



Monthly Notices of the Everglades Astronomical Society



Naples, FL
July 2010

Co-Presidents: Charlie Paul, Rick Piper; **Vice President:** Michael Usher; **Secretary:** Todd Strackbein;
Treasurer: Bob Gurnitz; **Newsletter Editor:** Frank Ligas (EAS.Naples.NewsLetter@gmail.com);
Fack Coordinator: Charlie Paul -- for information on viewing (cpaul651@earthlink.net , 239-410-8192)
Webmaster: Martin Zombeck (mvz@alum.mit.edu)

Home Page: <http://gator.naples.net/clubs/eas>

President's Message

Our first coffee shop meeting of the summer will be at Books-A-Million at 7:30pm on Tuesday, July 14th. For those of you who have not attended before, we simply meet & talk, drink coffee and or eat muffins. The conversations are usually about everything or anything. Come join us. You might even purchase an Astronomy magazine.

I will be speaking at the Rookery Bay Nat'l Estuarine Research Reserve as a part of their summer educational programs "Southwest Florida Connections" presented to the public on July 15th. Beginning Astronomy made easy. These are partnering programs with the Charlotte Harbor National Estuary and Carol Stewart of the Ft Myers Astronomy Club will also be speaking in Ft Myers. If interested in any of these programs check out Rookery Bay's website, www.rookerybay.org

In August we will once again have a coffee shop meeting, then in September we start our new season back at the Norris Center.

The humidity and clouds have made our monthly trips to the Fakahatchee difficult. It seems to clear a bit later. We hope to try again on Saturday July 11th.

Good skies – clean glass.
Co-President
Rick Piper

Dates for the "Fak"

*There are no scheduled dates this month.
Announcements may be made through email if weather permits.*

Sky Events

July 4 – Last Quarter Moon
July 11 -- New Moon
July 18 -- First Quarter Moon
July 25 -- Full Moon

Meteor Showers: **Delta Aquarid**
Radiating from the constellation Aquarius
Morning of maximum: July 29
Hourly rate: 20
Parent body: 96P/Machholz

Next Meeting

July 14, 2010
Time 7:30pm
At the Books-A-Million, Naples, FL

Astronomical Trivia Question of the Month

What is the gravitational wave sky?

- a. a map.
- b. a great place to surf.
- c. ripples in our clouds due to super nova.
- d. gravity from mass less particles.

**Answer on next page.*



Black Holes No Joke

by Dr. Tony Phillips

Kip Thorne: Why was the black hole hungry?
Stephen Hawking: It had a light breakfast!
Black hole humor—you gotta love it. Unless you're an astronomer, that is. Black holes are among the most mysterious and influential objects in the cosmos, yet astronomers cannot see into them, frustrating their attempts to make progress in fields ranging from extreme gravity to cosmic evolution. How do you observe an object that eats light for breakfast?

"Black holes are creatures of gravity," says physicist Marco Cavaglia of the University of Mississippi. "So we have to use gravitational waves to explore them." Enter LIGO—the NSF-funded Laser Interferometer Gravitational-wave Observatory. According to Einstein's Theory of General Relativity, black holes and other massive objects can emit gravitational waves—ripples in the fabric of space-time that travel through the cosmos. LIGO was founded in the 1990s with stations in Washington state and Louisiana to detect these waves as they pass by Earth.

"The principle is simple," says Cavaglia, a member of the LIGO team. "Each LIGO detector is an L-shaped ultra-high vacuum system with arms four kilometers long. We use lasers to precisely measure changes in the length of the arms, which stretch or contract when a gravitational wave passes by."

Just one problem: Gravitational waves are so weak, they change the length of each detector by just 0.001 times the width of a proton! "It is a difficult measurement," allows Cavaglia.

Seismic activity, thunderstorms, ocean waves, even a truck driving by the observatory can overwhelm the effect of a genuine gravitational wave. Figuring out how to isolate LIGO from so much terrestrial noise has been a major undertaking, but after years of work the LIGO team has done it. Since 2006, LIGO has been ready to detect gravitational waves coming from spinning black holes, supernovas, and colliding neutron stars anywhere within about 30 million light years of Earth.

So far the results are ... nil. Researchers working at dozens of collaborating institutions have yet to report a definite detection.

Does this mean Einstein was wrong? Cavaglia doesn't think so. "Einstein was probably right, as usual," he says. "We just need more sensitivity. Right now LIGO can only detect events in our little corner of the Universe. To succeed, LIGO needs to expand its range."

So, later this year LIGO will be shut down so researchers can begin work on Advanced LIGO—a next generation detector 10 times more sensitive than its

predecessor. "We'll be monitoring a volume of space a thousand times greater than before," says Cavaglia. "This will transform LIGO into a real observational tool." When Advanced LIGO is completed in 2014 or so, the inner workings of black holes could finally be revealed. The punch line may yet make astronomers smile.

Find out more about LIGO at <http://www.ligo.caltech.edu/> The Space Place has a LIGO explanation for kids (of all ages) at <http://spaceplace.nasa.gov/en/kids/ligo> , where you can "hear" a star and a black hole colliding!

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Caption: *Laser Interferometer Gravitational-wave Observatory in Livingston, Louisiana. Each of the two arms is 4 kilometers long. LIGO has another such observatory in Hanford, Washington.*

Answer to the trivia question:

A: *The gravitational wave sky is map of the sky as it would appear if one could see gravity waves and gravitational distortions in space. Technology does not exist yet that can create such a map. LIGO hopes to start the process of creating such a map.*

2010 Membership Dues:

For the bargain price of only **\$20.⁰⁰ per family**, all this can be yours for the coming year!

- ✓ Meet with your fellow astronomy enthusiasts at least 10 times a year.
- ✓ Many opportunities to freeze/sweat/get bitten by mosquitoes in the Fakahatchee Strand.
- ✓ View planets, nebulae and many other celestial objects.

Don't miss out! Fill out this form (please print plainly) and send it with your \$20 check, payable to:

Everglades Astronomical Society

P.O. Box 1868

Marco Island, Florida 34146

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