage space, and tell your friends. Storage Junction is located at 93257 Prairie Road (at the intersection of Hwy 99 and Hwy 36, 3 miles south of Junction City) Phone: 541-998-5177

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Observing In May

May 7, 7:09 PM	May 15, 4:48 AM	May 21, 8:49 PM	May 29, 7:20 AM
Mercury Rise: 5:10 AM	Mercury Rise: 5:04 AM	Mercury Rise: 5:03 AM	Mercury Rise: 5:09 AM
Venus Set: 10:54 PM	Venus Set: 11:10 PM	Venus Set: 11:19 PM	Venus Set: 11:27 PM
Mars Rise: 1:37 AM	Mars Rise: 1:18 AM	Mars Rise: 1:04 AM	Mars Rise: 00:43 AM
Jupiter Rise: 8:16 PM	Jupiter Set: 5:41 AM	Jupiter Set: 5:15 AM	Jupiter Set: 4:41 AM
Saturn Rise: 00:20 AM	Saturn Rise: 11:43 PM	Saturn Rise: 11:18 PM	Saturn Rise: 10:45 PM
Uranus Rise: 5:16 AM	Uranus Rise: 4:46 AM	Uranus Rise: 4:23 AM	Uranus Rise: 3:52 AM
Neptune Rise: 3:43 AM	Neptune Rise: 3:12 AM	Neptune Rise: 2:49 AM	Neptune Rise: 2:17 AM
Pluto Rise: 1:09 AM	Pluto Rise: 00:38 AM	Pluto Rise: 00:14 AM	Pluto Rise: 11:38 PM

All times Pacific Standard Time (November 4, 2018 - March 9, 2019 =UT -8 hours) or Pacific Daylight Time (March 11 - Nov. 3, 2018 = UT -7 hours)

Items of Interest This Month

MAY

5/6 (morning) peak of Eta Aquariid meteor shower

5/7 Io shadow transit from Jupiter rise (8:16 PM) to 10:06 PM

5/8 Jupiter at opposition – up all night

5/14 Io shadow transit 9:50 PM – midnight

5/18 First Quarter Friday star party

5/19 Europa shadow transit (the difficult one) 8:14 – 10:30 PM

5/20 Venus within 1° of M35, Ganymede shadow transit 10:05 – 11:48 PM

5/21 Moon within 1° of Regulus in afternoon. Good chance to find a star by day. Io shadow transit 11:45 PM – 1:55 AM

5/22 Callisto passes over Jupter's north pole late evening thru early morning of 23rd.

5/26 Europa shadow transit 10:50 PM – 1:06 AM

5/30 Io shadow transit 8:07 – 10:17 PM. Ganymede, Europa, and Callisto line up at midnight.

5/31 Io and Ganymede move away from Jupiter in vertical formation all night