The California Tech

VOLUME CVII, NUMBER 2 | PASADENA, CALIFORNIA | OCTOBER 3, 2005

Rotation Disaster:

Skurves Stuck in Elevator for Over an Hour

By CHANDRA BARNETT

"So fifteen Skurves walk into an elevator..." It sounds like the beginning of an off-color joke, but for several upperclassmen on Tuesday night, it was not funny.

Forced to relocate a meeting at the last minute, a few of us hopped into the elevator, hoping to save ourselves the few steps from the 2nd floor of CSS to the 1st. But as the doors began to close, in hopped a few more of us, and moments later still more. Proving conclusively that, here in Ricketts, laziness always prevails against common sense, the elevator doors finally slid shut on the afore-mentioned fifteen Skurves in an elevator. We proceeded to exuberantly press the first-floor button, with buttons "B," "2" and "3" following suite. The elevator started downwards. Mere moments later, it ground to a halt. A few expectant seconds passed as we looked at the doors, expecting them to slip aside and free us from our 6'x5' confines. To the tune of a few nervous giggles the doors remained steadfast, and then a voice rose out of our midst: "I think we broke it..."

Broken it we had. Seconds turned to minutes, and the elevator doors remained immobile. The time had come to use the emergency phone. I popped back the door and pushed the big red button. Much to our relief, a voice almost immediately crackled forth, "Campus Security, what is your emergency?" "We..." suddenly the humour of the situation struck me, and I fought back a few giggles. "We're caught in an elevator..." We explained to him as best we could our location in the building. "OK," said our friendly dispatcher, "Help is on the way..."

The response was speedy indeed. Within a few minutes a voice began calling to us from outside the elevator. After the resulting cacophony of joy had died down to a reasonable level, we asked how long we could expect to remain inside of the elevator. "Wait..." said the muffled voice. "You guys are stuck?" "Yes! [expletive omitted]," we yelled, nearly in unison. A strange noise from outside the elevator appeared to be a man's chuckling. "You're from security, right?" one of us finally inquired. "No," said the voice. "I conduct the orchestra. You guys are seriously stuck?"

The true security guards arrived some minutes later to maelstrom of inquiries as to the status of the rescue effort, further evidence that scurves do not grasp the concept of speaking one at a time. The following summarizes the ensuing conversation:

Elevator full of Skurves: "SHOUT! MUMBLE! COMPLAIN! INSULTS PERTAINING TO OTHER ELEVATOR DENIZENS' PARENTAGE!!"

One or two Skurves: "How soon will we be out of here?"

Security Guard: *something which is entirely drowned out by the resurgence of the Skurves*

Elevator full of Skurves: "HOLLER! FUSS! INSULTS PERTAINING TO THE SECURITY GUARDS' PARENTAGE! ALLEGATIONS AS TO THE SIMILARITIES AND DIFFERENCES BETWEEN THE ELEVATOR AND PEOPLE'S MOTHERS!"

One or two different Skurves: "SHUT. UP!!! Can you repeat that please?"

E. full of S.: "REPETITION OF PRIOR INSULTS AND ALLEGATIONS WITH A FEW NEW ONES THROWN IN FOR FUN!"

Security Guard: *unintelligible*

We carried on this way for some time as the elevator, filled to the brim with 15 warm bodies and 6 overhead halogen lamps, got hotter and hotter and nerves grew correspondingly thinner and thinner. One thing fifteen Skurves in an elevator do not do is smell nice. Whenever one of us requested that

the lights be turned off to let the elevator cool, the din of other skurves' concurring drowned out any response. The lights stayed on, and chaos reigned. In spite of this turmoil, we managed the following brief exchanges:

1) We suggested that the fire department could extract us quicker. Security informed us that the fire department had arrived but had then left.

2) We asked Security to bring back the fire department. Security clarified that Security, themselves, had sent away the fire department. Various responses to this revelation rumbled forth from inside elevator.

3) Security inquired as to exactly how many of us were inside of the elevator. We answered. They advised us that putting 15 people into a 6'x5' elevator is a pretty damned stupid thing to do. We thanked them roundly for their helpful input.

During our incarceration, we discovered that cell phones do not work inside of elevator shafts but that one of the trapped parties was able to connect to the campus wireless network with his laptop, placing us in the rare position of being caught in an elevator with instant messaging and email as our only links to the world at large, giving us access to such useful comments as, "You guys probably shouldn't have put 15 of you in the elevator at the same time," or, a bit more sympathetically, "Dude, that sucks."

The humour potential of the situation exhausted, temperatures rising and bladders becoming insistent, we just sat down and waited. And then, as if the all-knowing universe had been waiting for us to learn our lesson and shut the hell up, the door began to open. A few of us had been able to force the inner door aside by a few inches, and suddenly with a great sliding heave light from outside came pouring through the gap, followed by a hand, which we shook wildly in uproarious gratitude. It disappeared then returned to prod about behind the door with what looked like a bit of coat hanger.

Finally, unbelievably, the inner door slid back a few inches, then a few more and at long last slid open. We poured out through the gap, two and three at a time, hopping the last 16 inches or so from the elevator to the floor, to the growing astonishment of the Security officers outside. It must have looked like the unloading of clowns from a clown car. Passing the elevator guy, who sternly admonished us to go and tax the limits of his elevators no more, we went out into the cooling nighttime air to wander home in peace. We had been caught in the elevator for a little over an hour.

Since then I have resolved to abide by the following hard-learned precepts: Pile not into elevators of uncertain age and provenance; malign not the people who are trying to get you out of a stopped elevator, and, most importantly, if you need to pee, take the stairs.

Survey of Early Universe Uncovers Massive Galaxy

By ROBERT TINDOL

A massive galaxy seen when the universe was only 800 million years old has been discovered by teams of astronomers using NASA's Spitzer and Hubble Space Telescopes.

The galaxy's large mass and maturity come as a surprise, because experts previously thought that early galaxies in the young universe should be less prominent agglomerations of stars, rather than giant collections of hundreds of billions of stars as populous or more so than the Milky Way. The researchers are particularly intrigued by the fact that star formation in the galaxy seems to have already been completed. This implies that the bulk of the activity that built up the galaxy had occurred even earlier.

"This is truly a significant object," says Richard Ellis, who is the Steele Family Professor of Astronomy at the California Institute of Technology and a member of the discovery team. "Although we are looking back to when the universe was only 6 percent of its present age, this galaxy has already built up a mass in stars eight times that of the Milky Way.

"If the distance measurement to this object holds up to further scrutiny, the fact such a galaxy has already completed its star formation implies a yet earlier period of intense activity," Ellis adds. "It's like crossing the ocean and meeting a lone seagull, a forerunner of land ahead. There is now every reason to search beyond this object for the cosmic dawn when the first such systems switched on!"

The galaxy was pinpointed among approximately 10,000 others in a small patch of sky called the Hubble Ultra Deep Field (UDF). It is believed to be about as far away as the most distant galaxies known.

Bahram Mobasher of the Space Telescope Science Institute, leader of the science team, explains, "We found this galaxy in Hubble's infrared images of the UDF and expected it to be young and small, like other known galaxies at similar distances. Instead, we found evidence that it is remarkably mature and much more massive. This is the surprising discovery."

The galaxy's great distance was deduced from the fact that Hubble does not see the galaxy in visible light (despite the fact that the UDF is the deepest image ever taken in optical light). This indicates that the galaxy's blue light has been absorbed by traveling billions of light-years through intervening hydrogen gas. The galaxy was detected using Hubble's Near Infrared Camera and Multi-Object Spectrometer (NICMOS), and with an infrared camera on the Very Large Telescope (VLT) at the European Southern Observatory. At those near-infrared wavelengths it is very faint and red.

The big surprise is how much brighter the galaxy is in images at slightly longer infrared wavelengths from the Spitzer Space Telescope. Spitzer is sensitive to the light from older, redder stars, which should make up most of the mass in a galaxy. The infrared brightness of the galaxy suggests that it is very massive.

Photo courtesy of pr.caltech.edu

An ostensible photo of the galaxy in question

Two other Spitzer observations, one reported earlier by Ellis and his colleagues at the University of Exeter, UK, and the other by Haojing Yan of the Spitzer Science Center, had already revealed evidence for mature stars in more ordinary, less massive galaxies at similar distances, when the universe was less than one billion years old. However, the new observation extends this notion of surprisingly mature galaxies to an object which is perhaps ten times more massive, and which seemed to form its stars even earlier in the history of the universe.

The team estimated the distance to this galaxy by combining the information provided by the Hubble, Spitzer, and VLT observations. The relative brightness of the galaxy at different wavelengths is influenced by the expanding universe, and allows astronomers to estimate its distance. At the same time, they can also get an idea of the make-up of the galaxy in terms of the mass and age of its stars.

Efforts by Dan Stark, a graduate student at Caltech, using both the giant 10 m Keck and 8 m Gemini telescopes failed to pinpoint the galaxy's distance via spectroscopic methods-the astronomers' conventional tool for estimating cosmic distances. "We have to admit," says Stark, "that we have now reached the point where we are studying sources which lie beyond the spectroscopic capabilities of our current ground-based facilities. It may take the next generation of telescopes, such as the James Webb Space Telescope and Caltech's proposed Thirty Meter Telescope, to confirm the galaxy's distance."

While astronomers generally believe most galaxies were built up piecewise by mergers of smaller galaxies, the discovery of this object suggests that at least a few galaxies formed quickly and in their entirety long ago. For such a large galaxy, this would have been a tremendously explosive event of star birth.

The findings will be published in the December 20, 2005, issue of the Astrophysical Journal.

JPL manages the Spitzer Space Telescope mission for NASA. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology in Pasadena. JPL is a division of Caltech. Spitzer's infrared array camera, which took the picture of the galaxy, was built by NASA Goddard Space Flight Center, Greenbelt, Md.

Electronic images and additional information are available at hubblesite.org/news/2005/28 www.spitzer.caltech.edu/Media/releases/ssc2005-19/

Further information relating to the James Webb Space Telescope and the proposed Thirty Meter Telescope (a collaboration between the California Institute of Technology, the University of California, the Association of Universities for Research in Astronomy, and the Association of Canadian Universities for Research in Astronomy), can be found at the following sites:

http://www.jwst.nasa.gov/
http://www.tmt.org/

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Letters and submissions are welcome; e-mail submissions to *tech@tech.caltech.edu* as *plain-text* attachments, including the author's name, by Friday of the week before publication. Sorry the *Tech* does not accept anonymous contributions. The editors reserve the right to edit and abridge all submissions for any reason. All written work remains property of its author.

The advertising deadline is five p.m. Friday; alladvertising should be submitted electronically or as camera-ready art, but the *Tech* can also do simple typesetting and arrangement. All advertising inquiries should be directed to the business manager at *business@caltech.edu*. For subscription information, please send mail to "Subscriptions."

Get Off Campus!

By the **ASCIT SEXCOMM**
(compiled by **ROCKY VELEZ**)

******If you find yourself in Primm, Nevada on October 8, 2005, DEFINITELY go check out Team Caltech at the DARPA Grand Challenge!! See Alice, the Soul Reaper, finally in action!!!******

Tickets on Sale Soon

(at the time of writing):

On Sale: 09/25/05
Broadway In Bakersfield - Mamma Mia
@ Rabobank Arena, Sat, 12/24/05 + more dates

On Sale: 09/26/05
Eagles @ The Staples Center, Mon, 11/14/05
Eagles @ Anaheim Pond, Thu, 11/17/05

On Sale: 09/29/05
Our Lady Peace @ Henry Fonda Theatre, Thu, 10/27/05

On Sale: 10/01/05
Pat Green @ House of Blues Hollywood, Fri, 12/09/05
WWE @ Arrowhead Pond of Anaheim, Mon, 10/31/05
WWE Presents Smackdown
@ STAPLES Center, Sun, 10/30/05
Katrina Relief Comedy-Dane Cook & Jay Mohr @ The Wiltern LG, Mon, 10/17/05
Australian Pink Floyd @ Wilshire Theatre, Fri, 11/18/05

On Sale: 10/03/05
Clay Aiken @ Kodak Theatre, Wed, 11/09/05 + more dates

This coming week:

10/07/05: Motley Crue @ Save Mart Center, 08:00 PM
10/09/05: Los Angeles Philharmonic: Beethoven Cycle: Eroica @ Walt Disney Concert Hall, 02:00 PM
10/14/05: The Mars Volta @ Santa Barbara Bowl, 07:00 PM

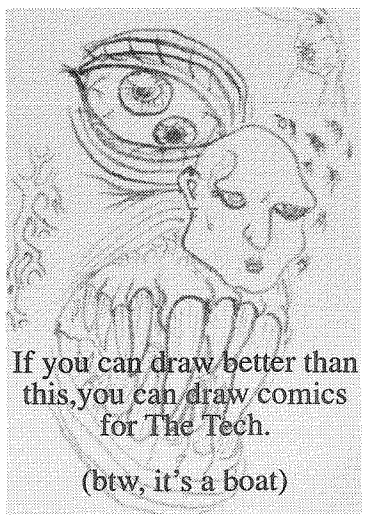
Coming REALLY Soon, with Tickets Already On Sale:

Tue, 11/01/05: U2 @ STAPLES Center, 07:30 PM
Wed, 11/02/05: U2 @ STAPLES Center, 07:30 PM

And lots more... just check out www.ticketmaster.com!

If you want to know more about certain types of events (i.e. motocross, conventions of sorts, different types of concerts, etc), send me an email and I'll look it up! (rocky@its)

HAVE FUN!!!

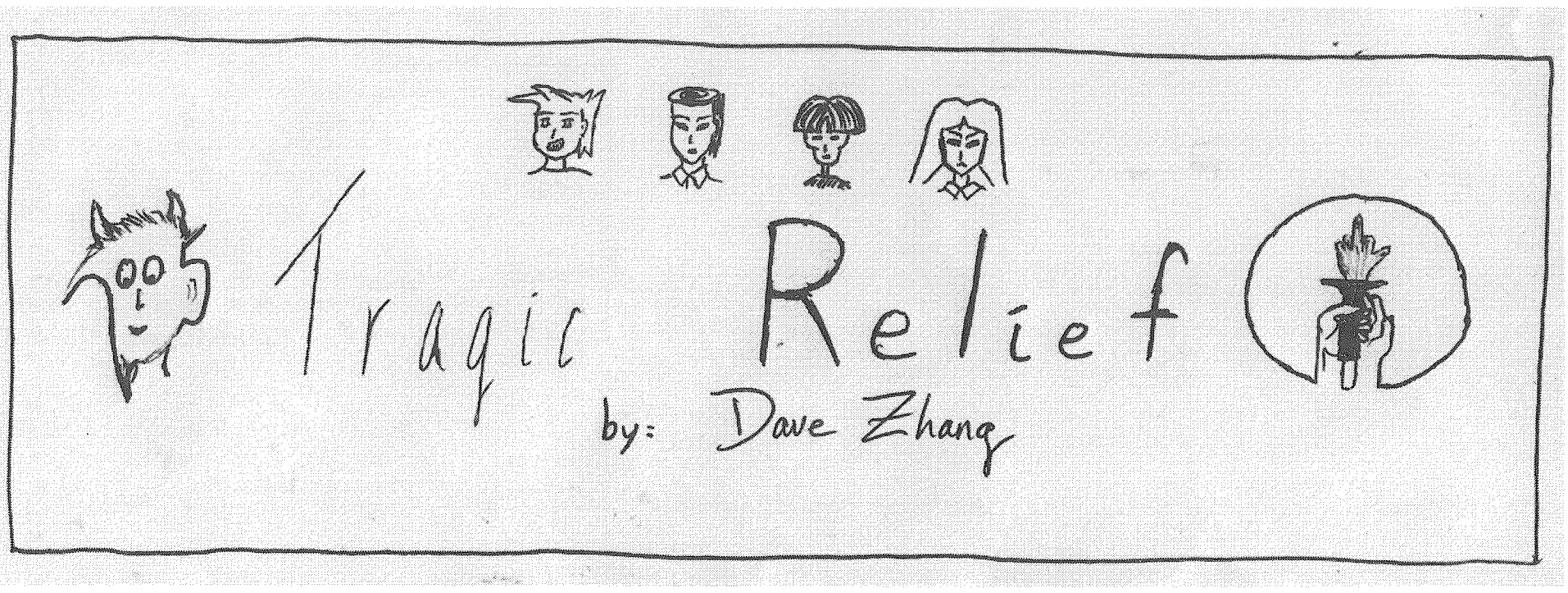


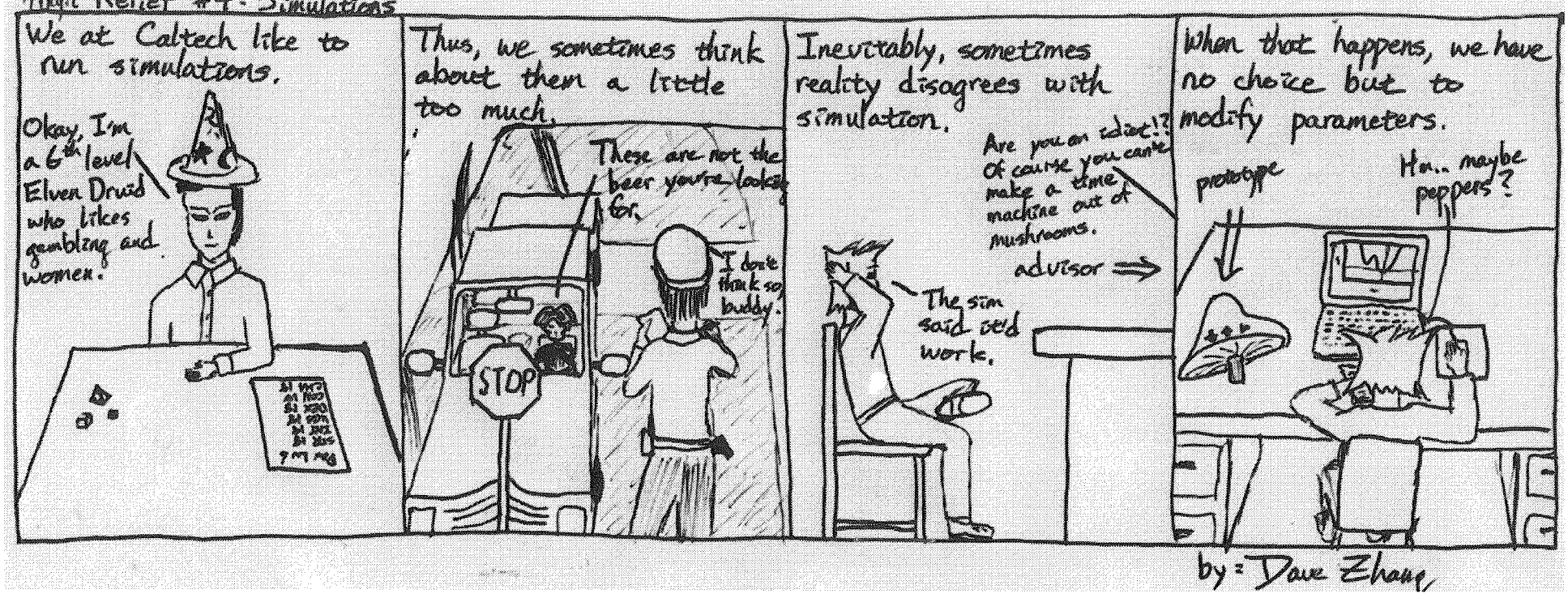
If you can draw better than this, you can draw comics for The Tech.

(btw, it's a boat)

G.L.O.M. - Greg's Life of Misery

By Nathan Lau





Plans For a New Album, But Same Old Death Cab

By CINDY KO

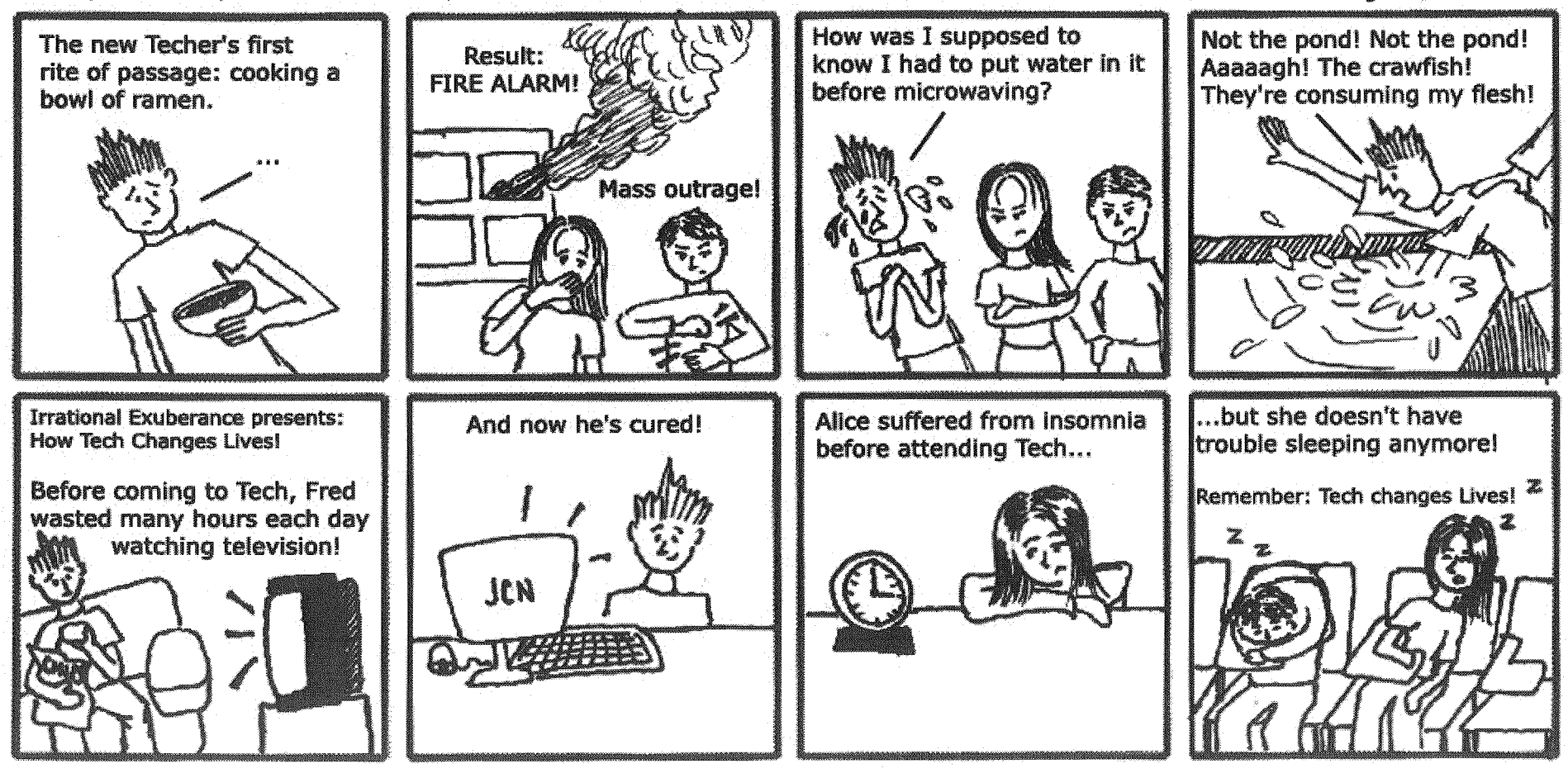
Death Cab for Cutie-*Plans* (2005)

Since the beginning of Death Cab's newfound popularity, the result of "The OC" and endless celebrity plugs, its expanding fanbase has taken it from message-board hot topic to heavy rotation on the alternative radio circuit. Nowadays, frontman Ben Gibbard's chub-chub good looks are all over websites and music mags across the nation. The good part is, despite their hype, they still sound like they did in the days when they were just breaking on the scene, and they are living up to their growing reputation. *Plans,* this year's follow-up to Death Cab for Cutie's *Transatlanticism* (2003) is, in some ways, exactly what you expect it to be: Gibbard's soft vocals, a magic songwriting formula and a little bit of Postal Service, Gibbard's techno side project, make it *Transatlanticism: Part Deux*, almost. Overall, the album is not quite as monumental as its predecessor, but strong in its own right, with stand alones such as "Soul Meets Body" and "Summer Skin." Nevertheless, they can't help but throw in the regular, old 'Song-I-Wrote-for-Girl-I-Dumped,' "Someday You Will be Loved," and a 'Damn, bitch: you cold,' "Your Heart is an Empty Room." A few opening guitar riffs sound borrowed from Flaming Lips, and other riffs are cheerful, stock DCFC favorites, like "Crooked Teeth." The best song on the record is a slow acoustic ballad, "I Will Follow You Into the Dark," an almost Elliott Smith-like confrontation with mortality and its place in eternal love. Gibbard continues to show his talent for writing love songs that make you feel that lump in the back of your throat but with very little growth from the last record. So, whether you're a new fan or an old devotee, at the very least *Plans* is a safe bet: a solid record from a band that deserves all the attention that it's getting.

--Cindy Ko

Irrational Exuberance by Zhiyun Guan

send suggestions, hate mail,
and exploding hamsters to:
zguan@caltech.edu



The London Dispatch

By MAYRA SHEIKH

Dear freshers and fellow upperclassmen,

Congratulations on surviving rotation, an unforgettable jumble of names and faces that no one can ever really remember all of. Now the all freshers will get to move their personal belongings across campus. Don't get me wrong, I love rotation, and am sad that I am missing it and house initiation traditions during my 4th year; however, I can't be too sad since I am in one of the most renowned cities of all time – LONDON! Of course, some of you are wondering who I am; for those who don't know me, my name is Mayra Sheikh (Blacker Hovse). I am spending a term at University College London (UCL) through the Caltech Study Abroad program. Since I would like the freshers to know me to some degree, and because a lot of techers are unaware of the Study Abroad Program, I am writing to you all through the TECH. I know we all learn about Britain as the imperialist empire upon which the sun didn't set for decades, but daily life in modern London is not quite the same as our secondary school history teachers' droning.

Before jumping head-on into a detailed description of life in London as a 20 year old University 'schtudent,' I'd like to tell you about the wonderful program that enabled me to leave tech for a short period of time. Caltech's Study Abroad program has exchanges with four different Universities; UCL, Cambridge, and the University of Edinburgh (newest one) in the UK and The University of Copenhagen/ The Danish Technical University in Denmark. Caltech sends between 28 – 35 students abroad for one quarter every year; 5-7 to UCL, 2-5 to UC/DTU, 5-7 to Edinburgh, and 16 to Cambridge, 10 Fall term and 6 Winter term. Students who apply must have a minimum 3.0 GPA and 2 recommendations letters from Caltech Professors. Besides grades, Lauren Stolper, Caltech's Study Abroad Advisor, also looks for maturity, honesty, tolerance, and flexibility in students as well. After all, bailing people out of jail internationally is rather tricky.

The application procedure is as expected. Most techers don't shy away from a short essay, an interview, and a couple of recommendation letters, however, choosing classes can be a difficult experience. Unfortunately the British aren't tech savvy, or are just plain stubborn and do not have an integrated inter-departmental registration process. Each department operates on its own and has its own timetable of classes and degrees even have different lengths. So navigating all the departmental websites and finding classes and understanding the British Degree structure involves some time and frustration. But, mind you, it's completely worth the relatively small hassle because classes here are definitely more laid back.

UCL, like most American colleges, does not have grueling weekly sets. The Brits are definitely more chill about schooling. However, time management is necessary because there is some work to be done and there are deadlines. A lot of students think only electives can be taken abroad, but that is untrue. Major requirements and general graduation requirements can be taken away from home. Students can even take correspondence courses if an equivalent course is not offered at the institution being visited. The only catch is that a Caltech professor in the appropriate department has to agree to approve each class taken abroad. Sometimes getting class approval involves some cajoling and the promise of some extra work upon return to tech, but it's worth an international experience.

However, the first week at UCL is like a really long party. As part of the new school year, there is freshers week and most classes are suspended until the second week. Many departments have parties for the incoming students, almost a third of which are international students form more than 140 countries. There are pub crawls, basically a groups of students go from pub to pub drinking for about 12 hours. The legal drinking age is 18, so most college students are old enough to down a few. Most students retain limits with such events; of course there are the usual few who create a ruckus. There is a lot of socializing in residence halls as new students meet the college world and returning students catch up. All and all, it's an exciting week of meeting lots of new people. Speaking of which, I should go meet more, since the freshers have now met me. Hope to see you all in three months.

-- May "I actually miss TECH" ra

TMT Scientists, Engineers Gather in Aspen

By ROBERT TINDOL

More than 90 scientists and engineers from the United States and Canada are in Aspen, Colorado, this week to review progress in planning for the Thirty Meter Telescope. When completed in the next decade, TMT will be the largest telescope in the world, with the capability of revolutionizing our understanding of the origin of galaxies, stars and planets.

According to Richard Ellis, Caltech's director of optical observatories and the Steele Professor of Astronomy, TMT Week is a crucial opportunity for the many participants in the highly distributed project to have face-to-face interactions and to review technical progress in the many multifaceted aspects of this ambitious endeavor. He adds that there is tremendous progress and enthusiasm at Aspen as plans are being laid out for the coming year's work.

TMT is a collaboration of Caltech, the University of California, the Association of Universities for Research in Astronomy, and the Association of Canadian Universities for Research in Astronomy. The project also draws on the expertise of a large number of experienced engineers and astronomers from academia, governmental organizations, and private industry for the construction of one of the most complex and exciting scientific instruments in history.

TMT Week participants include presenters from all elements of the design, as well as many members of the project teams, the industrial and instrument partners, and members of the TMT Board.

Presentations include detailed information on design and systems engineering, segment fabrication development, design of the mirrors and their support structures, adaptive optics systems, control systems, and environmental considerations. Astronomers are also discussing the scientific goals of the telescope in detail as they respond to technical information on cost and feasibility of the various designs.

The 30-meter-diameter optical and infrared telescope, complete with adaptive optics, will produce images more than 12 times sharper than those of the Hubble Space Telescope. The TMT will have nine times the light-gathering ability of one of the 10-meter Keck Telescopes, which are currently the largest in the world. With such a telescope, astrophysicists will be able to study the earliest galaxies and the details of their formation as well as pinpoint the processes that lead to young planetary systems around nearby stars.

Nominate Your Favorite Professor for the Richard P. Feynman Prize for Excellence in Teaching

By PAUL C. JENNINGS

I am pleased to solicit nominations for the Richard P. Feynman Prize for Excellence in Teaching. The Feynman Prize is endowed through the generosity of Ione and Robert E. Paradise, with additional contributions from Mr. and Mrs. William H. Hurt, to annually honor a professor who demonstrates, in the broadest sense, unusual ability, creativity, and innovation in undergraduate and graduate classroom or laboratory teaching.

Nominations for the Feynman Teaching Prize are welcome from faculty, students, postdoctoral scholars, staff, and alumni. Guidelines for the prize are attached. Please submit detailed nomination packages to the Provost's Office by December 30, 2005.

Former Feynman Prize Recipients:

2004-05 Christopher Brennen, Mechanical Engineering
2003-04 George Rossman, Mineralogy
2002-03 Niles Pierce, Applied and Computational Mathematics
2001-02 Joseph Kirschvink, Geobiology
2000-01 David Stevenson, Planetary Science
1999-00 Donald Cohen, Applied Mathematics
1998-99 Emlyn Hughes, Physics
1997-98 Barbara Imperiali, Chemistry
1996-97 R. David Middlebrook, Electrical Engineering
1995-96 Yaser Abu-Mostafa, Electrical Engineering and Computer Science
1994-95 Erik Antonsson, Mechanical Engineering
1993-94 Tom Tombrello, Basic and Applied Physics

CRITERIA FOR THE PRIZE:

The Richard P. Feynman Prize in teaching is to be awarded annually to a professor who demonstrates, in the broadest sense, unusual ability, creativity, and innovation in undergraduate and graduate classroom or laboratory teaching.

ORIGIN OF THE PRIZE:

The prize is made possible by a gift of endowment by Ione and Robert E. Paradise, with additional contributions from Mr. and Mrs. William H. Hurt, in appreciation of Richard Feynman's contributions to excellent teaching.

TERMS OF THE PRIZE:

The prize consists of a cash award of $3,500, matched by an equivalent raise in the annual salary of the awardee.

ELIGIBILITY:

All professorial faculty of the Institute are eligible.

NOMINATIONS FOR THE PRIZE:

Nominations for the Feynman Prize may be made by any member of the Caltech community, including faculty, students, postdoctoral scholars, alumni, and staff. A letter of nomination and detailed supporting material (including, but not limited to, a curriculum vitae, course syllabus or description, and supporting recommendation letters) should be directed to the Feynman Prize Selection Committee, Mail Code 206-31, at the California Institute of Technology, Pasadena, California, 91125. Nomination packages are due by December 30.

RENOMINATIONS:

Nominees not selected in a given year will be considered part of the nomination pool for each of the following two years. New material is not required for renomination, but will be accepted. Consideration of a nominee after three years will require renomination.

SELECTION:

Selection of the recipient will be made by a committee appointed by the Provost. The committee chair and members will be rotated frequently to reflect all segments of the Institute. The committee shall consist of three professorial faculty, and one representative each from the undergraduate student body and the graduate student body.

PRESENTATION OF THE PRIZE:

The Feynman Prize will be presented at a regular meeting of the Caltech faculty in the second term. In addition, the awardee will be honored at a small celebratory dinner or other suitable event with a few colleagues and members of the administration, and the donors of the prize.

Further information regarding the prize or nomination procedure can be obtained from Stacey Scoville in the Provost's Office (626-395-6320; staceys@caltech.edu).

Alice Gets Ready to Roll

By KATHY SVITIL

Having already completed three trials, the intrepid Alice stands ready to take center stage for the fourth time at the California Speedway in Fontana. Alice is no diva but the California Institute of Technology's entrant in this year's Defense Advanced Research Projects Agency Grand Challenge race, a grueling field test of autonomously driven robotic vehicles organized by DARPA to speed the development of battlefield-ready robotic tanks, trucks, and other all-terrain vehicles.

Before reaching the race, Alice, a Ford E-350 van modified for off-roading and packed with tons of sophisticated computer servers and sensors, and a field of 42 other entrants will be put through their paces at the National Qualification Event (NQE) from September 28 to October 6 in Fontana. Because of the large number of entrants and the difficulty of the test, the exact time of Alice's qualification run won't be determined until after the start of the NQE.

During the NQE, each vehicle must navigate itself with no human intervention through a course of sharp turns, rough roads, power poles, foliage, and other obstacles. The top 20 teams will move on to compete on October 8 in the Grand Challenge finals, a wild ride through the Mojave Desert, over unpaved roads, down trails, and around ditches and sand dunes. The first vehicle to complete the almost 175-mile trek, which will start and end just outside Primm, Nevada, at the California-Nevada state line (the exact course won't be revealed until two hours before start time), in under 10 hours will receive a $2 million prize.

"I think we'll do great at the NQE," said Richard Murray, professor of control and dynamical systems and leader of Team Caltech. Team Caltech consists of over 50 undergraduates from Caltech, Princeton, Virginia Tech, and Lund University in Sweden, plus high school volunteers, Caltech faculty participants, and engineers from the Jet Propulsion Laboratory, Sportsmobile, Northrop Grumman, and Systems Technology Incorporated. Over the past year, the student team members have combined to put in over 45,000 hours developing Alice.

"The race is going to be tough, although we were farther along with Alice at the beginning of the summer than we were with Bob for the final challenge last year. A lot will depend on how our work over the next two weeks goes," Murray added, when Alice will continue to be put through her paces in desert test runs and through courses in the parking lots of the Rose Bowl, Santa Anita race track, and the former St. Luke Medical Center. "We are optimizing and tuning our software, trying to get it to respond intelligently to the many types of conditions it might see during the race."

In last year's Grand Challenge, Team Caltech's Bob, a '96 Chevy Tahoe, didn't respond so intelligently to a swath of barbed wire. Bob plowed headlong into it and got hung up, ending his race at mile 1.3. This year, drawing on lessons from Bob's mistakes (Alice's license plate, in fact, reads "I 8 BOB"), the members of Team Caltech have perfected their sensors and software, and their game plan.

"We want Alice to 'see' what is going on around it and drive based on that knowledge," Murray said. "This is much harder than making use of maps and satellite data to locate the roads ahead of time. With five cameras and five laser ranging devices (LADARs), we have a lot more sensors and computers than many of the other teams. This should give us an advantage if the course turns out to be something that is not just running along dirt roads and trails."

Team Caltech has already decided what it will do with the cash prize if Alice wins: $1 million will endow a fund to support CS/EE/ME 75, the class in multidisciplinary project design taken by Team Caltech's students; $500,000 will be divided equally among four student engineering chapters, the American Society of Mechanical Engineers, the Association for Computing Machinery, the Institute for Electrical and Electronics Engineers, and the Society of Women Engineers. The other $500,000 will be divvied up among Team Caltech's student members.

The public was invited to attend the NQE, which kicked off with a 9:00 a.m. opening ceremony on September 28, and the Grand Challenge finals. Admission for both is free, with grandstand seating available. Spectator information is available at the DARPA Grand Challenge website: www.darpa.mil/grandchallenge/spectator_handout.pdf. For the latest information on Team Caltech's NQE start time, visit Team Caltech's website: http://team.caltech.edu.

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