NATIONAL CAPITAL ASTRONOMERS, INC.

STAR DUST

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APRIL 2008: DR. ALYCIA WEINBERGER, CIW-DTM

WHAT ARE PLANETS MADE OF? EXPLORING THE COMPOSITION OF PROTO-PLANETARY DISKS

The Earth probably formed hot and dry and therefore had to get its volatiles, including water and carbon, in a "late veneer" delivered by comets or asteroids. Similarly, the planetesimals and smaller bodies in exosolar disks provide the raw material for delivery of volatiles to any terrestrial planets also encircling those stars. I will talk about how we measure the composition of these exosolar disks. Observations with the Spitzer and Hubble Space Telescopes suggest that complex organics may be common on the surfaces of planetesimals and that forming planets may be rich in carbon.

Alycia Weinberger has been a staff researcher at the Carnegie Institution of Washington's Department of Terrestrial Magnetism since 2001. She earned her Bachelor's degree in physics from the University of Pennsylvania in Philadelphia and her Ph.D. in physics from the California Institute of Technology in Pasadena. She was a postdoctoral scholar at UCLA, first as a member of the Hubble Space Telescope near-infrared camera (NICMOS) science team and then as a NASA Astrobiology Institute postdoctoral fellow. In 2000, she was awarded the Annie Jump Cannon prize by the American Association of University Women and American Astronomical Society for significant research by a female postdoctoral scholar. In 2002, she was awarded the Vainu Bappu Gold Medal by the Astronomical Society of India for her work.

Alycia specializes in observations of circumstellar disks. She is a regular user of space telescopes and Carnegie's Las Campanas Observatory in Chile. She admits that she has never met a big telescope that she doesn't like. However, she plans to use her trusty 4-inch Astroscan, now about 25 years old, to introduce her two young sons to the joys of astronomy.

TRACKING WILDLIFE FROM SPACE

BY PATRICK BARRY

It's 10 o'clock, and do you know where your Oriental Honey Buzzard is?

Tracking the whereabouts of birds and other migrating wildlife across thousands of miles of land, air, and sea is no easy feat. Yet to protect the habitats of endangered species, scientists need to know where these roving animals go during their seasonal travels.

Rather than chasing these animals around the globe, a growing number of scientists are leveraging the bird's-eye view of orbiting satellites to easily monitor animals' movements anywhere in the world.

The system piggybacks on weather satellites called Polar Operational Environmental Satellites, which are operated by the National Oceanic and Atmospheric Administration (NOAA), as well as a European satellite called MetOp. Sensors aboard these satellites pick up signals beamed from portable transmitters on the Earth's surface, 850 kilometers below. NOAA began the project—called Argos—in cooperation with NASA and the French space agency (CNES) in 1974. At that time, scientists placed these transmitters primarily on buoys and balloons to study the oceans and atmosphere. As electronics shrank and new satellites' sensors

... continued on p3

SPECIAL POINTS OF INTEREST:

- Tracking animals doesn't sound like it has anything to do with astronomy or space… Or does it? p1
- Have ideas on how to run the club? Become an officer! p2
- Want to know how to get rid of light pollution? Find out on p4.
- What's going on at the telescope-making workshops? p6
- Want to help promote NCA? p7

Contents:

ELECTIONS ARE COMING! AND IT'S NOT OBAMA VS CLINTON!

2007-2008 NCA President Walt Faust has appointed Harold Williams, Wayne Warren, Jay Miller, and Jeffrey Norman (chair, jeffrey.norman@att.net, 202-966-0739) to serve as a Nominating Committee. This Committee is charged with finding potential candidates to serve as officers of NCA for 2008-2009. Members in good standing (dues paid!) are invited to contact the Committee if interested in serving (and if you have ideas about what should be happening in our organization, you should consider being an officer!). The Committee will also be in touch with (but hopefully not twisting arms!) many members. The expectation is that, in accordance with the by-laws, the new Slate of Officers will be announced in the May issue of StarDust and at the May 10 meeting. There will also be an opportunity for nominations from the floor. Elections will then be held at the June 14 meeting, and those selected will take office July 1.

May Newsletter

We are looking for observing reports, astronomy equipment/book/product reviews, *How I Got Into Astronomy* stories, photo submissions (like above!), astropoems, and anything else astro- related.

Please send submissions to

warnerem@astro.umd.edu

CALENDAR OF EVENTS

NCA Mirror- and Telescope-making Classes: Fridays, April 4, 11, 18 and 25, 6:30 to 9:30pm at the Chevy Chase Community Center, at the northeast corner of the intersection of McKinley Street and Connecticut Avenue, N.W. Contact instructor Guy Brandenburg at 202-635-1860 or email him at gfbrandenburg @yahoo.com. In case there is snow, call (202) 282-2204 to see if the CCCC is open.

Open house talks and observing at the University of Maryland Observatory in College Park on the 5th and 20th of every month at 8:00pm. (Nov.-Apr.) or 9:00pm (May-Oct.). There is telescope viewing afterward if the sky is clear.

Dinner with NCA members and speaker: Saturday, April 12 at 5:30 P.M., preceding the meeting, at the *Garden Restaurant* in the University of Maryland University College Inn and Conference Center.

Upcoming NCA Meetings at the University of Maryland Observatory

Saturdays

April 12, 2008,
Dr. Alycia J. Weinberger, CIW-DTM, *"What are planets made of? Exploring the composition of proto-planetary disks"*

May 10, 2008,
tbd

June 14, 2008,
Dr. Harold Williams, Montgomery College, *tbd*

July & August,
Summer Hiatus
See You in September!

PLEASE GET *STAR DUST* ELECTRONICALLY

NCA members able to receive *Star Dust*, the newsletter of the NCA via e-mail as a PDF file attachment, instead of hardcopy via U.S. Mail, can save NCA a considerable amount of money on the printing and postage in the production of *Star Dust* (the NCA's single largest expense) and also save some trees.

If you can switch from paper to digital, please contact Michael L. Brabanski, the NCA Sec-Treasurer, at mlbrabanski@verizon.net or 301-649-4328 (h).

Thank you!

MEETING VIDEOS

Those who attend the meetings have probably noticed that Jay Miller records the talks. While the main purpose is to produce a DVD to assist the reviewer of the talk, he also makes several extra copies. While he claims not to be Spielberg, if there is a lecture you've missed or one you want to look at again, members can contact Jay to borrow a copy.

rigel1@starpower.net

...continued from p1 Tracking Wildlife from Space

became more sensitive, the transmitters became small and light enough by the 1990s that scientists could mount them safely on animals. Yes, even on birds like the Oriental Honey Buzzard.

"Scientists just never had the capability of doing this before," says Christopher O'Connors, Program Manager for Argos at NOAA.

Today, transmitters weigh as little as 1/20th of a pound and require a fraction of a watt of power. The satellites can detect these feeble signals in part because the transmitters broadcast at frequencies between 401 and 403 MHz, a part of the spectrum reserved for environmental uses. That way there's very little interference from other sources of radio noise.

"Argos is being used more and more for animal tracking," O'Connors says. More than 17,000 transmitters are currently being tracked by Argos, and almost 4,000 of them are on wildlife. "The animal research has been the most interesting area in terms of innovative science."

For example, researchers in Japan used Argos to track endangered Grey-faced Buzzards and Oriental Honey Buzzards for thousands of kilometers along the birds' migrations through Japan and Southeast Asia. Scientists have also mapped the movements of loggerhead sea turtles off the west coast of Africa. Other studies have documented migrations of wood storks, Malaysian elephants, porcupine caribou, right whales, and walruses, to name a few.

The ARGOS program tracks the whereabouts of endangered migrating animals via miniature transmitters on the animals and the POES satellites in orbit.

Argos data is available online at www.argos-system.org, so every evening, scientists can check the whereabouts of all their herds, schools, and flocks. Kids can learn about some of these endangered species and play a memory game with them at spaceplace.jpl.nasa.gov/en/kids/poes_tracking/.

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

LOCAL ASTRONOMY EVENTS

5 Apr, 8pm UM Obs Open House

9 Apr, 7:30pm
Westminster Astro Soc Mtg
Bear Branch Nature Center

Sat 12 Apr,10am-3pm *Celebrating 400 Years of the Telescope Family Day*
Udvar-Hazy Center

12 Apr, 7:30pm NCA Mtg
UM Observatory

13 Apr, 7pm NOVAC Mtg
Enterprise Hall, GMU

16 Apr, 7:30pm TriState Astro Mtg
William Brish Planetarium

17 Apr, 7:30pm
Howard Aatro League Mtg
Howard County Dept. of Recreation and Parks

Sat 19 Apr, 10am-3pm *Explore the Universe Family Day*
National Mall

19 April, 7pm *Space-time Invariance and Quantum Gravity: or how c, G, and h create the fabric of time-space (reality)!*
Montgomery College Planetarium

20 Apr, 8pm UM Obs Open House

24 Apr, 7:30pm
Astro Soc Greenbelt Mtg
H.B. Owens Science Center

26 Apr, 10am-4pm MD DAY
UMCP campus

The UM Observatory website maintains a more complete list of links to local astronomy clubs and space places.

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The Adventures of Vern: VERN JOINS THE CAUSE

Written by Ron Smith for the Midlands Astronomy Club, Inc (Jan 2001)
Reprinted with permission

The other evening I was setting up the ole refractor in the front yard for some planetary viewing when my neighbor, Vern, comes walking over. You may have heard of Vern, his claim to fame was being Mr. June in the "Men of Redbank" Calendar in 1985. You know the guy who posed beside his favorite wrecker. He was, at that time, the proud owner of Red Bank Towing. He gave a new meaning to the phrase "Smash and Grab." Anyway, Vern is a regular visitor over at my house. He tends to drop by unexpectedly, with the usual greeting "What ya doing?" After explaining that I was setting up to look at some planets, Vern decided that he would stick around.

As darkness set in, the viewing conditions revealed a slight haze that really pronounced the light pollution coming from the direction of the nearby "mega-store." I proceeded to explain to Vern that the viewing conditions that night would be less than perfect due to the haze and light pollution. "Light pollution?" exclaimed Vern "is that anything like the stuff they found in my well water?" I launched into a long explanation of what light pollution was, and how it greatly affected us sky watchers. After finishing, I looked over at Vern to see if any of my explanation had sunk in. Vern had this strange, determined look on his face. He turned and started moving towards his house. Asking where he was going, Vern yelled back, "I'm going to do something about it." And off Vern went, fully intent on giving the manager of the offending mega-store a piece of his mind!

After what seemed to be an eternity, Vern's pickup returned from his mission. Turning into my driveway, Vern's high beam headlights nicely illuminated my observing site. Pulling up, Vern slowly began to unload a strange assortment of goods from his front seat. Out came four boxes of Girl Scout cookies, two new brooms, several discount coupon books, a handful of informational brochures, and a fresh baked pie. Exhausted, Vern collapsed in one of my lawn chairs.

Eager to know how his encounter went, I asked what happened when he confronted the store manager. "Never made it inside the store," Vern replied. Evidently, Vern had found too many good buys after encountering the gauntlet of "vendors" at the front door of the store. "By the time I got all this stuff, I had forgotten why I had gone there in the first place," Vern dejectedly sighed. Then, a strange grin came across his face. With a cookie in his hand, Vern proudly announced that he had come up with a better way of turning out the offending lights. Eager to hear his new plan, I leaned forward in my chair. Vern pointed to his prize squirrel rifle laid across his front seat, "What's good enough for a squirrel is good enough for a light bulb" he replied with a knowing wink.

Drawing © Jim Hunt

Mid-Atlantic Occultations and Expeditions

by Dr. David Dunham

Asteroidal Occultations

2008 Date	Day	EDT	Star	Mag	Planet or Asteroid	dmag	dur. s	Ap. in.	Location
Apr 15	Tue	4:32	TYC04080399	10.2	1999 VN24	8.0	1	4	eNC,eVA,MD,PA
Apr 17	Thu	1:55	22 Scorpii	4.8	1988 EB	12.3	2	0	NJ,PA,MD?,nVA?
Apr 18	Fri	21:17	2UC28554207	13.6	2001 FL194	9.3	4	12	TNO e.N.Amer?
Apr 21	Mon	23:37	SAO 77521	9.7	2001 YJ140	12.3	5	5	TNO e.N.Amer?
Apr 23	Wed	4:56	TYC57850675	11.0	2000 PJ30	13.7	9	7	TNO N.America?
Apr 27	Sun	0:42	2UC33230431	13.2	2002 GZ32	6.5	9	11	TNO N.America?

Lunar Grazing Occultations

DATE	Day	EDT	Star	Mag	% alt	CA	Location
Apr 11	Fri	22:10	39 Gem	6.2	41+ 46	15N	Richmond & Chesapeake, VA
Apr 12	Sat	1:22	SAO 79052	8.8	43+ 11	12N	Verona & Bass Lake, VA
May 8	Thu	22:32	SAO 78579	9.3	18+ 17	14N	Chantilly&DaleC,VA;LaPlata,MD
May 9	Fri	22:43	SAO 79618	7.7	27+ 24	14N	Allentown, PA; Fostertown, NJ
May 10	Sat	23:12	ZC 1297	6.8	38+ 28	14N	Natural Bridge,VA, Witaker,NC

Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Apr 13	Sun	0:37	D	7 Cancri	6.8	54+	26	75S	K0	ZC 1215
Apr 13	Sun	2:25	D	mu Cancri	5.3	55+	6	57S	G2	ZC 1224; Azimuth 293 dg
Apr 14	Mon	20:38	D	SAO 98730	7.1	74+	63	65S	K0	Sun -11
Apr 15	Tue	23:48	D	48 Leonis	5.1	83+	50	25S	G8	ZC 1549; close double?
Apr 16	Wed	20:22	D	75 Leonis	5.2	89+	41	72S	M0	ZC 1635;Sun-8;close dbl
Apr 19	Sat	0:20	D	ZC 1845	6.5	98+	41	84S	G8	Watts angle 80
Apr 22	Tue	1:52	R	ZC 2174	6.5	97-	27	56S	B8	WA 252; close double?
Apr 23	Wed	5:48	R	ZC 2318	6.6	92-	15	78S	B9	Sun -6; Az 216; WA 266
Apr 25	Fri	4:16	R	SAO 187318	7.7	71-	21	58N	A3	
Apr 25	Fri	5:40	R	SAO 187363	7.2	71-	24	88N	K0	Sun alt. -7 deg.
Apr 26	Sat	4:10	R	ZC 2879	6.7	62-	19	90N	A3	
Apr 28	Mon	3:09	R	iota Cap	4.3	42-	2	77N	G8	Azimuth 114 deg.
May 1	Thu	5:22	R	ZC 3385	6.7	22-	18	52N	F8	Sun alt. -9 deg.
May 6	Tue	21:31	D	X05643	8.5	4+	5	2S	F8	Az 299; 20" to chi Tau
May 6	Tue	21:32	D	chi Tauri	5.4	4+	5	-1S	B9	ZC 647; Azimuth 299
May 7	Wed	22:09	D	ZC 833	7.1	10+	10	78S	B5	Az 296
May 9	Fri	22:33	D	SAO 79618	7.7	28+	26	37N	F5	Graze in PA & NJ
May 9	Fri	22:35	D	SAO 79616	8.2	28+	26	42S	A0	
May 9	Fri	23:07	D	SAO 79621	7.4	28+	20	2S	K0	
May 9	Fri	23:48	D	SAO 79663	7.5	28+	13	87N	K0	Azimuth 289 deg.
May 10	Sat	20:13	D	35 Cancri	6.6	37+	60	54S	G0	ZC 1282; Sun -2 deg.
May 10	Sat	21:40	D	ZC 1287	6.7	38+	44	59S	A5	rest Praesepe stars
May 10	Sat	22:35	D	SAO 98009	7.6	38+	34	67N	A7	
May 10	Sat	23:07	D	SAO 98027	7.8	38+	28	47N	A8	
May 10	Sat	23:47	D	BY Cancri	7.9	39+	20	74N	A7	SAO 98054

Explanations & more information is at iota.jhuapl.edu/exped.htm.
David Dunham, dunham@starpower.net, phone 301-474-4722

DO YOU NEED A RIDE?

Please contact Jay Miller, 240-401-8693, if you need a ride from the metro to dinner or to the meeting at the observatory. *Please try to let him know in advance by e-mail at rigel1@starpower.net.*

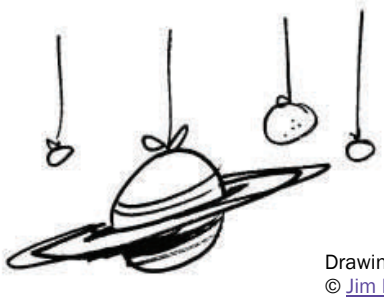
DIRECTIONS TO DINNER/MEETING

Members and guests are invited to join us for dinner at the Garden Restaurant located in the UMUC Inn & Conference Center, 3501 University Blvd E.

The meeting is held at the UM Astronomy Observatory on Metzerott Rd about halfway between Adelphi and University Blvd.

OBSERVING AFTER THE MEETING

Following the meeting, members and guests are welcome to tour through the Observatory. Weather permitting, several of the telescopes will also be set up for viewing.



Drawing © Jim Hunt

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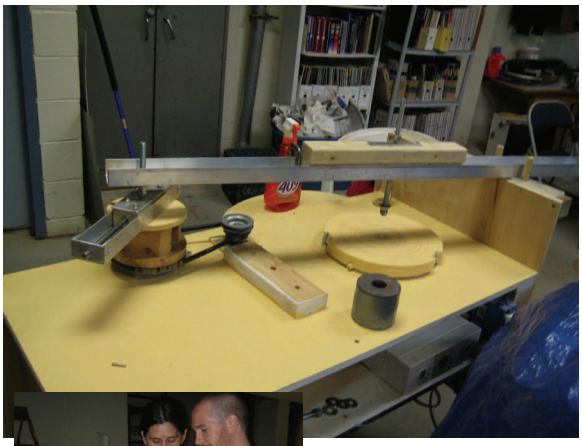
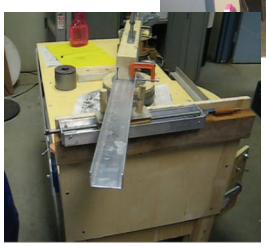
NEWS FROM THE NCA TELESCOPE-MAKING WORKSHOP APRIL 2008

BY GUY BRANDENBURG

Several of us who like playing with machinery have been working on upgrading a mirror-grinding machine that was donated to us a few years ago by someone who thought that hand-grinding was too slow. So he decided to build his own machine instead, but got frustrated anyway and never finished the job. We have changed some of the gears and modified the design to resemble a Hindle-Draper machine, named after two well-known astronomical pioneers. The machine is less like a Waineo machine or a Mirror-o-Matic (if those terms mean anything to you), but even though the design represents something of a step backwards in time, the strokes seem to be more controllable than they used to be. We have been experimenting with an 8-inch f/6 Pyrex mirror blank originally started by Patricia Metzger, and are at the 25-micron stage of fine grinding. We'll see how polishing and figuring goes. (Figuring is the trickiest part of mirror-making, because it involves taking off exceedingly tiny layers of glass – only molecules thick - in specific locations in order to transform a near-sphere into a near-paraboloid.)





Photos courtesy of Guy Brandenburg

The most recent modifications involve putting in two cranks for fine control on both ends of the overarm crank, and putting in a total of three switches so that the machine is easy to stop from nearly any corner of it, as well as trying numerous different gears and pulley ratios.

Before our most recent round of modifications, Bill Blackmore used the machine to do almost all of the work on a 6 inch mirror blank that was sitting around. He was unable to get the machine to do the figuring of the mirror, and found that this had to be done by hand. Major work on the machine was done by Bill Blackmore, Guy Brandenburg, Alan Bromborsky, Ian Carmack, Michael Chesnes, and David Gordon. (I apologize in advance to anybody whom I may have forgotten.)

Web Videos on Amateur Telescope Making

If you would like to see a YouTube video of the machine in action, point your browser to www.youtube.com/watch?v=psbLr6mr800 .

NCA member Jim McPherson also made some interesting YouTube videos on telescope-making. He has two videos on making a Mirror-o-Matic grinding and polishing machine, one on making a magnetic stirrer for polishing slurries to feed into said machine, and one on using a wii to point a telescope where you want it to go. (A wii is a hand-held universal video game controller.) You can find his videos if you go to YouTube and search for his nickname, king-jamez80.

NCA member Ben McIlwain recently finished a mirror in our workshop and is nearly done with the mount. He has an interesting website where he details many of the steps involved from start to finish. You can read the details at www.cydeweys.com/blog/category/atm/ .

Despite all of this talk about machine-aided mirror-making, it remains the case (so far) that hand-grinding, hand-polishing, and hand-figuring a small mirror (in the 6 to 10 inch range) seem to go faster, and better, than using any of the machines I have seen so far. I tried using the same machine to hog out a large, thin blank (16.5 inch diameter. 7/8 inch thickness) and got exactly nowhere after many weeks of trying. By contrast, doing the hogging by hand with a heavy weight went quite well.

Non-member Francis O'Reilly, who is an amateur telescope-maker from the New York area, visited our workshop a while ago to have a mirror coated. He has posted some videos on hand-grinding mirrors and flats on YouTube as well. www.youtube.com/user/foreilly1958 .

As usual, the NCA-sponsored telescope-making class runs every Friday night, at the Chevy Chase Community Center on the northeast corner of McKinley Street and Connecticut Avenue, NW, in Washington, DC, unless canceled by the DC Department of Recreation for inclement weather or some such event. You can just come in to ask questions and observe what people or doing, or else you can begin a project of your own. We have just about all of the materials on hand that you need for any Pyrex-type reflecting mirror in sizes from 4.25 inches to 12.5 inches. We have a fair amount of wood-working and metal-working tools, both hand-operated and electrical, that can be used to saw up the pieces of wood or metal that you might need to construct the rest of your telescope. We have active telescope-makers ranging in age from about 9 to over 90 and from all ethnic groups and nationalities, though there is a notable predominance of the XY chromosome. If you are lucky, you may even witness a practice session on the musical instruments (mostly drums and pianos) that are installed in the same workshop!

HELP WITH OUTREACH EVENTS

There are two NASM events coming up that have requested help from the local amateur community. NCA has been invited to setup a table for both events. It is not clear to me who would be organizing our participation, but if you are interested, I can put you in touch with the NASM organizers.

Sat 12 Apr,10am-3pm *Celebrating 400 Years of the Telescope Family Day*
Udvar-Hazy Center

Sat 19 Apr, 10am-3pm *Explore the Universe Family Day*
National Mall

In addition, astrophotgraphers are invited to submit images to First Light, a special feature in their Explore the Universe gallery displaying the wonders of our Universe as captured by amateur astrophotographers. Details

AN ENGINE FOR MIND-BOGGLING BLASTS

From Phil Berardelli
*Science*NOW: Daily News
14 February 2007

Stellar explosions known as gamma ray bursts (GRBs) crank out in just a few seconds as much energy as the sun will generate over its entire 10-billion-year lifetime.

Scientists generally believe that the titanic blasts are generated when extremely large stars collapse into black holes. As a mammoth star contracts under its own immense gravity, it heats up, causing runaway nuclear reactions that send jets of matter streaming out at millions of kilometers per hour. Not all of the matter travels at the same speed, and faster matter catches up to slower-moving stuff, causing violent collisions. These shock waves heat the matter so that it glows in gamma rays, the most energetic form of radiation. At least, that has been the prevailing thinking.

Now, astrophysicist Pawan Kumar of the University of Texas in Austin and colleagues argue that the jets giving rise to GRBs are not made of matter but actually are powerful magnetic fields transporting energy away from the collapsing stars. The researchers analyzed data from 10 GRBs collected by NASA's Swift satellite and found that the sources of the bursts were located about 10 billion kilometers from the sites of the stellar collapses–about 100 times farther than expected. By the time jets of ordinary matter would have reached that distance, they could not have retained enough energy to generate gamma rays.

Instead, extremely high-energy magnetic outflows produce GRBs when they interact with surrounding atoms of gas and dust far from the black hole, the team reports. A similar process takes place on a much smaller scale on the sun, Kumar says. "Some fraction of the magnetic field energy of sunspots is deposited in charged particles and converted to [gamma] radiation," which also produces solar flares.

Some researchers had speculated that the bursts might be generated magnetically, but until now there have been only hints in one or two observations of the phenomena. So if the current finding is confirmed, Peter Meszaros of Pennsylvania State University in State College says, "it could represent a major turning point in our understanding of GRBs."

[NGR]

Yes, I'd like to join NATIONAL CAPITAL ASTRONOMERS!

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FIRST CLASS
DATED MATERIAL

Next NCA Mtg:

April 12
7:30pm
@ UM Obs
Dr. Alycia Weinberger

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