

Event Horizon

January 2001

Volume 8 Issue 3

The Elegant Universe: Wraps in Superstring

It is said that a teacher's greatest compliment is to have his/her students surpass him/her. The second greatest joy, then, is to have a former student tell her father that although she is not interested in going to the Redman Lecture 2000 with him, perhaps Mr. Jefferson might be. Wow! This sure puts paid to the argument that students never think of their teachers outside of the classroom. Secondly, it sure does my ego wonders to think that I have made these kinds of impressions on the minds of children and young people!

My thanks has to go to Jasmine Baetz of Dundas and her dad, Dr. Brian Baetz of the Faculty of Engineering at McMaster University. One couldn't go to a cosmology lecture in better company. Many of the people there, he knew.

Dr. Brian Greene was the elegant presenter of *The Quest for the Unified Theory* on Wednesday, Oct. 18 and *Space and Time Since Einstein* on Thursday, Oct. 19. Both presentations were at 8pm in Room 1A1 of the McMaster Health Science Centre. Several members of the HAA and the Hamilton Centre were in attendance either for one or both lectures. There may have been others that I did not see in a more-than-fully-packed house on both nights. Such is the drawing power of a mind like Professor Greene's. Cloistered at Columbia University, he set up the String Program there in 1996 and published the best-seller *The Elegant Universe: Superstrings, Hidden Dimensions and the Quest for the Ultimate Theory* in 1999. Having shared the podium with Stephen Hawking and Edward Witten, he is one of the world's leading experts in

string theory — and here is what he said:

Over the last 100 years there has been a search for an elegant unified theory to unite all of the natural forces. It, perhaps, began with Einstein but it was always a stumbling block. What was needed was a simple and elegant solution.

From the time of Newton there have been conflicts driving the world of physics. Newton's classical mechanics conflicted with the electromagnetic theory of James Clerk Maxwell. This led to the development of Einstein's Special Relativity which in turn conflicted with classical gravitational theory. This sparked the development of General Relativity (for macro applications) which later found itself at odds with Quantum Mechanics (for micro applications). Hence the development of Superstring

(Continued on page 3)

inside...

Chair's Report
Cosmology
The Tale of Kana

page 2
page 3
page 4

Comets and Asteroids
February Night Skies
Calendar of Events

page 6
page 7
page 8

Chair's Report

Margaret Walton

I hope that everyone had a great holiday and got every astronomy related accessory that they asked Santa for. Of course, we all received a great gift in the form of clear skies and a partial solar eclipse. After what seemed like months of cloudy skies, and a not-to-promising forecast, the sun came out on Christmas day. It was a great opportunity to share this event with the entire family. My son took the filter and looked every few minutes as the eclipse progressed.

Our challenges with the Hamilton Spectator continue. They will only be letting us know about the room a few weeks prior to each meeting. This does not allow us to publish the meeting location in the Event Horizon, so please

check the web site, Big Bang, HAA egroups, get yourself on our email list, or call one of the council prior to each meeting to confirm the location.

There is an astronomy related project going on that everyone interested can participate in. No experience required, no scope needed. This is the Mars crater experiment being conducted by NASA.

"There are many scientific tasks that require human perception and common sense, but may not require a lot of scientific training. Identifying craters on Mars is something almost anyone can do, and classifying them by age is only a little harder.

This an experiment to see if public volunteers, each working for a few minutes here and there, can do some routine science analysis that would normally be done by a scientist or graduate student working for months on end."

If you would like to try this out, visit the web site at <http://clickworkers.arc.nasa.gov/top>.

Have a great month.

HAMILTON AMATEUR ASTRONOMERS

Event Horizon is a publication of the Hamilton Amateur Astronomers (HAA).

The HAA is an amateur astronomy club dedicated to the promotion and enjoyment of astronomy for people of all ages and experience levels

The cost of the subscription is included in the \$25 individual or \$30 family membership fee for the year. Event Horizon is published a minimum of 10 times a year.

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Cosmology Discussion Group

The next cosmology meeting will be Saturday, March 10th, 2000, 8pm. In McMaster's Burke Science Building room B148. The meeting will be a 16mm movie night. There will be free coffee, ginger ale, cola, and timbits. We welcome our members to bring a small entree. Everyone welcome, open discussion. For further information call Larry at 529-1037.

Superstring...

(Continued from page 1)

development of Superstring Theory to unify the strife among all of these systems.

Newton maintained that gravity acted instantaneously on all bodies in the universe but Einstein said that light is the fastest thing there is. The solution was to invent the fabric of space and time. Its warps and curves would transmit gravity at the same speed as that of light.

In large scale, General Relativity sees only smooth, gentle curves. In the micro-world on earth and in the universe, Quantum Mechanics sees only small, jittery curves, especially at the Planck length of 10^{-35} metres! Therefore, (1) since the laws of physics are breaking down, deeper laws must exist and (2) since we can't go back to TIME "0", we do not know what laws existed in the pre-natal universe (remember: Big Bang is an evolution only and NOT a cause) we have to invoke a new way to explain the universe. Enter *String Theory*! Here, discrete particles present themselves, not as solid, inelastic bodies, but as tiny volumes containing little loops of vibrating energy. Perhaps the small decorative light

bulbs with the dancing filaments would be good analogies. The type of vibration identifies the kind of particle.

Where does this leave us? (1) It resolves problems between Quantum Mechanics and General Relativity. (2) It makes both of these work in unison! (3) Probe size sets how sensitive you wish to measure. (4) Strings are too big to be affected by the insignificant, but annoying and violent micro-fluctuations in space-time. (5) It is also, therefore necessary to have a universe with more than 3-D.

(1) Current research is called M-Theory.

(2) Before 1995 there were 5 'string theories'.

(3) Actually, #2 is really 5 'windows' of M-Theory.

(4) "M" means Mystery, Mother, Matrix, Membrane — Murky?

- replace solid particles
- unite "gravity" & QM
- need more dimensions
- maybe "M" is the long-sought unified theory.

Michael Jefferson

The Tale of Kana and How He Rescued the Sun and the Moon and the Stars

Denise Kaisler

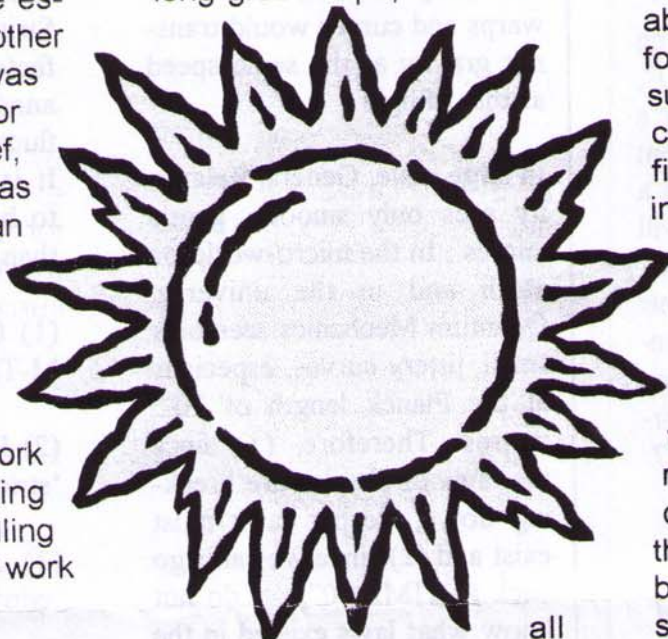
A long time ago, when the world was young and the islands of Hawaii were newly-made, there lived a young man named Kana.

Kana was strong and handsome and came from a large, loving family. He especially loved his brother Niheu. But no one was happy in their family or their tribe, for their chief, one Kahoa by name, was a cruel and greedy man who constantly drove his people to exhaustion just so his whims could be satisfied. Kahoa's overseers forced the people to work day and night, beating those who were unwilling or unable to meet their work quotas.

One day, when Kana and Niheu saw one of the overseers beating an old man, they realised they had seen enough. Niheu hit the overseer with a big stick, but to his dismay, the overseer lay quite still on the ground. No amount of shouting or shaking would rouse him.

When Kahoa heard of this

he was thoroughly enraged. He called for the deaths of whomever had killed the overseer, but none of the islanders would betray the two young men. So Kahoa did something even worse. He reached up into the sky and seized the sun and the moon. Then he gathered up all the stars, put everything under his long grass cape, and hid it



all away in a secret place.

The villagers were frightened and dismayed. They held a meeting to decide what was to be done. First Niheu stepped forward and offered to give himself up but Kana interceded. He said "Let us find the sun, moon, and stars ourselves." He turned to his

grandmother, the oldest woman in the village and very wise. "Grandmother, where might chief Kahoa have hidden the sun and moon and stars?"

His grandmother shook her head. "Their whereabouts are unknown to me. But if you can find my sister, Woman-who-walks-in-Darkness, she might be able to tell you. Venture forth, to the place where the sun used to rise. When you cannot journey any further, find a cliff that falls straight into the sea. There is my sister's home."

So Kana and Niheu set forth. But the way was long and difficult and it was the time of great rains. The heavens opened above them and the cold wind pierced their bones. Niheu was not as strong as Kana and before the journey's end he lay down beneath a palm tree, unable to go on. Kana made a blanket of palm leaves for his brother and then stoically went on to find the dwelling of Woman-Who-Walks-In-Darkness.

At last, at the base of a

(Continued on page 5)

Kana....

(Continued from page 4)

sheer cliff, Kana saw a small fire burning before a cave. He knew that the woman sitting next to it must be the one of whom his grandmother spoke.

"Aloha, Woman-Who-Walks-In-Darkness. I, Kana, grandson of your sister have come seeking your help."

The woman smiled gently, her blind eyes staring straight ahead. "I know why you have come, Kana. You seek the place where Chief Kahoa has hidden the sun and moon and stars."

"Yes," breathed Kana, amazed at the woman's power.

"Kahoa's house is at the top of this cliff. Behind it is a cave, sealed by a large white stone. It is there that Kahoa's servants guard his most valuable treasures."

Kana darkened his skin with a concoction of oil and ashes. Then he crept up towards the house from which came music and loud, drunken laughter. He had just seen the entrance to the cave when heavy footfalls sounded on the path behind him. Kana hid himself among the trees.

He peeked out just in time to see Chief Kahoa stride up to the cave. He rolled aside the stone demanding a drinking gourd filled with the Water of Life. Kana gasped. Years ago he had heard his grandmother tell of this magical elixir. Drinking it would cure any illness and fend off death.

Kana saw Kahoa take a deep swallow of the Water of Life and then stride away, back towards his house. That was when Kana crept forward, took up the discarded gourd, rolled aside the massive stone and shouted, in his best imitation of Kahoa, "You there! More Water of Life!"

When the gourd came, brimming, back to him, Kana then called out. "And now my treasures."

The stars were passed out first and immediately Kana flung them up into the sky. The moon, too, he hung there and once again the world was bathed in its beautiful light. Last, he took the blazing sun and tossed it up as well. Kana heard a shout of rage from

Kahoa's house, but didn't stop to see the Chief's reaction. Instead he took up the gourd and ran with it to the place where Niheu lay. After a few swallows, the young man was well again and both brothers journeyed back to their village.

The people received them with joy. It was clear that the reign of Kahoa was over and that their lives would be better now that the sun and moon and stars were back in the sky, which is where they are to this day except when the rains come and everyone is reminded for a terrible instant of what it would be like without the sun or moon or stars.



Comets & Asteroids - 2001

I) Close Approach NEO's

Name	Date	Encounter Distance(AU)
(4688) 1980 WF	Jan. 3.61	0.1701
1997 GH3	Feb. 14.06	0.1474
(4034) 1986 PA	Apr. 3.05	0.1465
(3103) Eger	Aug. 6.31	0.1161
1987 QB	Aug. 16.74	0.1629
1996 PC1	Aug. 22.37	0.0986
1998 SD9	Oct. 9.10	0.1438
1996 GD1	Nov. 19.79	0.1997
(3362) Khufu	Dec. 29.46	0.1597

II) Timing of Cometary Apparitions

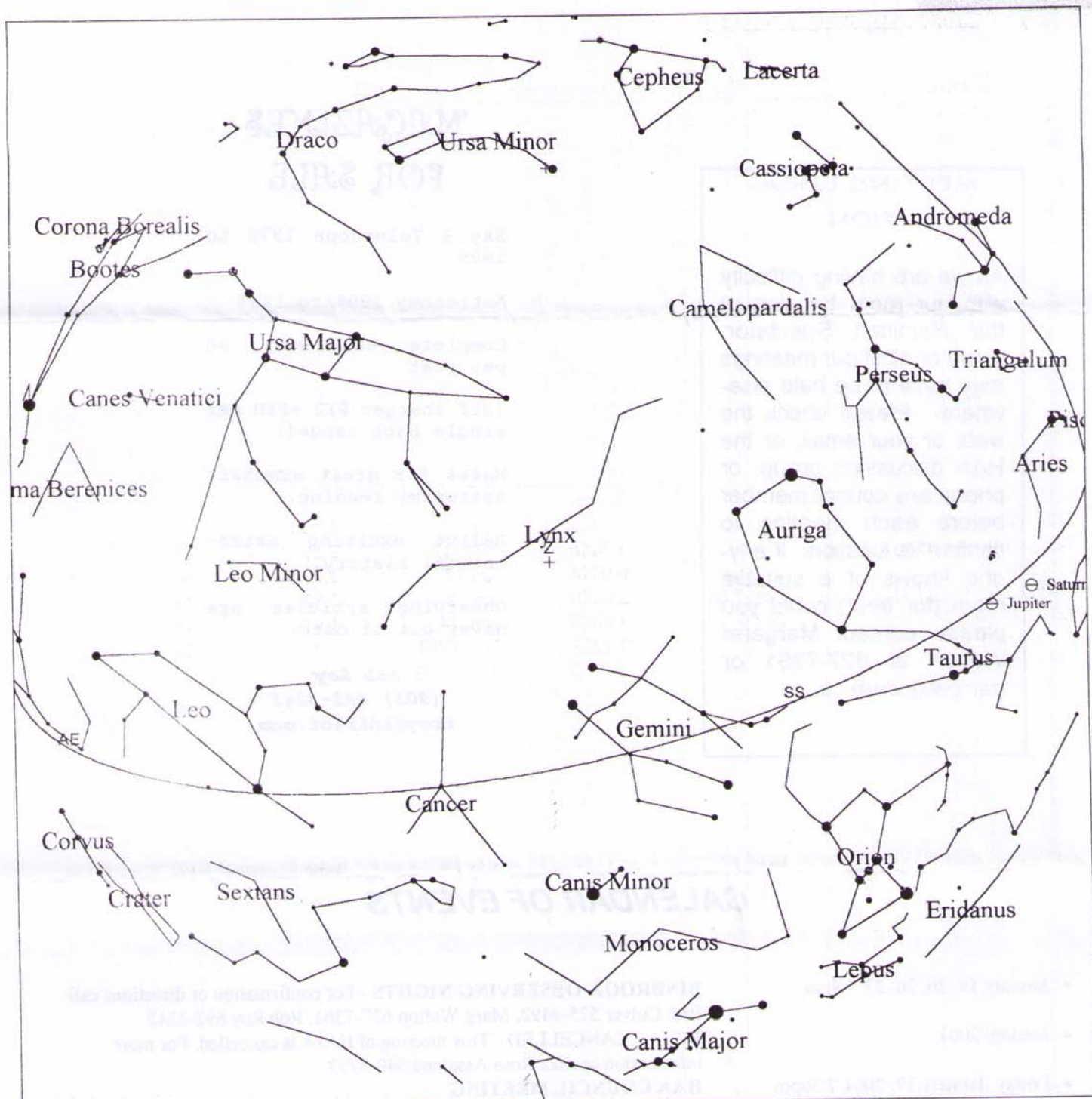
Name	T	q(AU)	Nearest	Dist(AU)	Mag.
47P/Ashbrook-John	Jan. 6.5	2.3054	Nov.27	2.21	13
41P/Tuttle-G-K	6.98	1.0523	July 19	1.52	12
74P/Smirnova-Chernyk	15.65	3.5458	Mar. 13	2.57	15
73P/S-W 3	27.73	0.9374	Jan.17	1.79	6*
P/1992 G3(Mueller 4)	Feb. 7.86	2.6470	Apr. 2	1.82	16
44P/Reinmuth 2	20.00	1.8897	Nov.24	1.91	15
113P/Spitaler	25.88	2.1273	Feb.21/02	2.28	20
75P/Kohoutek	27.35	1.7873	Mar.30/02	2.49	14
110P/Hartley 3	Mar. 21.4	2.4783	Mar. 13/ 02	2.23	15
45P/H-M-P	29.89	0.5284	Apr. 23	1.24	9*
97P/Metcalf-Brewington	Apr. 10.24	2.6054	Jan. 14/ 02	2.33	16
P/1993 X1(Kushida-M)	29.55	2.7526	Feb. 7/ 02	2.15	16
24P/Schmausse	May 2.66	1.2050	May 1	1.49	10*
61P/Shajn-Shaldach	8.99	2.3301	Dec. 8	1.79	16
51P/Harrington	Jun. 5.89	1.5681	Nov. 18	1.34	16
86P/Wild 3	18.60	2.3103	May 28	1.30	17
P/1994 A1(Kushida)	27.79	1.4313	June 23	2.44	20
16P/ Brooks 2	Jul. 19.83	1.8349	Nov. 18	1.18	14
82P/ Gehrels 3	Sep. 3.07	3.6266	Jan. 29/ 02	2.67	19
19P/Borrelly	14.73	1.3582	Dec. 29	1.29	9*
P/1987 Q3 (Helin)	24.75	2.5308	Sept. 19	1.53	15

III) Space Missions

This year there are 3 space missions that are active with minor bodies. On January 15th, the STARDUST spacecraft flies past Earth at a distance of 5000 km to obtain a gravity assist to send it onwards to its target, comet Wild 2. The NEAR-Shoemaker mission to the asteroid Eros comes to a dramatic end on February 12th with a controlled crash-landing on the asteroid's surface. Finally, Deep Space 1 will fly past Comet Borrelly on September 20th which will be the swan song for that spacecraft.

Ray Badgerow

February Night Skies



ECU V3.0 (Star Atlas Mode) - February Night Skies

UTC: 2001/02/16 at 03:30
LMT: 2001/02/15 at 10:30pm

RA=07h55.1m Dec=+43°17'
Field=180.0° Azim=339°53' Alt=+90°00'

MEETING LOCATION

As we are having difficulty with our room booking at the Hamilton Spectator, some or all of our meetings may have to be held elsewhere. Please check the web, or your email, or the HAA discussion group, or phone any council member before each meeting to confirm its location. If anyone knows of a suitable room (for free!) could you please contact Margaret Walton at 627-7361 or margw@icom.ca.

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Rob Roy
(905) 692-3245
rroy@idirect.com

CALENDAR OF EVENTS

- January 19, 20, 26, 27 ~ 8pm
- January 2001
- Friday, January 19, 2001 7:30pm
- Friday, February 9, 2001 7:30pm
- Saturday, March 10, 2001 8pm

BINBROOK OBSERVING NIGHTS - For confirmation or directions call Bret Culver 575-9492, Marg Walton 627-7361, Rob Roy 692-3245

HAA - CANCELLED. This meeting of HAA is cancelled. For more information contact Rosa Assalone 540-8793

HAA COUNCIL MEETING

HAA GENERAL MEETING - The meeting will possibly be at the Spectator Building auditorium. Call any council member to confirm the location.

COSMOLOGY MEETING - 16 mm movie night. Contact Larry for more information 529-1037