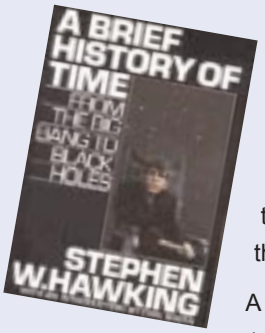
the talk of the lab

Hawking Ponders Infinity

"CAN YOU HEAR ME?"

A substantial baritone, round and full; the accent borderline Scottish or Welsh, but schooled well short of a full brogue. A hint of wry in the tone, promising a barb or two before the night's work was done.

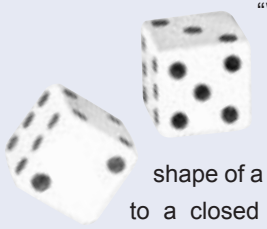


The voice immediately owned every expanse of the Arie Crown Theater at McCormick Place, Chicago's gargantuan convention center by the lake. But who owned the voice?

A motorized wheelchair rested at center stage, life support apparatus stacked behind the wheels, its inhabitant almost too still for reality. His head leaned unmoving against his right shoulder, his skeletal body angled in the chair like an oddly-bent wire coathanger. In front of him was a small custom computer console, where a minute twitch of his finger activated an ultra-sophisticated speech synthesizer that generated the theatrically-comfortable voice without movement of lips.

"My greatest achievement is being alive today," began Stephen Hawking, overcoming the symbolic distance between computerized voice and ravaged body, verbally striding into his lecture on "The Universe in a Nutshell." During his frequent long pauses, the auditorium was as still as the night sky.

Leading off a four-part lecture series on "Our Expanding Universe," presented by Chicago's Adler Planetarium, Hawking selected his theme from a speech of *Hamlet:*



"We could be bordered in a nutshell and count ourselves kings of infinite space."

Hawking suggested he was comparing the shape of a nutshell—a tiny, slightly flattened sphere—to a closed surface that could comprise our known universe, Yet a sense of great things in maddeningly-confined space seemed a metaphor for his own state.

"The prospect of an early death focused my mindpower wonderfully," said Hawking, diagnosed with amytropic lateral sclerosis (Lou Gehrig's Disease) in 1963 at the age of 21, and given a life expectancy of two to three years.

Now 57, and since 1979 the Lucasian Professor of Mathematics at Cambridge University (the post once held by Sir Isaac Newton), this most prominent theoretical physicist since Einstein is also a star of popular culture. He is the best-selling author of *A Brief History of Time*; host of the BBC television series *Stephen Hawking's Universe*, which has been viewed around the world; and perhaps most impressively to the many high-school students in his Chicago audience that night, soon to be featured as an animated version of himself on *The Simpsons* (though many of the older scientific notables on hand will certainly be watching, too).

Already that day, he had lectured at the University of Chicago, at a symposium on inflationary cosmology co-sponsored by the university, Fermilab and the Pritzker Foundation. On this Friday night, January 29, he declared that incorporating the Uncertainty Principle into Einstein's theory has been the greatest challenge for theoretical physics in the last 30 years. He also recalled that Einstein had reacted angrily to the Uncertainty Principle by declaring: "God does not play dice!"

Hawking countered: "All the evidence shows that God was actually quite a gambler, and the universe is a great casino, where dice are thrown, and roulette wheels spin on every occasion. Over a large number of bets, the odds even out and we can make predictions; that's why casino owners are so rich. But over a very small number of rolls of the dice, the uncertainty principle is very important."

He spoke of imaginary time, a dimension at right angles to regular time, encompassing every possible closed surface that the universe could have generated in its multiple histories—histories growing from all the possibilities of rolling the dice an

infinite number of times. The universe must have every possible history, he said, with our existence a restriction of history: we live within the minority of histories containing galaxies and stars.

"If the universe were different," he reasoned, "we would not be here to observe it."

And if Hawking's universe were different?

"My expectations had been reduced to zero," he said simply. "My ALS ruled out most careers except for theoretical physics. I am happier now than before my condition appeared."

—Mike Perricone

Aging Utility Poles

Running north from Wilson Hall is a row of utility poles so spare in shape they look like sculptures by Giacometti—whimsical larger-than-life birds with long legs and outspread wings, peeling off to the horizon. They bring in the power that makes our protons go 'round.

Robert Wilson, Fermilab's founding director, designed the utility poles to resemble the Greek letter pi. Pi is, of course, a ubiquitous symbol in particle physics (and in math). It is that magical relationship between the diameter of a ring and its circumference, and the root name of those strange particles from cosmic rays that spill into our atmosphere unannounced.

Wilson wasn't being cute when he designed the poles. He just wanted to make utility poles that weren't as ugly as the ones that commonly line American roads. "I went to Commonwealth Edison and told them I wanted to design my own power poles," Wilson once recounted. "They were outraged. After a lot of fighting, the power company gave in. I'm surprised that my poles never caught on. They really are prettier."

The fight Wilson referred to involved questions of practicality: Whatever Commonwealth Edison thought of their aesthetics, it wasn't convinced the poles would be functional, and the company required full-scale testing to ensure that the poles could carry any anticipated load. Fermilab was allowed to erect the poles only when the testing proved them fit.

Over the years, the poles have drawn still more trouble. The poles were never capped, which left their tops subject to the elements.

In 1986, and again in 1991 and 1992, sound (and other) tests were done to determine whether the poles were deteriorating. Inspectors tapped them with mallets—a nice ring meant the douglas fir was solid inside; a dull thud signaled the wood was rotting away. Ultrasonic tests were also done in which a transmitter was placed on one side of a pole and a receiver on the other, and the velocity of the sound wave measured as it passed through the wood. The news was not reassuring.

"Heart rot" had set in. Black ants had invaded. Woodpeckers had chipped away, digging for insects. Fungi with long Latin names were taking over.

Good poles were treated with a combination pesticide-fungicide, bad ones with copper naphthenate. Sections were swathed in chicken wire to ward off the woodpeckers, who subsequently flew these coops. Fused rods made of boron, a toxic substance, were inserted to stem the spread of fungi.

At one point, even researchers in the Forest Service, under the U.S. Department of Agriculture, took interest in helping out, but after running samples of wood borings to identify the sources of the trouble, their funding dried up.

All the attention on these unique utility poles could not reverse the damage, but it did extend their useful life. A three-year, $2.5-million project to replace them won't have to begin until 2002.

—Sharon Butler

Mini-Symposium on the Early Days of Fermilab

On Wednesday, March 10, a mini-symposium on the early days of Fermilab will honor Ned Goldwasser on his 80th birthday. Goldwasser was Fermilab's first deputy director. The open symposium in Ramsey Auditorium will include perspectives on the international character of high-energy physics. This is an excellent opportunity to learn more about Fermilab's roots. With Bob Wilson, Ned Goldwasser established Fermilab and guided it through its first decade. After leaving Fermilab, Goldwasser served as vice chancellor of the University of Illinois and worked at the SSC Central Design Group.

Six outstanding scientists will participate, including Norman Ramsey and Rich Orr. Ramsey was founding president of URA and winner of the 1989 Nobel Prize in physics. Orr led many activities at Fermilab, from the Business Office to the Tevatron project. With several others, Orr received the National Medal of Technology for the Tevatron work. Other speakers will include Bill Fowler, leader of the 15-foot bubble chamber project and super-conducting magnet development, and Yoshio Yamaguchi, a particle theorist at the University of Tokyo, who has been active in the international side of high-energy physics for many years. David Jackson, the author of a celebrated book on classical electrodynamics, will recall the establishment of the theory program at Fermilab. The symposium will close with reminiscences and observations from Goldwasser.

For more information, call Dick Carrigan, X8755, or Jackie Coleman, X3027.

LAB NOTE

URA Scholarship Information

Candidates for Universities Research Association (URA) scholarships are reminded that applications are due March 1.

Applications are available from and should be returned to Human Resources, WH15SE, M.S. 124.

LUNCH SERVED FROM 11:30 A.M. TO 1 P.M. $8/PERSON

DINNER SERVED AT 7 P.M. $20/PERSON

Chez Léon MENU

FOR RESERVATIONS, CALL X4512
CAKES FOR SPECIAL OCCASIONS
DIETARY RESTRICTIONS
CONTACT TITA, X3524
HTTP://WWW.FNAL.GOV/FAW/EVENTS/MENUS.HTML

LUNCH
WEDNESDAY, FEBRUARY 24

Cheese Fondue

Salad of Mixed Greens with Mustard Vinaigrette

Poached Pears with Raspberry Sauce

DINNER
THURSDAY, FEBRUARY 25

CARNIVAL

Black Bean Soup

Roast Suckling Pig

Rice with Pigeon Peas

Stewed Chayote

Pineapple Flan and Tropical Fruit

LUNCH
WEDNESDAY, MARCH 3

Catfish Veracruz

Steamed Carrots & Zucchini w/Chipotle Chili Butter

Herb Green Rice

Spiced Bananas & Ice Cream

DINNER
THURSDAY, MARCH 4

BOOKED

FERMI NEWS
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CLASSIFIEDS

FOR SALE

■ '97 Ford F250 Supercab, 8' bed w/bedliner, ac, overdrive, Omaha (contractor's) Topper. Towing package & set up for trailer brakes, 351 cubic in. (5.8L) V8, teal green, low miles, $21,000 w/topper, $20,000 w/out. Call Scott Doerr, long distance pager (630) 266-4430.

■ '87 Volvo 240 DL sedan, auto, 160K miles, gray, cc, orig. owner, $3,000. Call Bill, x4173 or (630) 879-6841.

■ Queen size mattress, box, frame w/2 night-stands, $85; PC 486DX, 66 MHz, 650 MB Hard Disk, 16MB RAM, 32K CD drive, 14.4K Modem, Window 95, MS Office 95, w/keyboard & mouse (no monitor), $150. (630) 355-1253 or chendi@fnal.gov.

■ Queen size waterbed w/oak frame & side cabinets & newer, quality mattress, $250 or obo. Call Jeff x3951 or (630) 876-3293.

■ House, in Warrenville, Summer Lakes Subdivision, 3 bdrm ranch w/central air, vaulted ceilings & exposed beams, oak parquet flooring in kitchen, dining & living rms, 99% energy efficient gas fireplace, 2 car garage, screened & carpeted front porch, tri-level cedar deck w/seating. Custom wood fence w/lighted planters. Must see, very unique. Asking $146,900. Call Karen, x5427 for appointment.

FOR RENT

■ Apartment to sublet: unfurnished, 1 bdrm in Warrenville, $635/mo. Phone Thornton, x3150.

WANTED

■ French Tutor. Looking for French tutor to teach 3 children in our NE Aurora home, 10 mins from the lab. Two 12 year olds and one 8 year old. Please call Kevin if interested, x2788 or (630) 859-3427 or kuk@fnal.gov

CALENDAR

Web site for Fermilab events: http://www.fnal.gov/faw/events.html

FEB 20
Fermilab Art Series Presents: *William Bennett, Flute in Recital with Clifford Benson* $10. All performances begin at 8 p.m. in Ramsey Auditorium, Wilson Hall. For tickets or more information call (630) 840-ARTS.

FEB 21
Barn dance in the Kuhn Village Barn from 2-5 p.m. Music by Lower Fiddle Class, calling by Paul Ford. All dances are taught, people of all ages and experience levels welcome. Admission is $5, children under 12 are free (12-18 $2). Sponsored by the Fermilab Folk Club. For more info call Lynn Garren, x2061 or Dave Harding, x2971.

FEB 25
Wellness Works Presents: Y-ME a workshop on Breast Cancer Awareness by the National Breast Cancer Organization, "What you need to know about breast cancer" from noon – 1 p.m. in Curia II conference room.

FEB 26
International Film Society Presents: *The Sweet Hereafter.* Dir: Atom Egoyan, (Canada 1997, 110 mins.) Film at 8 p.m. in Ramsey Auditorium, Wilson Hall, $4. (630) 840-8000.

MARCH 2
Wellness Works Presents: "How Muscles Work", Covert Bailey's Video Series, noon – 1p.m. in 1 West.

MARCH 10
The Fermilab Barnstormers Radio Control Model Club annual Delta Dart Night in the Kuhn Barn at 5:30 p.m. All Fermilab employees & their families are invited. The Delta Dart is a small rubber band powered airplane constructed of balsa wood & tissue paper. Build one in ~ 45 minutes and fly it for fun and prizes. Barnstormers will guide you through every step of the construction & give tips for flying. Materials cost $1 for adults & teenagers, juniors (12 and under) are free. Everything you need to build & fly is provided. The junior's fly off will be held at 7 p.m. For more info call Fred Krueger, x5515, or Jim Zagel x4076.

ONGOING
NALWO coffee, Thursdays, 10 a.m. in the Users' Center, call Selitha Raja, (630) 305–7769. In the barn, International folk dancing, Thursdays, 7:30–10 p.m., call Mady, (630) 584–0825; Scottish country dancing Tuesdays, 7–9:30 p.m., call Doug, x8194. English classes on Tuesdays at the Users' Center. Beginners from 9–10 a.m. & intermediate students, 10–11 a.m. Fee of $ 4 per morning. Students welcome to attend both classes. Lessons taught by Rose More, (630) 208-9309.

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